UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

North American Electric Reliability Corporation	**)** **)**	**Docket No. _____**

PETITION OF THE NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION FOR APPROVAL OF PROPOSED RELIABILITY STANDARD PRC-010-1 (UNDERVOLTAGE LOAD SHEDDING)

Gerald W. Cauley
President and Chief Executive Officer
North American Electric Reliability Corporation
3353 Peachtree Road, N.E.
Suite 600, North Tower
Atlanta, GA 30326
(404) 446-2560
(404) 446-2595 – facsimile

Charles A. Berardesco
Senior Vice President and General Counsel
Holly A. Hawkins
Associate General Counsel
William H. Edwards
Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099 – facsimile
charles.berardesco@nerc.net
holly.hawkins@nerc.net
william.edwards@nerc.net

Counsel for the North American Electric Reliability Corporation

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Pursuant to Section 215(d)(1) of the Federal Power Act ("FPA")[1] and Section 39.5[2] of the Federal Energy Regulatory Commission's ("FERC" or "Commission") regulations, the North American Electric Reliability Corporation ("NERC")[3] hereby submits for Commission approval proposed Reliability Standard PRC-010-1 (*Undervoltage Load Shedding*) (Exhibit A). NERC requests that the Commission approve the proposed Reliability Standard and find that it is just, reasonable, not unduly discriminatory or preferential, and in the public interest.[4] NERC also requests approval of: (i) a revised definition of "Undervoltage Load Shedding Program (UVLS Program)" for inclusion in the NERC Glossary of Terms; (ii) the Implementation Plan for the proposed Reliability Standard (Exhibit B); and (iii) the associated Violation Risk Factors ("VRFs") and Violation Severity Levels ("VSLs") (Exhibits A and E). Finally, NERC requests

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[1] 16 U.S.C. § 824o (2012).

[2] 18 C.F.R. § 39.5 (2014).

[3] The Commission certified NERC as the electric reliability organization ("ERO") in accordance with Section 215 of the FPA on July 20, 2006. *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006).

[4] Unless otherwise designated, capitalized terms shall have the meaning set forth in the *Glossary of Terms Used in NERC Reliability Standards* ("NERC Glossary of Terms"), *available at* http://www.nerc.com/files/Glossary_of_Terms.pdf.

retirement of the following Undervoltage Load Shedding ("UVLS") Reliability Standards (the "UVLS-Related Standards"), as listed in the Implementation Plan:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program;
- PRC-020-1 – Under-Voltage Load Shedding Program Database;
- PRC-021-1 – Under-Voltage Load Shedding Program Data; and
- PRC-022-1 – Under-Voltage Load Shedding Program Performance.

Prior to the discussion of proposed Reliability Standard PRC-010-1 below, NERC provides a summary of the recommendations related to UVLS made in the U.S.-Canada Power System Outage Task Force ("Task Force") *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* ("2003 Blackout Report")[5] and NERC actions taken in response to those recommendations. NERC also summarizes the Commission's determinations in Order No. 693[6] for Reliability Standards related to UVLS. As explained below, the proposed PRC-010-1 Reliability Standard reflects consideration of the 2003 Blackout Report recommendations and the Commission determinations in Order No. 693.

As required by Section 39.5(a)[7] of the Commission's regulations, this petition, in Section IV, presents the technical basis and purpose of proposed Reliability Standard PRC-010-1, a summary of the development history (Exhibit F), and a demonstration that the proposed Reliability Standard meets the criteria identified by the Commission in Order No. 672[8] (Exhibit D). The NERC Board of Trustees ("Board") adopted proposed Reliability Standard PRC-010-1 on November 13, 2014.

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[5] U.S.-Canada Power System Outage Task Force, *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations*, Apr. 2004.

[6] *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, 118 FERC ¶ 61,218 (2007).

[7] 18 C.F.R. § 39.5(a) (2014).

[8] The Commission specified in Order No. 672 certain general factors it would consider when assessing whether a particular Reliability Standard is just and reasonable. *See Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards*, Order No. 672, FERC Stats. & Regs. ¶ 31,204, at P 262, 321-37, *order on reh'g*, Order No. 672-A, FERC Stats. & Regs. ¶ 31,212 (2006).

I. Executive Summary

Proposed Reliability Standard PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in the UVLS-Related Reliability Standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The purpose of PRC-010-1 is to "establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs)." Proposed PRC-010-1 represents an improvement to the prior set of UVLS-Related Standards. Proposed PRC-010-1 addresses the Commission directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated and coordinated approach to all protection systems. The proposed Reliability Standard also replaces the applicability to and involvement of the "Regional Reliability Organization" in Reliability Standards PRC-020-1 and PRC-021-1 and consolidates the UVLS-Related Standards into one comprehensive standard. The proposed Reliability Standard incorporates the proposed definition of "UVLS Program", which clearly identifies and separates centrally controlled undervoltage-based load shedding, which is now addressed by the proposed definition of "Remedial Action Scheme."

The proposed Reliability Standard requires applicable entities to evaluate a UVLS Program's effectiveness prior to implementation, including the UVLS Program's coordination with other Protection Systems and generator voltage ride through capabilities. Proposed PRC-010-1 also requires UVLS entities to adhere to UVLS Program specifications and the implementation schedule. In addition, applicable entities must perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies. Finally, applicable entities must maintain and share UVLS Program data.

II. Notices and Communications

Notices and communications with respect to this filing may be addressed to the following:[9]

Charles A. Berardesco*
Senior Vice President and General Counsel
Holly A. Hawkins*
Associate General Counsel
William H. Edwards*
Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099 – facsimile
charles.berardesco@nerc.net
holly.hawkins@nerc.net
william.edwards@nerc.net

Valerie L. Agnew*
Director of Standards
North American Electric Reliability Corporation
3353 Peachtree Road, N.E.
Suite 600, North Tower
Atlanta, GA 30326
(404) 446-2560
(404) 446-2595 – facsimile
valerie.agnew@nerc.net

III. 2003 Blackout Report

In the 2003 Blackout Report, the Task Force included Recommendation 21 to "make more effective and wider use of system protection measures."[10] In addition, the Task Force added three additional recommendations, Recommendation 21A–21C. Recommendations 21B and 21C include actions related to UVLS.

A. Recommendation 21B

The 2003 Blackout Report identifies that NERC, in support of Recommendation 21, required each regional reliability council to evaluate the feasibility and benefits of UVLS capability in load centers that could become unstable as a result of insufficient reactive power

[9] Persons to be included on the Commission's service list are identified by an asterisk. NERC respectfully requests a waiver of Rule 203 of the Commission's regulations, 18 C.F.R. § 385.203 (2014), to allow the inclusion of more than two persons on the service list in this proceeding.

[10] 2003 Blackout Report at 3, 158.

following credible multiple-contingency events. NERC instructed the regional reliability councils to complete the initial studies and report the results to NERC within one year. NERC also provided that the regions should, where beneficial, promote the installation of UVLS capabilities in critical areas, as determined by the studies, as an effective way to in prevent or contain an uncontrolled cascade of the power system.[11]

The Task Force recommended, via Recommendation 21B in the 2003 Blackout Report, that NERC require the results of the regional studies to be provided to federal and state or provincial regulators at the same time that they are reported to NERC. In addition, the Task Force recommended that NERC require every entity with a new or existing UVLS program to have a well-documented set of guidelines that specify the conditions and triggers for UVLS use.[12]

Following the issuance of Recommendation 21B, the Board, at its February 2006 meeting, approved a resolution to implement the recommendations contained in the *Review of Regional Evaluations of Undervoltage Load Shedding Capability in Response to NERC Blackout Recommendation 8b* ("Recommendation 8b Report"), which was developed by the NERC Planning Committee.[13] The Board resolution:

- directed the Planning Committee to develop by the end of 2006 a comprehensive set of study guidelines for use in future evaluations of the need and benefit of implementing undervoltage load shedding (UVLS) systems;
- requested each regional reliability council, in conjunction with its members, to develop implementation plans and schedules to install UVLS capability in those load centers where regional studies have identified UVLS as feasible and beneficial to preventing

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[11] *Id.* at 158 (summarizing NERC actions related to Recommendation 21 on evaluation of the applicability of UVLS). *See also* NERC, *August 14, 2003 Blackout: NERC Actions to Prevent and Mitigate the Impacts of Future Cascading Blackouts*, Feb. 2004 at 12 (summarizing NERC recommendation 8b, which tracks to Recommendation 21B of the 2003 Blackout Report) ("NERC Blackout Recommendations Report").

[12] 2003 Blackout Report at 159.

[13] *See* U.S.-Canada Power System Outage Task Force, *Final Report on Implementation of Task Force Recommendations*, Sept. 2006, at 31-32; *see also* NERC Board Feb. 7, 2006 Resolution on the Blackout Recommendation 8b Report, *available at* http://www.nerc.com/gov/bot/Pages/AgendasHighlightsMinutes.aspx.

instability and to provide these plans and schedules to the Planning Committee for review by June 2006;

- directed the Planning Committee to review and report to the Board at its August 2006 meeting on the regional UVLS implementation plans and schedules;
- directed the Planning Committee to survey the existing UVLS systems installed on the Bulk Electric System, to continue to monitor future installations, and support potential future standards activities in this area; and
- directed the Planning Committee to survey the status of research and development efforts on methods to more accurately determine and model load characteristics and to report to the Board at its November 2006 meeting on the results of those efforts.

As noted in the Task Force's *Final Report on Implementation of Recommendations* ("Blackout Implementation Report"), no further action beyond the actions directed by the Board were required to fully implement Recommendation 21B.[14]

B. Recommendation 21C

The 2003 Blackout Report also identified that NERC, in support of Recommendation 21, planned to evaluate Planning Standard III, System Protection and Control, and propose specific revisions to the criteria to address adequately the issue of slowing or limiting the propagation of a cascading failure.[15]

The Task Force further recommended, in Recommendation 21C, that NERC determine the goals and principles needed to establish an integrated approach to relay protection for generators and transmission lines, as well as the use of UFLS and UVLS programs. The Task Force explained that an integrated approach was necessary to ensure that at the local and regional level, these interactive components would provide an appropriate balance of risks and benefits in terms of protecting specific assets and facilitating overall grid survival. The Task Force stated

[14] *See* Blackout Implementation Report at 31 (Sept. 2006), *available at* http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinalImplementationReport(2).pdf

[15] 2003 Blackout Report at 159; *see also* NERC Blackout Recommendations Report at 13 (summarizing NERC Recommendation 8C, which tracks to Recommendation 21C).

that the review should include an assessment of the appropriate role and scope of UFLS and UVLS, and the appropriate use of time delays in relays. In addition, the task force recommended that in this effort, NERC should work with industry and government research organizations to assess the applicability of existing and new technology to make the interconnections less susceptible to cascading outages.

The NERC Planning Committee, at its December 2005 meeting, approved the recommendations of its own blackout recommendations review task force. The NERC Planning Committee's task force also developed an assignment matrix as to which subgroups of the Planning Committee and Operating Committee would address the twenty-four NERC-identified recommendations. The Blackout Implementation Report indicates that completion of the work recommended by the Planning Committee and approval by the Board will constitute full implementation of Recommendation 21C.[16]

IV. Order No. 693 and Description of UVLS-Related Standards

Following the 2003 Blackout Report, the Commission has demonstrated its support of NERC's efforts in addressing Recommendation 21 and the creation of mandatory Reliability Standards for UVLS. While the Commission generally viewed the UVLS-Related Standards as improving the reliability of the Bulk-Power System, the Commission did identify one area to focus on for the future. In the *Staff Preliminary Assessment of the North American Electric Reliability Council's Proposed Mandatory Reliability Standards* ("Staff Preliminary Assessment"),[17] the Commission stated the following regarding UFLS, UVLS, line protection and generation protection:

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[16] Blackout Implementation Report at 31-32.

[17] *See Staff Preliminary Assessment of the North American Electric Reliability Council's Proposed Mandatory Reliability Standards*, May 11, 2006, Docket No. RM06-16-000.

> UFLS and UVLS act as a safety net for the grid. Generation protection systems disconnect the generator to prevent damage to the generator. Line protection systems are designed to sense faults in the lines and, where detected, take the faulty line out of service. An integrated and coordinated approach between UFLS, UVLS, line protection and generation protection is needed to "ensure that at the local and regional level these interactive components provide an appropriate balance of risks and benefits in terms of protecting specific assets and facilitating overall grid survival." [18]

In Order No. 693, the Commission ultimately approved Reliability Standards PRC-010-0, PRC-021-1, and PRC-022-1.[19] However, the Commission neither approved nor remanded PRC-020-1 since the Reliability Standard only applied to Regional Reliability Organizations.[20] A summary of each of the UVLS-Related Standard is included below for background.

C. PRC-010-0

Reliability Standard PRC-010-0 requires Distribution Providers, Load Serving Entities, Transmission Operators, and Transmission Owners, to periodically assess and document the effectiveness of its program in coordination with its associated Transmission Planner and Planning Authority. The Reliability Standard contains one Requirement[21] and applies to a Load-Serving Entity that operates a UVLS program, a Transmission Owner that owns a UVLS program, a Transmission Operator that operates a UVLS program, and a Distribution Provider that owns or operates a UVLS program.

In its determination approving the PRC-010-0 Reliability Standard, the Commission directed NERC to develop a modification to PRC-010-0 through the Reliability Standards

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18 *Id*. (citing 2003 Blackout Report at 159).

19 Order No. 693 at PP 1509, 1560, 1565.

20 *Id.* at 1555.

21 Requirement R2 and the associated elements were approved by the Commission for retirement as part of the Paragraph 81 project. *See Electric Reliability Organization Proposal to Retire Requirements in Reliability Standards* Order No. 788, 145 FERC ¶ 61,147 (2013).

development process that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and UFLS and UVLS programs."[22] The Commission determination also referenced its prior position in the NOPR and stated that "NERC is continuing to develop an integrated and coordinated approach to protection for generators, transmission lines and UFLS and UVLS programs within its work on the fill-in-the-blank proposed Reliability Standards."[23]

D. PRC-020-1

Reliability Standard PRC-020-1 ensures that a regional database for UVLS programs is available for Bulk-Power System studies by requiring Regional Reliability Organizations with any entities that have UVLS programs to maintain and annually update a database. The Reliability Standard contains two Requirements and applies to any Regional Reliability Organization with entities that own or operate a UVLS program.

E. PRC-021-1

Reliability Standard PRC-021-1 requires entities to supply data support the regional undervoltage load shedding database by requiring the owner of such a system to supply data related to its system and other related protection schemes to its regional reliability organization's database. The Reliability Standard includes two Requirements and applies to Transmission Owners that own a UVLS program and Distribution Providers that own a UVLS program. In Order No. 693, the Commission did not issue directives on the Reliability Standard.

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[22] *Id.*

[23] Order No. 693 at P 1508 (citing P 883 of the NOPR and the Recommendation 8b Report follow-up work).

F. PRC-022-1

Reliability Standard PRC-022-1 requires entities to ensure that undervoltage load shedding programs perform as intended by requiring each entity that operates such a program to analyze and document all of its operations and misoperations and develop a corrective action plan to avoid future misoperations. The Reliability Standard includes one Requirement and applies to Transmission Operators that operate a UVLS program, Distribution Providers that operate a UVLS program, and Load-Serving Entities that operate a UVLS program.[24]

In Order No. 693, the Commission did not issue a directive to modify the Reliability Standard. However, the Commission did direct NERC to consider comments made by FirstEnergy during the Reliability Standards development process. FirstEnergy summarized that Requirement R1.3 of PRC-022-1 requires "a simulation of the event, if deemed appropriate by the RRO" and believes that the applicable entities such as transmission operators may not be able to simulate large system events."[25] FirstEnergy suggested that Requirement R1.3 be revised to state that "a simulation of the event, if deemed appropriate, and assisted by the [regional reliability organization]."[26]

V. Reliability Standard Development Background

A. Regulatory Framework

By enacting the Energy Policy Act of 2005,[27] Congress entrusted the Commission with the duties of approving and enforcing rules to ensure the reliability of the Nation's Bulk-Power System, and with the duties of certifying an Electric Reliability Organization ("ERO") that

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24 Requirement R2 was retired as part of the Paragrpah 81 Project previously approved by the Commission.
25 Order No. 693 at P 1564.
26 *Id*.
27 16 U.S.C. § 824o (2012).

would be charged with developing and enforcing mandatory Reliability Standards, subject to Commission approval. Section 215(b)(1)[28] of the FPA states that all users, owners, and operators of the Bulk-Power System in the United States will be subject to Commission-approved Reliability Standards. Section 215(d)(5)[29] of the FPA authorizes the Commission to order the ERO to submit a new or modified Reliability Standard. Section 39.5(a)[30] of the Commission's regulations requires the ERO to file with the Commission for its approval each Reliability Standard that the ERO proposes should become mandatory and enforceable in the United States, and each modification to a Reliability Standard that the ERO proposes should be made effective.

The Commission has the regulatory responsibility to approve Reliability Standards that protect the reliability of the Bulk-Power System and to ensure that such Reliability Standards are just, reasonable, not unduly discriminatory or preferential, and in the public interest. Pursuant to Section 215(d)(2) of the FPA[31] and Section 39.5(c)[32] of the Commission's regulations, the Commission will give due weight to the technical expertise of the ERO with respect to the content of a Reliability Standard.

B. NERC Reliability Standards Development Procedure

The proposed Reliability Standard was developed in an open and fair manner and in accordance with the Commission-approved Reliability Standard development process.[33] NERC

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28 *Id.* § 824(b)(1).

29 *Id.* § 824o(d)(5).

30 18 C.F.R. § 39.5(a).

31 16 U.S.C. § 824o(d)(2).

32 18 C.F.R. § 39.5(c)(1).

33 *Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards,* Order No. 672 at P 334, FERC Stats. & Regs. ¶ 31,204, *order on reh'g,* Order No. 672-A, FERC Stats. & Regs. ¶ 31,212 (2006) ("Further, in considering whether a proposed Reliability Standard meets the legal standard of review, we will entertain comments about whether the ERO implemented its Commission-approved Reliability Standard development process for the

develops Reliability Standards in accordance with Section 300 (Reliability Standards Development) of its Rules of Procedure and the NERC Standard Processes Manual.[34] In its order certifying NERC as the Commission's ERO, the Commission found that NERC's proposed rules provide for reasonable notice and opportunity for public comment, due process, openness, and a balance of interests in developing Reliability Standards[35] and thus satisfies certain of the criteria for approving Reliability Standards.[36] The development process is open to any person or entity with a legitimate interest in the reliability of the Bulk-Power System. NERC considers the comments of all stakeholders, and stakeholders must approve, and the NERC Board of Trustees must adopt a Reliability Standard before the Reliability Standard is submitted to the Commission for approval.

C. Project 2008-02 – Undervoltage Load Shedding

NERC Project 2008-02 was established to modify the UVLS-Related Standards to establish an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS programs that are used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading on the Bulk Electric System. The standard drafting team for Project 2008-02 aimed to consolidate the existing UVLS-Related Standards to create one comprehensive standard and eliminate the Regional Reliability Organization as an applicable entity in Reliability Standard PRC-020-1. The standard drafting team sought to create a results-based standard that clearly defines the responsibilities of applicable entities to:

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development of the particular proposed Reliability Standard in a proper manner, especially whether the process was open and fair. However, we caution that we will not be sympathetic to arguments by interested parties that choose, for whatever reason, not to participate in the ERO's Reliability Standard development process if it is conducted in good faith in accordance with the procedures approved by FERC.").

[34] The NERC *Rules of Procedure* are available at http://www.nerc.com/AboutNERC/Pages/Rules-of-Procedure.aspx. The NERC *Standard Processes Manual* is available at http://www.nerc.com/comm/SC/Documents/Appendix_3A_StandardsProcessesManual.pdf.

[35] 116 FERC ¶ 61,062 at P 250.

[36] Order No. 672 at PP 268, 270.

- pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of automatic, distributed UVLS programs;
- ensure the coordination of automatic, distributed, UVLS programs with generator voltage ride-through capabilities and protection and control systems; and
- establish proper and meaningful automatic, distributed UVLS database requirements.

To accomplish these goals, the standard drafting team considered input from a variety of sources including the 2003 Blackout Report, Commission guidance in Order No. 693, and recommendations from the NERC System Protection and Control Subcommittee ("SPCS") in its December 2010 *NERC SPCS Technical Review of UVLS-Related Standards: PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1* ("SPCS Technical Review").[37] The SPCS Technical Review is included as Exhibit I. The SPCS Technical Review recommended: (1) combining the four existing UVLS Reliability Standards; (2) revising the applicability to entities responsible for UVLS program design, implementation, and coordination; (3) including a requirement for assessment of coordination between UVLS programs and all other protection systems; and (4) differentiating post-event validation of UVLS program design from verifying correct operation of UVLS equipment.

VI. Justification for Approval

As discussed in Exhibit D and below, the proposed Reliability Standard PRC-010-1 and the definition of "UVLS Program" satisfy the Commission's criteria in Order No. 672 and are just, reasonable, not unduly discriminatory or preferential, and in the public interest. The following section provides a description of and the technical basis for the proposed definition and Requirements, and describes how the proposed Reliability Standard and associated definition improve reliability and support Recommendation 21 of the 2003 Blackout Report. This section also provides a brief summary of how the proposed Reliability Standards satisfy the outstanding

[37] *See* http://www.nerc.com/comm/PC/System%20Protection%20and%20Control%20Subcommittee%20SPCS%20DL/PRC-010_022%20Report_Approved_20101208.pdf.

Commission directives from Order No. 693 related to the UVLS-Related Standards. Finally, this section includes a discussion of the enforceability of the proposed Reliability Standard.

A. Proposed Reliability Standard PRC-010-1

Proposed Reliability Standard PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in the UVLS-Related Reliability Standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard drafting team developed PRC-010-1 using PRC-006-1 (*Automatic Underfrequency Load Shedding*) as a model. Understanding that UVLS and UFLS systems have fundamental differences, the drafting team adopted the industry-vetted reliability principles and language of PRC-006-1 as applicable to UVLS Programs. The need for and design of UVLS Programs is unique to each system preservation footprint. As a result, the proposed Reliability Standard provides a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. Proposed PRC-010-1 does not, however, require a mandatory UVLS Program, nor does this standard address whether an entity needs to employ an UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The purpose of PRC-010-1 is to "establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs)." Proposed PRC-010-1 represents an improvement to the prior set of UVLS-Related Standards. Proposed PRC-010-1 addresses the Commission directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated and coordinated approach to all protection systems. The proposed Reliability Standard also replaces the applicability to and involvement of the "Regional Reliability Organization" in Reliability Standards PRC-020-1 and

PRC-021-1 and consolidates the UVLS-Related Standards into one comprehensive standard. The proposed Reliability Standard incorporates the proposed definition of "UVLS Program", which clearly identifies and separates centrally controlled undervoltage-based load shedding, which is now addressed by the proposed definition of "Remedial Action Scheme."

The proposed Reliability Standard applies to Planning Coordinators and Transmission Planners. The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the UVLS Program. Proposed PRC-010-1 also applies to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as "UVLS entities" within the Applicability section of proposed Reliability Standard PRC-010-1. The phrase "Planning Coordinator or Transmission Planner" within the description of "UVLS entities" in the applicability section provides the latitude for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator or Transmission Planner that establishes the UVLS Program will be responsible for identifying the UVLS equipment and the necessary Distribution Providers and Transmission Owners.

1. Proposed Defined Term and Requirements

a) Proposed Defined Term "UVLS Program"

A proposed definition of "Undervoltage Load Shedding Program (UVLS Program)" has been introduced and incorporated into the proposed Requirements. This proposed definition sets the parameters for which UVLS systems fall within the scope of the proposed PRC-010-1 Requirements. The proposed defined term reads:

> **Undervoltage Load Shedding Program (UVLS Program)**: An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Centrally controlled undervoltage-based load shedding is not included.

The standard drafting team found it necessary to introduce the term "UVLS Program" because different types of UVLS systems need to be treated appropriately with respect to mandatory reliability requirements. The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. To ensure that the applicability of the proposed Reliability Standard covers undervoltage-based load shedding systems whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one or more of the following: voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System. By focusing on the enumerated risks, the definition is meant to inherently exclude locally-applied relays that are designed to protect a contained area or, in other words, are not designed to mitigate wide-area voltage collapse. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a Remedial Action Scheme, wherein load shedding is the remedial action. Therefore, just like for a Remedial Action Scheme, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding.

This type of UVLS system now falls within the scope of the proposed definition of Remedial Action Scheme, which is also pending approval with the Commission.

Of note, the definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.

2. Proposed Requirements

Although the use of UVLS is not mandatory under the proposed Reliability Standard, if it is determined that this system preservation measure is necessary to support reliability and a UVLS Program is installed, the UVLS Program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. The Requirements of proposed Reliability Standard PRC-010-1 meet four primary objectives. First, the proposed Reliability Standard requires applicable entities to evaluate a UVLS Program's effectiveness prior to implementation, including the UVLS Program's coordination with other Protection Systems and generator voltage ride through capabilities. Second, applicable entities must adhere to UVLS Program specifications and the implementation schedule. Third, applicable entities must perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies. Finally, applicable entities must maintain and share UVLS Program data.

a) Requirement R1

> *R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: [Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design.

1.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Proposed Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to evaluate the viability and effectiveness of the UVLS Program before implementation. This evaluation must include, but is not limited to whether implementation of the program resolves the identified undervoltage conditions that led to its design, and whether the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate subparts in the proposed Requirement, the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

Proposed Requirement R1 also requires the Planning Coordinator or Transmission Planner to provide the UVLS Program's specifications and implementation schedule to applicable UVLS entities to implement the program. It is noted that studies to evaluate the effectiveness of the program must be completed prior to providing the specifications and schedule under the proposed Requirement.

b) Requirement R2

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5. [Violation Risk Factor: High] [Time Horizon: Long-term Planning]

Proposed Requirement R2 requires UVLS entities, as defined in the Applicability section of PRC-010-1, to meet the specifications and implementation schedule provided by the Planning Coordinator or Transmission Planner for a UVLS Program (designed under R1) or address any necessary corrective actions for a UVLS Program (developed under R2). If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

c) Requirement R3

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. Each assessment shall include, but is not limited to, studies and analyses that evaluate whether: [Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments are required for continued effectiveness of the UVLS Program.

Proposed Requirement R3 requires this type of assessment to be completed at least once every sixty (60) calendar months to capture the cumulative effects of minor changes to the system that have occurred since the last assessment was completed. This comprehensive assessment supplements the annual assessment to evaluate the impact of Protection Systems required under Reliability Standard TPL-001-4. The 60-month period is the same time frame used for assessments in TPL-001-4 and also in the PRC-006-1 assessment related to underfrequency load shedding. The UVLS Program assessment must include studies and analysis that evaluate the program based on two criteria, as described in subparts R3.1 and R3.2. These metrics are the same two criteria used in the assessment under Requirement R1.

While not included in Requirement R3, at any point in time, a Planning Coordinator or Transmission Planner may determine that a material change to system topology or operating conditions affects the performance of the UVLS Program and, therefore, necessitates the same comprehensive assessment. If a Planning Coordinator or Transmission Planner conducts a comprehensive assessment sooner for the reasons discussed above, the 60-month time period would restart upon completion of this assessment.

d) Requirement R4

> *R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. [Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

When a UVLS Program does not function as expected and designed during a voltage excursion event, this presents a risk to system reliability. To mitigate this risk, proposed Requirement R4 requires applicable entities to commence a timely assessment to evaluate

whether the UVLS Program resolved the undervoltage issues associated with the applicable event. This assessment must be completed within twelve calendar months from the date of the event, as this timeframe provides the requisite time to coordinate with other Planning Coordinators, Transmission Operators, Transmission Planners and UVLS entities to complete the performance assessment.

e) Requirement R5

> *R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of completing the assessment. [Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

If program deficiencies are identified during an assessment of a UVLS Program performed in either Requirement R3 or R4, the Planning Coordinator or Transmission Planner must develop a Corrective Action Plan to address the deficiencies.

The proposed Requirement sets a time period of three calendar months to provide the Corrective Action Plan to UVLS entities. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and the time needed to consider potential solutions, coordinate resources, develop a Corrective Action Plan and implementation schedule, and provide the Corrective Action Plan and schedule to UVLS entities. The three-month time frame is only to develop the Corrective Action Plan and provide it to UVLS entities and does not encompass the time UVLS entities have to implement the Corrective

Action Plan. Proposed Requirement R2 requires UVLS entities to execute the Corrective Action Plan according to the schedule provided by the Planning Coordinator or Transmission Planner.

f) Requirement R6, R7, and R8

> *R6. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model the UVLS Program(s) in its area for use in event analyses and assessments of the UVLS Program at least once each calendar year. [Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*
>
> *R7. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. [Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*
>
> *R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request. [Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Proposed Requirement R6 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year. Proposed Requirement R7 requires the UVLS entity to provide UVLS Program data in accordance with specified parameters. Proposed Requirement R8 requires that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time period. Requests for the database must also be fulfilled for those functional entities that have a reliability need for the data.

A UVLS Program database may include, but is not limited to, the following:

- Owner and operator of the UVLS Program

- Size and location of customer load, or percent of connected load, to be interrupted
- Corresponding voltage set points and clearing times
- Time delay from initiation to trip signal
- Breaker operating times
- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and Remedial Action Schemes.

B. Misoperation of UVLS Equipment

During the development of PRC-004-3 (Project 2010-05.1) and PRC-010-1 (Project 2008-02), both standard drafting teams decided that the UVLS standard drafting team would address the Misoperation of UVLS equipment stemming from the retirement of PRC-022-1 (*Under-Voltage Load Shedding Program Performance*). The PRC-022-1 Reliability Standard addressed Misoperation of UVLS; however, it was retired with the creation of PRC-010-1, which was adopted by the Board on November 13, 2014. This aspect of PRC-022-1 will be accounted for through further development work in Project 2008-02.2 Phase 2 Undervoltage Load Shedding (UVLS): Misoperations.[38] This phase of the UVLS project will address Misoperation of UVLS equipment to complete the work anticipated by the two standard drafting teams. The standard drafting team is currently working to make the necessary standard changes and anticipates submitting proposed changes to Board in May for adoption pending favorable ballot results.

[38] The Project webpage is available at http://www.nerc.com/pa/Stand/Pages/Project-2008-02_2-Phase-2-Undervoltage-Load-Shedding-UVLS-Misoperations.aspx.

C. Enforceability of Proposed Reliability Standard

The proposed Reliability Standard PRC-010-1 includes Measures that support each Requirement to help ensure that the Requirements will be enforced in a clear, consistent, non-preferential manner and without prejudice to any party. The proposed Reliability Standard also includes VRFs and VSLs for each Requirement. The VRFs and VSLs for the proposed Reliability Standard comport with NERC and Commission guidelines related to their assignment. A detailed analysis of the assignment of VRFs and the VSLs for proposed PRC-010-1is included as Exhibit E.

VII. Conclusion

For the reasons set forth above, NERC respectfully requests that the Commission approve:

- the proposed Reliability Standard and other associated elements included in Exhibit A;
- the new defined term, as noted herein;
- the VRFs and VSLs (Exhibits A and E); and
- the Implementation Plan, including the noted retirements, included in Exhibit B.

Respectfully submitted,

/s/ William H. Edwards

Charles A. Berardesco
Senior Vice President and General Counsel
Holly A. Hawkins
Associate General Counsel
William H. Edwards
Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099 – facsimile
charles.berardesco@nerc.net
holly.hawkins@nerc.net
william.edwards@nerc.net

Counsel for the North American Electric Reliability Corporation

Date: February 6, 2015

Exhibit A

Proposed Reliability Standard PRC-010-1

A. Introduction

1. **Title: Undervoltage Load Shedding**

2. **Number: PRC-010-1**

3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).

4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 Undervoltage load shedding (UVLS) entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

5. **Background:**

   PRC-010-1 – Undervoltage Load Shedding is a consolidation and revision of the following Reliability Standards:

   - PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
   - PRC-020-1 – Under-Voltage Load Shedding Program Database
   - PRC-021-1 – Under-Voltage Load Shedding Program Data
   - PRC-022-1 – Under-Voltage Load Shedding Program Performance

   The UVLS Standard Drafting Team (or drafting team) developed the revised PRC-010-1 to meet the following objectives:

   - Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated and coordinated approach to all protection systems.
   - Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
   - Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
   - Clearly identify and separate centrally controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS systems.
   - Create a single results-based standard that addresses current reliability issues associated with UVLS.

B. Requirements and Measures

R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design.

1.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M1. Acceptable evidence may include, but is not limited to, date-stamped studies and analyses, reports, or other documentation detailing the effectiveness of the UVLS Program, and date-stamped communications showing that the UVLS Program specifications and implementation schedule were provided to UVLS entities.

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

M2. Acceptable evidence must include date-stamped documentation on the completion of actions and may include, but is not limited to, identifying the equipment armed with UVLS relays, the UVLS relay settings, associated Load summaries, work management program records, work orders, and maintenance records.

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. Each assessment shall include, but is not limited to, studies and analyses that evaluate whether: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M3. Acceptable evidence may include, but is not limited to, date-stamped reports or other documentation detailing the assessment of the UVLS Program.

R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar

months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M4. Acceptable evidence may include, but is not limited to, date-stamped event data, event analysis reports, or other documentation detailing the assessment of the UVLS Program.

R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of completing the assessment. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M5. Acceptable evidence must include a date-stamped Corrective Action Plan that addresses identified deficiencies and may also include date-stamped reports or other documentation supporting the Corrective Action Plan. Evidence should also include date-stamped communications showing that the Corrective Action Plan and an associated implementation schedule were provided to UVLS entities.

R6. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model the UVLS Program(s) in its area for use in event analyses and assessments of the UVLS Program at least once each calendar year. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M6. Acceptable evidence may include, but is not limited to, date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated.

R7. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M7. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.

R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M8. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating that the UVLS Program database was provided within 30 calendar days of receipt of a written request.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The Planning Coordinator, Transmission Planner, Distribution Provider, and Transmission Owner shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The applicable entity shall retain documentation as evidence for six calendar years.

If an applicable entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

"Compliance Monitoring and Assessment Processes" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	High	N/A	N/A	N/A	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in Parts 1.1 and 1.2.
R2	Long-term Planning	High	N/A	N/A	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.

PRC-010-1 – Undervoltage Load Shedding

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R3	Long-term Planning	Medium	N/A	N/A	N/A	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in Parts 3.1 and 3.2.
R4	Operations Planning	Medium	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 calendar months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.

PRC-010-1 – Undervoltage Load Shedding

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R5	Operations Planning	Medium	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.
R6	Operations Planning	Lower	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 30 calendar days but less than or equal to 60 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.

PRC-010-1 – Undervoltage Load Shedding

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R7	Operations Planning	Lower	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.
R8	Operations Planning	Lower	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

Introduction

PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in its legacy standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard also addresses a FERC directive from Order No. 693, Paragraph 1509. This paragraph directs NERC to develop a modification to PRC-010-0 that requires an integrated and coordinated approach to all protection systems, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Since FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding was developed under a similar construct of combining existing standards and addressing a FERC Order No. 693 directive, the drafting team looked to this standard as a guide. With the understanding that UVLS and UFLS systems have fundamental differences, the drafting team adopted PRC-006-1's industry-vetted reliability principles and language as applicable to UVLS Programs.

The drafting team's established purpose for PRC-010-1 is to clearly define the responsibilities of applicable entities to pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs. Since the need for and design of UVLS Programs is unique to each system preservation footprint, the intent of the standard is to provide a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. The drafting team emphasizes that PRC-010-1 does not require a mandatory UVLS Program, nor does this standard address the need to have a UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The drafting team provides the following discussion to support the approach to the standard. The information is meant to enhance the understanding of the reliability needs and deliverable expectations of each requirement, supported as necessary by technical principles and industry experience.

The design and characteristics of a centrally controlled undervoltage-based load shedding system are commensurate with a Special Protection System (SPS) or Remedial Action Scheme (RAS), therefore, the drafting team maintains that this type of load shedding should be covered by SPS-or-RAS-related Reliability Standards. Therefore, PRC-010-1 introduces a new Glossary of Terms Used in NERC Reliability Standards term, UVLS Program, to establish the applicability of PRC-010-1 to automatic load shedding programs consisting of distributed relays and controls used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Undervoltage-based load shedding that does not have such an impact as determined by the Planning Coordinator or Transmission Planner is not included. It is further noted that this term excludes centrally controlled undervoltage-based load shedding.

Subsequently, since the current Glossary of Terms Used in NERC Reliability Standards definition of Special Protection System excludes UVLS, concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) will adjust the definition to exclude only UVLS Programs as defined above and therefore include centrally controlled undervoltage-

based load shedding. Of note, the drafting team for Project 2010-05.2 is proposing to change the term from Special Protection System to Remedial Action Scheme. Accordingly, PRC-010-1 uses the term Remedial Action Scheme instead of Special Protection System. In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program, which is in NUC-001-2.1. Project 2012-13–Nuclear Plant Interface Coordination has adjusted the language of this reference in proposed NUC-001-3 to eliminate any potential confusion of a lowercase usage of a defined term. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.

Requirements of the revised Reliability Standard PRC-010-1 meet the following objectives:

- Evaluate a UVLS Program's effectiveness prior to implementation, including the program's coordination with other protection systems and generator voltage ride-through capabilities.
- Adhere to UVLS Program specifications and implementation schedule.
- Perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies.
- Maintain and share UVLS Program data.

Also of note, Project 2009-03 – Emergency Operations is proposing EOP-011-1, which, as part of the overall revisions, retires specific requirements from EOP-003-2 – Load Shedding Plans to eliminate identified redundancy between PRC-010-1 and EOP-003-2. In addition, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Programs that are intended to trip one or more BES Elements. A change to make these types of UVLS Programs explicitly applicable to PRC-004 will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

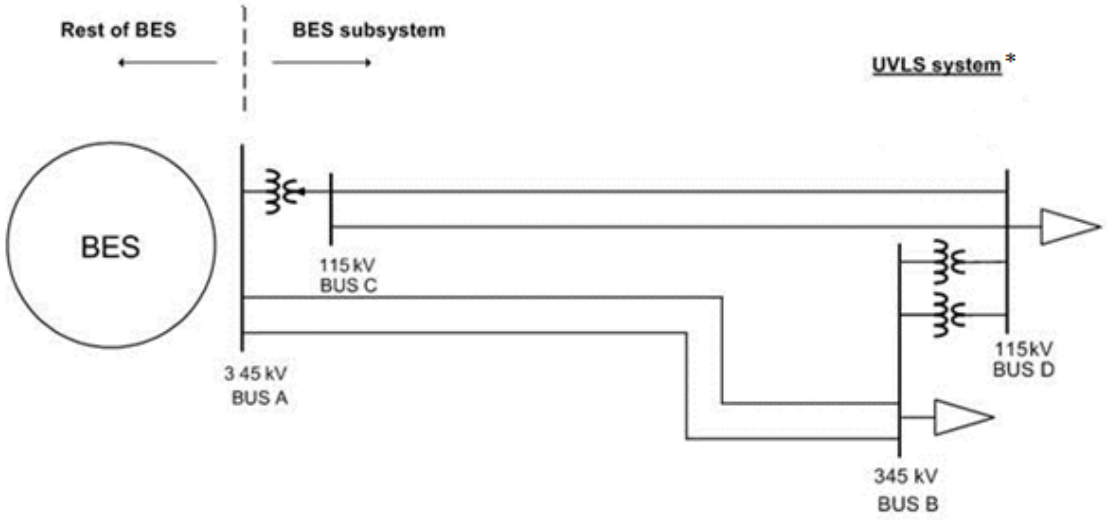
Guidelines for UVLS Program Definition

The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. As such, the failure of a single component is unlikely to affect the reliable operation of the program.

The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a RAS, wherein load shedding is the remedial action. Therefore, just like for a RAS, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding.

To ensure that the applicability of the standard is to only those undervoltage-based load shedding systems whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one or more of the following: voltage instability, voltage collapse, or Cascading impacting the BES. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

Below is an example of a BES subsystem for which UVLS system could be used as a solution to mitigate various issues following the loss of the 345 kV double circuit line between bus A and bus B. If the consequence of this Contingency does not impact the BES by leading to voltage instability, voltage collapse, or Cascading involving the BES, UVLS system (installed at either, or both, bus B and D) used to mitigate this case would not fall under the definition of a UVLS Program. However, if this same UVLS system would be used to mitigate Adverse Reliability Impact outside this contained area, it would be classified as a wide-area undervoltage problem and would fall under the definition of UVLS Program.



*UVLS systems may be installed at either, or both, bus B and D

High Level Requirement Overview

Requirement	Entity						
R1	PC or TP	X					
R2	UVLS entity		X				
R3	PC or TP	X		X			
R4	PC or TP	X		X			
R5	PC or TP				X		
R6	PC					X	
R7	UVLS entity					X	
R8	PC					X	

Guidelines for Requirement R1:

A UVLS Program may be developed and implemented to either serve as a safety net system protection measure against unforeseen extreme Contingencies or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under Transmission Planning (TPL) Reliability Standards. Regardless of the purpose, it is important that the UVLS Program being implemented is effective in terms that it mitigates undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Consideration should be given to voltage set points and time delays, rate of voltage decay or recovery, power flow levels, etc. when designing a UVLS Program.

For the UVLS Program to be effective in achieving its goal, it is also necessary that the UVLS Program is coordinated with generator voltage ride-through capabilities and other protection and control systems that may have an impact on the performance of the UVLS Program. Some of these protection and control systems may include, but are not limited to, transmission line protection, RAS, other undervoltage-based load shedding programs, autoreclosing, and controls of shunt capacitors, reactors, and static var systems (SVSs).

For example, if the purpose of a UVLS Program is to mitigate fault-induced delayed voltage recovery (FIDVR) events in a large load center that also includes local generation, it is important that such a UVLS Program is coordinated with local generators' voltage ride-through capabilities. Generators in the vicinity of a load center are critical to providing dynamic voltage support to the system during FIDVR events. To maximize the benefit of on-line generation, the best practice may be to shed load prior to generation trip. However, occasionally, it may be best to let generation trip prior to load shed. Therefore, the impact of generation tripping should be considered while designing a UVLS Program.

Another example that can be highlighted is the coordination of a UVLS Program with automatic shunt reactor tripping devices if there are any on the system. Most likely, any shunt reactors on the system will trip off automatically after some time delay during low voltage conditions. In such cases, shunt reactors should be tripped before the load is shed to preserve the system. This may require coordination of time delays associated with the UVLS Program with shunt reactor tripping devices.

Examples given above demonstrate that, for a UVLS Program to be effective, proper consideration should be given to coordination of a UVLS Program with generator ride-through capabilities and other protection and control systems.

Guidelines for Requirement R2:

Once a Planning Coordinator or Transmission Planner has identified a need for a UVLS Program, the Planning Coordinator or Transmission Planner will develop a program that includes specifications and an implementation schedule, which are then provided to UVLS entities per Requirement R1. Specifications may include voltage set points, time delays, amount of load to be shed, the location at which load needs to be shed, etc. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal. The UVLS entity must document that all necessary actions were completed to implement the UVLS Program.

Similarly, when a Corrective Action Plan (CAP) to address UVLS Program deficiencies is developed by the Planning Coordinator or Transmission Planner and provided to UVLS entities per Requirement R5, UVLS entities must comply with the CAP and its associated implementation schedule to ensure that the UVLS Program is effective. The UVLS entity is required to complete the actions specified in the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion.

Deferrals or other relevant changes to the UVLS Program specifications or CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence.

For example, documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency:

> CAP Example 1 - Corrective actions for a quick triggering problem; preemptive actions for similar installations:
>
> PC or TP obtains fault records from a UVLS entity that participates in its UVLS Program that indicate a group of UVLS relays triggered at the appropriate undervoltage level but with shorter delays than expected. The PC or TP directed the UVLS entity to schedule on-site inspections within three weeks.

The results of the inspection confirmed that the delay-time programmed on the relays was 60 cycles instead of 90 cycles. The PC or TP then directed the UVLS entity to correct to a 90-cycle time delay setting of the UVLS relays identified to have shorter time delay settings within eight weeks.

Applicability to other UVLS relays: The PC or TP then developed a schedule with the UVLS entity to verify and adjust all remaining UVLS relays time delay settings within a one-year period.

The PC or TP verified completion of verification and adjustment of the time delay settings for all of the UVLS entity's equipment that participates in the PC or TP UVLS Program

CAP Example 2 - Corrective actions for a firmware problem; preemptive actions for similar installations:

PC or TP obtains fault records on 6/4/2014 from a UVLS entity that participates in its UVLS Program. The UVLS entity also provided the fault records to the manufacturer, who responded on 6/11/2014 that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. The PC or TP approved the UVLS entity's plan to schedule Version 3 firmware installation on 6/12/2014.

Applicability to other UVLS relays: The PC or TP then developed a schedule with the UVLS entity to install firmware version 3 at all of the UVLS entity's UVLS relays that are determined to be programmed with version 2 firmware. The completion date was scheduled no-later-than 12/31/2014.

The firmware replacements were completed on 12/4/2014.

Guidelines for Requirement R3:

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments (detailed analyses) are required to ensure its continued effectiveness. This assessment should be completed at least once every 60 calendar months to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed. However, at any point in time, a Planning Coordinator or Transmission Planner may also determine that a material change to system topology or operating conditions affects the performance of the UVLS Program and therefore necessitates the same comprehensive assessment. Regardless of the trigger, each assessment should include an evaluation of each UVLS Program to ensure the continued integration through coordination.

This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. The 60-month period is the same time frame used in TPL-001-4 and in PRC-006-1.

With respect to situations in which a material change to system and topology or operating conditions would necessitate a comprehensive assessment of the UVLS Program, it is understood that the term material change is not transportable on a continent-wide basis. This determination must be made by the Planning Coordinator or Transmission Planner and should be accompanied by documentation to support the technical rationale for determining material changes.

As specified in Requirement R3, a comprehensive assessment must be performed at least once every 60 calendar months. If a Planning Coordinator or Transmission Planner conducts a comprehensive assessment sooner for the reasons discussed above, the 60-month time period would restart upon completion of this assessment.

Guidelines for Requirement R4:

The goal of the assessment required in Requirement R4 is to evaluate whether the UVLS Program resolved the undervoltage issues for an event that occurred on the system. It is expected that the assessment should include event data analysis, such as the relevant sequence of events leading to the undervoltage conditions (e.g., Contingencies, operation of protection systems, and RAS) and field measurements useful to analyzing the behavior of the system. A comprehensive description of the UVLS Program operation should be presented, including conditions of the trigger (e.g., voltage levels, time delays) and amount of load shed for each affected substation. Assessment of the event shall be performed to evaluate the level of performance of the program for the event of interest and to identify deficiencies to be included in a CAP per Requirement R5.

The studies and analyses showing the effectiveness of the UVLS Program can be similar to what is required in Requirements R1 and R3, but should include a clear link between the evaluation of effectiveness (in studies using simulations) and the analysis of the event (with measurements and event data) that actually occurred. For example, differences between the expected and actual system behavior for the event of interest should be discussed and modeling assumptions should be evaluated. Important discrepancies between the simulations and the actual event should be investigated.

Considering the importance of an event that involves the operation of a UVLS Program, the 12-calendar-month period provides adequate time to analyze the event and perform an assessment while identifying deficiencies within a reasonable time. This time period is also required in PRC-006-1.

Guidelines for Requirement R5:

Requirement R5 promotes the prudent correction of an identified problem during assessment evaluations of each UVLS Program. Per Requirements R3 and R4, an assessment of an active UVLS Program is triggered:

- Within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate.
- At least once every 60 months. The default time frame of 60 months or less between assessments has the intention to assure that the cumulative changes to the network and operating condition affecting the UVLS Program are evaluated.

Since every UVLS is unique, if material changes are made to system topology or operating conditions, the Planning Coordinator or Transmission Planner will decide the degree to which the change in topology or operating condition becomes a material change sufficient to trigger an assessment of the existing UVLS Program.

A CAP is a list of actions and an associated timetable for implementation to remedy a specific problem. It is a proven tool for resolving operational problems. Per Requirement R5, the Planning Coordinator or Transmission Planner is required to develop a CAP and provide it to UVLS entities to accomplish the purpose of this requirement, which is to prevent future deficiencies in the UVLS Program, thereby minimizing risk to the system. Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found.

Based on industry experience and operational coordination timeframes, the drafting team believes that within three calendar months from the date an assessment is completed is a reasonable time frame for development of a CAP, including time to consider alternative solutions and coordination of resources. The "within three calendar months" time frame is solely to develop a CAP, including its implementation schedule, and provide it to UVLS entities. It does not include the time needed for its implementation by UVLS entities. This implementation time frame is dictated within the CAP's associated timetable for implementation, and the execution of the CAP according to its schedule is required in Requirement R2.

Guidelines for Requirements R6–R8

An accurate UVLS Program database is necessary for the Planning Coordinator or Transmission Planner to perform system reliability assessment studies and event analysis studies. Without accurate data, there is a possibility that annual reliability assessment studies that are performed by the Planning Coordinator or Transmission Planner can lead to erroneous results and therefore impact reliability. Also, without the accurate data, it is very difficult for the Planning Coordinator or Transmission Planner to duplicate a UVLS event and determine the root cause of the problem.

To support a UVLS Program database, it is necessary for each UVLS entity to provide accurate data to its Planning Coordinator. Each UVLS entity will provide the data according to the specified format and schedule provided by the Planning Coordinator. This is required in order for the Planning Coordinator to maintain and support a comprehensive UVLS Program database. By having a comprehensive database, the Planning Coordinator can embark on a reliability assessment or event analysis/benchmarking studies, identify the issues with the UVLS Program, and develop remedial action plans.

The UVLS Program database may include, but is not limited to the following:

- Owner and operator of the UVLS Program
- Size and location of customer load, or percent of connected load, to be interrupted

- Corresponding voltage set points and clearing times
- Time delay from initiation to trip signal
- Breaker operating times
- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and RAS.

Additionally, the UVLS Program database should be updated annually (once every calendar year) by the Planning Coordinator. The intent here is for UVLS entities to review the data annually and provide changes to the Planning Coordinators so that Planning Coordinators can keep the databases current and accurate for performing event analysis and other assessments.

Finally, a Planning Coordinator is required to provide information to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of receipt of a written request. Thirty calendar days was selected as the time frame as it is considered to be reasonable and well-accepted by the industry. Also, this requirement of sharing the database with applicable functional entities supports the directive provided by FERC that requires an integrated and coordinated approach to UVLS programs (Paragraph 1509 of FERC Order No. 693).

Version History

Version	Date	Action	Change Tracking
0	April 1, 2005	Effective Date	New
0	February 8, 2005	Adopted by NERC Board of Trustees	
0	March 16, 2007	Approved by FERC	
0	February 7, 2013	R2 and associated elements approved by NERC Board of Trustees for retirement as part of the Paragraph 81 project (Project 2013-02) pending applicable regulatory approval.	
0	November 21, 2013	R2 and associated elements approved by FERC for retirement as part of the Paragraph 81 project (Project 2013-02)	

1.0	November 13, 2014	Adopted by NERC Board of Trustees	Revisions made under Project 2008-02: Undervoltage Load Shedding (UVLS) & Underfrequency Load Shedding (UFLS) to address directive issued in FERC Order No. 763. Completed revision, merged and updated PRC-010-0, PRC-020-1, PRC- 021-1, and PRC-022-1.

Rationale:

During development of this standard, text boxes were embedded within the standard to explain the rationale for various parts of the standard. Upon BOT approval, the text from the rationale text boxes was moved to this section.

Rationale for Applicability

This standard is applicable to Planning Coordinators and Transmission Planners that have or are developing a UVLS Program, and to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as UVLS entities for the purpose of this standard.

The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.

The phrase "Planning Coordinator or Transmission Planner" provides the latitude for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

Rationale for R1

In Paragraph 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability, and that each Planning Coordinator or Transmission Planner that develops a UVLS Program should evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage conditions

that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate items, the drafting team recognizes that the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

In addition, Requirement R1 also requires the Planning Coordinator or Transmission Planner to provide the UVLS Program's specifications and implementation schedule to applicable UVLS entities to implement the program. It is noted that studies to evaluate the effectiveness of the program should be completed prior to providing the specifications and schedule.

Rationale for R2

UVLS entities must implement a UVLS Program or address any necessary corrective actions for a UVLS Program according to the specifications and schedule provided by the Planning Coordinator or Transmission Planner. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

Rationale for R3

A periodic comprehensive assessment (detailed analysis) should be conducted to identify and catalogue the accumulated effects of minor changes to the system that have occurred since the last assessment was completed, and should include an evaluation of each UVLS Program to ensure the continued integration through coordination. This comprehensive assessment supplements the NERC Reliability Standard TPL-001-4 annual assessment requirement to evaluate the impact of protection systems.

Based on the drafting team's knowledge and experience, and in keeping with time frames contained in similar requirements from other PRC Reliability Standards, 60 calendar months was determined to be the maximum amount of time allowable between assessments. Assessments will be performed sooner than the end of the 60-calendar month period if the Planning Coordinator or Transmission Planner determines that there are material changes to system topology or operating conditions that affect the performance of a UVLS Program. Note that the 60-calendar-month time frame would reset after each assessment.

Rationale for R4

A UVLS Program not functioning as expected during a voltage excursion event for which the UVLS Program was designed to operate presents a critical risk to system reliability. Therefore, a timely assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the applicable event is essential. The 12 calendar months (from the date of the event) provides adequate time to coordinate with other Planning Coordinators, Transmission Planners, Transmission Operators, and UVLS entities, simulate pre- and post-event conditions, and complete the performance assessment.

Rationale for R5

If program deficiencies are identified during an assessment of a UVLS Program performed in either Requirement R3 or R4, the Planning Coordinator or Transmission Planner must develop a

Corrective Action Plan (CAP) to address the deficiencies. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and the time needed to consider potential solutions, coordinate resources, develop a CAP and implementation schedule, and provide the CAP and schedule to UVLS entities.

It is noted that the three-month time frame is only to develop the CAP and provide it to UVLS entities and does not encompass the time UVLS entities have to implement the CAP. Requirement R2 requires UVLS entities to execute the CAP according to the schedule provided by the Planning Coordinator or Transmission Planner.

Rationale for R6

Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R6 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year.

Rationale for R7

Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R7 supports this reliability need by requiring the UVLS entity to provide UVLS Program data in accordance with specified parameters.

Rationale for R8

Requirement R8 supports the integrated and coordinated approach to UVLS programs directed by Paragraph 1509 of Order No. 693 by requiring that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time period. Requests for the database should also be fulfilled for those functional entities that have a reliability need for the data (such as the Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits).

Exhibit B

Implementation Plan

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Implementation Plan

PRC-010-1 – Undervoltage Load Shedding

Standards Involved

Approval:

- PRC-010-1 – Undervoltage Load Shedding

Retirements:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

Prerequisite Approvals

- Revised definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems)

  Approval of the proposed definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) is required to align the classification of centrally controlled undervoltage-based load shedding with the proposed definition of "Undervoltage Load Shedding Program (UVLS Program)" below. The term "UVLS Program" excludes centrally controlled undervoltage-based load shedding because the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with Special Protection Systems or Remedial Action Schemes. The proposed definition of "Remedial Action Scheme" excludes "UVLS Programs." As a result, the proposed definition of "Remedial Action Scheme" clarifies that centrally controlled undervoltage-based load shedding is included in its scope.

- EOP-011-1 in Project 2009-03 – Emergency Operations

  Project 2009-03 – Emergency Operations (EOP-011-1) proposes to retire EOP-003-2. Requirements R2, R4, and R7 of EOP-003-2 are not included in EOP-011-1, since these requirements map to PRC-010-1, Requirement R1. As a result, approval of EOP-011-1 is necessary to prevent overlap with Requirement R1 of PRC-010-1.

Revisions to the NERC Glossary of Terms

The following new term is proposed for addition:

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Centrally controlled undervoltage-based load shedding is not included.

Applicable Entities

- Planning Coordinator
- Transmission Planner
- UVLS entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

General Considerations

The effective dates of PRC-010-1 and its proposed new NERC Glossary term, EOP-011-1, the revised NERC Glossary definition of "Remedial Action Scheme," and each of the associated retirements are intended to align to accommodate the needed transitions of standard coverage noted above.

The implementation plan for the revised definition of "Remedial Action Scheme" addresses entities that will have newly identified Remedial Action Schemes resulting from the application of the defined term with respect to the inclusion of centrally controlled undervoltage-based load shedding. Please refer to the implementation plan posted with the definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) for more information.

Effective Date

PRC-010-1 and the definition of "Undervoltage Load Shedding Program (UVLS Program)" shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date that the standard and definition are approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard and the definition shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date the standard and definition are adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Retirement of Existing Standards:

PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 shall be retired at midnight of the day immediately prior to the effective date of PRC-010-1 in the particular jurisdiction in which the new standard is becoming effective.

PRC-010-1 is a consolidation of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

Exhibit C

Mapping Document

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Project 2008-02 Undervoltage Load Shedding

Mapping Document

This mapping document shows translation of the requirements of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, PRC-022-1 – Under-Voltage Load Shedding Program Performance, and specific requirements from EOP-003-2 – Load Shedding Plans to the requirements of PRC-010-1 – Undervoltage Load Shedding.

Project 2008-02 – Undervoltage Load Shedding (PRC-010-1) retires Reliability Standards PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. Project 2009-03 – Emergency Operations (EOP-011-1), which is following a concurrent development timeline with Project 2008-02, retires EOP-003-2, Requirements R2, R4, and R7. The reliability objectives of those three requirements is reflected in PRC-010-1, and the respective translations are illustrated in the mapping documents for both projects.

The drafting team has established the applicability of PRC-010-1 to its proposed new NERC Glossary term "Undervoltage Load Shedding Program (UVLS Program)." This term explicitly excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) with respect to reliability requirement-related needs. As such, centrally controlled undervoltage-based load shedding should be subject to SPS or RAS-related standards. This clarification is being facilitated by way of a conforming revision to the definition of the term "Remedial Action Scheme" by concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems). This project is also subsequently revising the SPS or RAS-related Reliability Standards.

In addition, the requirements for PRC-010-1 apply to UVLS Program development and assessment and not to equipment. As PRC-022-1 addresses UVLS equipment Misoperations, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Program equipment. A change to make PRC-004 explicitly applicable to UVLS Program equipment will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall periodically (at least every five years or as required by changes in system conditions) conduct and document an assessment of the effectiveness of the UVLS program. This assessment shall be conducted with the associated Transmission Planner(s) and Planning Authority(ies). **R1.1.** This assessment shall include, but is not limited to: **R1.1.1.** Coordination of the UVLS programs with other protection and control systems in the Region and with other Regional Reliability Organizations, as appropriate. **R1.1.2.** Simulations that demonstrate that the UVLS programs performance is consistent with Reliability Standards TPL-001-0, TPL-002-0, TPL-003-0 and TPL-004-0. **R1.1.3.** A review of the voltage set points and timing.	**PRC-010-0 R1 maps to PRC-010-1 R3**. Applicability changed to Planning Coordinator or Transmission Planner since the Planning Coordinator or Transmission Planner is responsible for the program design. **PRC-010-0 R1.1.1 maps to PRC-010-1 R3, part 3.2**. **PRC-010-0 R1.1.2 and R1.1.3 are inherently embedded in PRC-010-1 R3** (comprehensive assessment). The specific items listed in R1.1.2 and R1.1.3 are described in PRC-010-1's Guidelines and Technical Basis.	**R3.** Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. The assessment shall include, but is not limited to, studies and analyses that evaluate whether: **3.1.** The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed. **3.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall provide documentation of its current UVLS program assessment to its Regional Reliability Organization and NERC on request (30 calendar days).	FERC-approved retirement of Requirement R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Regional Reliability Organization shall establish, maintain and annually update a database for UVLS programs implemented by entities within the region to mitigate the risk of voltage collapse or voltage instability in the BES. This database shall include the following items: **R1.1.** Owner and operator of the UVLS program. **R1.2.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.3.** Corresponding voltage set points and overall scheme clearing times. **R1.4.** Time delay from initiation to trip signal. **R1.5.** Breaker operating times. **R1.6.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	**PRC-020-1 R1 maps to PRC-010-1 R6.** Applicability changed from the Regional Reliability Organization to the Planning Coordinator since the Planning Coordinator is responsible for maintaining information about programs in its area (and requirements can no longer be applicable to Regional Reliability Organizations). **PRC-020-1 R1.1– R1.6 are inherently embedded in PRC-010-1 R6**. The specific items listed in R1.1–R1.6 are described in PRC-010-1's Guidelines and Technical Basis.	**R6.** Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year.

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Regional Reliability Organization shall provide the information in its UVLS database to the Planning Authority, the Transmission Planner, or other Regional Reliability Organizations and to NERC within 30 calendar days of a request.	**PRC-020-1 R2 maps to PRC-010-1 R8**. Applicability changed from the Regional Reliability Organization to the Planning Coordinator since the Planning Coordinator is responsible for maintaining information about programs in its area (and requirements are no longer applicable to Regional Reliability Organizations). Eliminated specificity to the Regional Reliability Organization as a receiving entity by replacing it with "other functional entities with a reliability need." Eliminated NERC as a receiving entity since the ERO Rules of Procedures, Section 401:3. Data Access, provide the ability for NERC to obtain this information.	**R8.** Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Owner and Distribution Provider that owns a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall annually update its UVLS data to support the Regional UVLS program database. The following data shall be provided to the Regional Reliability Organization for each installed UVLS system: **R1.1.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.2.** Corresponding voltage set points and overall scheme clearing times. **R1.3.** Time delay from initiation to trip signal. **R1.4.** Breaker operating times. **R1.5.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	**PRC-021-1 R1 maps to PRC-010-1 R7**. Replaced the Regional Reliability Organization with the Planning Coordinator as the receiving entity since the Planning Coordinator is assigned responsibility for maintaining the database. **PRC-021-1 R1.1–R1.5 are inherently embedded in PRC-010-1 R7**. The specific items listed in R1.1–R1.5 are described in PRC-010-1's Guidelines and Technical Basis.	**R7.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Owner and Distribution Provider that owns a UVLS program shall provide its UVLS program data to the Regional Reliability Organization within 30 calendar days of a request.	**PRC-021-1 R2 maps to PRC-010-1 R7**. Replaced the Regional Reliability Organization with the Planning Coordinator as the receiving entity since the Planning Coordinator is assigned responsibility for maintaining the database.	**R7.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall analyze and document all UVLS operations and Misoperations. The analysis shall include: **R1.1.** A description of the event including initiating conditions. **R1.2.** A review of UVLS set points and tripping times. **R1.3.** A simulation of the event, if deemed appropriate by the Regional Reliability Organization. For most events, analysis of sequence of events may be sufficient and dynamic simulations may not be needed. **R1.4.** A summary of the findings. **R1.5.** For any Misoperation, a Corrective Action Plan to avoid future Misoperations of a similar nature.	**PRC-022-1 R1 maps to PRC-010-1 R4 and R5.** Applicability changed to Planning Coordinator or Transmission Planner since the Planning Coordinator or Transmission Planner is responsible for the program design. **PRC-022-1 R1.1 and R1.4 are part of the measure for PRC-010-1 R4.** **PRC-022-1 R1.2 and R1.3 are inherently embedded in PRC-010-1 R4**. The specific items listed in R1.2 and R1.3 are described in PRC-010-1's Guidelines and Technical Basis. **PRC-022-1 R1.5 is included as part of PRC-010-1 R5.** Also see last paragraph of the second page of this mapping document.	**R4**. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. **R5.** Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of completing the assessment.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall provide documentation of its analysis of UVLS program performance to its Regional Reliability Organization within 90 calendar days of a request.	FERC-approved retirement of Requirement R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator shall establish plans for automatic load shedding for undervoltage conditions if the Transmission Operator or its associated Transmission Planner(s) or Planning Coordinator(s) determine that an under-voltage load shedding scheme is required.	**EOP-003-2 R2 maps to PRC-010-1 R1**. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R4. A Transmission Operator shall consider one or more of these factors in designing an automatic under voltage load shedding scheme: voltage level, rate of voltage decay, or power flow levels.	**EOP-003-2 R4 is inherently embedded in PRC-010-1 R1, part 1.1.** The specific items noted are described in PRC-010-1's Guidelines and Technical Basis. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R7. The Transmission Operator shall coordinate automatic undervoltage load shedding throughout their areas with tripping of shunt capacitors, and other automatic actions that will occur under abnormal voltage, or power flow conditions.	**EOP-003-2 R7 is inherently embedded in PRC-010-1 R1, part 1.2**. The specific items noted are described in PRC-010-1's Guidelines and Technical Basis. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Exhibit D

Order No. 672 Criteria

EXHIBIT D

Order No. 672 Criteria

In Order No. 672, the Commission identified a number of criteria it will use to analyze Reliability Standards proposed for approval to ensure they are just, reasonable, not unduly discriminatory or preferential, and in the public interest.[1] The discussion below identifies these factors and explains how the proposed definition for "Remedial Action Scheme" (Exhibit A) and the Proposed Reliability Standards (Exhibit B) have met or exceeded the criteria.

1. Proposed Reliability Standards must be designed to achieve a specified reliability goal and must contain a technically sound means to achieve that goal.[2]

Proposed Reliability Standard PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in the UVLS-Related Reliability Standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The purpose of PRC-010-1 is to "establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs)." The standard drafting team developed PRC-010-1 using PRC-006-1 (Automatic Underfrequency Load Shedding) as a model. With the understanding that UVLS and UFLS systems have fundamental differences, the drafting team adopted the industry-vetted reliability principles and language of PRC-006-1 as applicable to UVLS Programs as a guide for development of proposed PRC-010-1. The need for and design of UVLS Programs is unique to each system preservation footprint. As a result, the proposed Reliability Standard provides a framework of reliability requirements for such

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[1] *Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards*, Order No. 672, FERC Stats. & Regs. ¶ 31,204, *order on reh'g*, Order No. 672-A, FERC Stats. & Regs. ¶ 31,212 (2006).

[2] Order No. 672 at PP 321, 324.

programs to which each individual entity can apply its program's specific considerations and characteristics. Proposed PRC-010-1 does not, however, require a mandatory UVLS Program, nor does this standard address whether an entity needs to employ an UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The proposed Reliability Standard is a technically sound means of meeting the purpose statement of the proposed Reliability Standard. The proposed Reliability Standard employs measures prior to implementation of a UVLS Program, during, and following deployment of a UVLS Program. The proposed Reliability Standard requires applicable entities to evaluate a UVLS Program's effectiveness prior to implementation, including the UVLS Program's coordination with other Protection Systems and generator voltage ride through capabilities. Proposed PRC-010-1 also requires UVLS entities to adhere to UVLS Program specifications and the implementation schedule. In addition, applicable entities must perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies. Finally, applicable entities must maintain and share UVLS Program data.

2. Proposed Reliability Standards must be applicable only to users, owners and operators of the bulk power system, and must be clear and unambiguous as to what is required and who is required to comply.[3]

The proposed Reliability Standard applies to Planning Coordinators and Transmission Planners. The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the UVLS Program.

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[3] Order No. 672 at PP 322, 325.

Proposed PRC-010-1 also applies to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as "UVLS entities" within the Applicability section of proposed Reliability Standard PRC-010-1. The phrase "Planning Coordinator or Transmission Planner" within the description of "UVLS entities" in the applicability section provides the latitude for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator or Transmission Planner that establishes the UVLS Program will be responsible for identifying the UVLS equipment and the necessary Distribution Providers and Transmission Owners.

The proposed Requirements contain clear language and identification of the responsible entities. In addition, a proposed definition of "Undervoltage Load Shedding Program (UVLS Program)" has been introduced and incorporated into the proposed Requirements. This proposed definition sets the parameters for which UVLS systems fall within the scope of the proposed PRC-010-1 Requirements and provides further clarity on what is covered by the proposed Reliability Standard.

3. A proposed Reliability Standard must include clear and understandable consequences and a range of penalties (monetary and/or non-monetary) for a violation.[4]

The Violation Risk Factors ("VRFs") and Violation Severity Levels ("VSLs") for the

[4] Order No. 672 at P 327.

proposed Reliability Standard comport with NERC and Commission guidelines related to their assignment. The assignments of the severity levels for the VSLs are consistent with the corresponding Requirement and will ensure uniformity and consistency in the determination of penalties. The VSLs do not use any ambiguous terminology, and support uniformity and consistency in the determination of similar penalties for similar violations. For these reasons, the proposed Reliability Standard includes clear and understandable consequences. Justification and explanation of the VRFs and VSLs is included in Exhibit E.

4. A proposed Reliability Standard must identify clear and objective criterion or measure for compliance, so that it can be enforced in a consistent and non-preferential manner.[5]

The proposed Reliability Standard contains Measures that support the Requirements by clearly identifying what is required and how the Requirements will be measured for compliance. The Measures are listed after each of the Requirements of the proposed PRC-010-1 Reliability Standard and provide clarity on types of evidence to support each Requirement, which will allow the Requirements to be enforced in a consistent and non-preferential manner. The Measures are provided within the proposed Reliability Standard in Exhibit A.

5. Proposed Reliability Standards should achieve a reliability goal effectively and efficiently — but do not necessarily have to reflect "best practices" without regard to implementation cost or historical regional infrastructure design.[6]

The proposed Reliability Standard achieves the reliability goal effectively and efficiently in accordance with Order No. 672. The need for and design of UVLS Programs is unique to

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5 Order No. 672 at P 328.

6 Order No. 672 at P 328.

each system preservation footprint. As a result, the proposed Reliability Standard provides a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. Proposed PRC-010-1 does not, however, require a mandatory UVLS Program, nor does this standard address whether an entity needs to employ an UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies. The purpose of PRC-010-1 is to "establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs)." The proposed Reliability Standard provides the necessary Requirements to achieve the purpose statement, while maintaining the flexibility and discretion to design and employ a UVLS Program based on the needs of a system.

6. Proposed Reliability Standards cannot be "lowest common denominator," *i.e.*, cannot reflect a compromise that does not adequately protect Bulk-Power System reliability. Proposed Reliability Standards can consider costs to implement for smaller entities, but not at consequences of less than excellence in operating system reliability.[7]

The proposed definition and revisions to the Proposed Reliability Standards do not reflect a "lowest common denominator" approach. Proposed PRC-010-1 represents an improvement to the prior set of UVLS-Related Standards. Proposed PRC-010-1 addresses the Commission directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated and coordinated approach to all protection systems. The proposed Reliability Standard also replaces the applicability to and involvement of the "Regional Reliability Organization" in Reliability Standards PRC-020-1 and PRC-021-1 and consolidates the UVLS-Related Standards into one

[7] Order No. 672 at P 329-30.

comprehensive standard. The proposed Reliability Standard incorporates the proposed definition of "UVLS Program", which clearly identifies and separates centrally controlled undervoltage-based load shedding, which is now addressed by the proposed definition of "Remedial Action Scheme."

7. **Proposed Reliability Standards must be designed to apply throughout North America to the maximum extent achievable with a single Reliability Standard while not favoring one geographic area or regional model. It should take into account regional variations in the organization and corporate structures of transmission owners and operators, variations in generation fuel type and ownership patterns, and regional variations in market design if these affect the proposed Reliability Standard.[8]**

The proposed Reliability Standard applies throughout North America and does not favor one geographic area or regional model.

8. **Proposed Reliability Standards should cause no undue negative effect on competition or restriction of the grid beyond any restriction necessary for reliability.[9]**

The proposed PRC-010-1 will not cause undue negative effect on competition or result in any unnecessary restrictions. Proposed PRC-010-1 focuses solely on the establishing an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs.

9. **The implementation time for the proposed Reliability Standard is reasonable.[10]**

The suggested effective dates for the proposed definition and Reliability Standards are

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[8] Order No. 672 at P 331.

[9] Order No. 672 at P 332. As directed by section 215 of the FPA, FERC itself will give special attention to the effect of a proposed Reliability Standard on competition. The ERO should attempt to develop a proposed Reliability Standard that has no undue negative effect on competition. Among other possible considerations, a proposed Reliability Standard should not unreasonably restrict available transmission capability on the Bulk-Power System beyond any restriction necessary for reliability and should not limit use of the Bulk-Power System in an unduly preferential manner. It should not create an undue advantage for one competitor over another.

[10] Order No. 672 at P 333.

just and reasonable. NERC proposes an effective date of the first day of the first calendar quarter that is twelve (12) months after approval. This period will allow time for entities to review current systems and make any necessary adjustments in their internal processes necessary to implement the proposed the new definition and related Reliability Standards based on the increased granularity of the proposed definition. The proposed implementation plan is attached as Exhibit B**.**

10. The Reliability Standard was developed in an open and fair manner and in accordance with the Commission-approved Reliability Standard development process.[11]

The proposed definition and Reliability Standards were developed in accordance with NERC's Commission-approved, ANSI- accredited processes for developing and approving Reliability Standards.[12] Exhibit F includes a summary of the development proceedings and details the processes followed to develop the proposed definition and Reliability Standards. These processes included, among other things, comment and balloting periods. Additionally, all meetings of the drafting team were properly noticed and open to the public.

11. NERC must explain any balancing of vital public interests in the development of proposed Reliability Standards.[13]

NERC has identified no competing public interests regarding the request for approval of the proposed PRC-010-1 Reliability Standard. No comments were received that indicated the proposed Reliability Standard conflicts with other vital public interests.

12. Proposed Reliability Standards must consider any other appropriate factors.[14]

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11 Order No. 672 at P 334.

12 *See* NERC *Rules of Procedure*, Section 300 (Reliability Standards Development) and Appendix 3A (Standard Processes Manual).

13 Order No. 672 at P 335.

14 Order No. 672 at P 323.

No other factors relevant to whether the proposed Reliability Standard is just and reasonable were identified.

Exhibit E

Analysis of Violation Risk Factors and Violation Severity Levels

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Project 2008-02 Undervoltage Load Shedding (PRC-010-1)

VRF and VSL Justifications

This document provides the Undervoltage Load Shedding Standard Drafting Team's (drafting team's) justification for assignment of violation risk factors (VRFs) and violation severity levels (VSLs) for each requirement in PRC-010-1 – Undervoltage Load Shedding.

Each primary requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violations of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

The drafting team applied the following NERC criteria and FERC Guidelines when proposing VRFs and VSLs for the requirements under this project:

NERC Criteria - Violation Risk Factors

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, place the Bulk Electric System at an unacceptable risk of instability, separation, or Cascading failures, or hinder restoration to a normal condition.

Medium Risk Requirement

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 is administrative in nature and 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; or, a requirement that is administrative in nature and 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.

FERC Violation Risk Factor Guidelines

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report

The Commission seeks to ensure that Violation Risk Factors assigned to requirements of reliability standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard

The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards

The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level

Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation

Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such requirements must not be watered down to reflect the lower risk level associated with the less important objective of the reliability standard.

The following discussion addresses how the drafting team considered FERC's VRF Guidelines 2 through 5. The team did not address Guideline 1 directly because of an apparent conflict between Guidelines 1 and 4. Whereas Guideline 1 identifies a list of topics that encompass nearly all topics within NERC's Reliability Standards and implies that these requirements should be assigned a "High" VRF, Guideline 4 directs assignment of VRFs based on the impact of a specific requirement to the reliability of the system. The drafting team believes that Guideline 4 is reflective of the intent of VRFs in the first instance and, therefore, concentrated its approach on the reliability impact of the requirements.

PRC-010-1 – Undervoltage Load Shedding is a standard revision with the stated purpose: *To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs.* FERC Order No. 693 requested that PRC-010-0 be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency loading shedding (UFLS) and undervoltage load shedding (UVLS) programs. PRC-010-1 addresses this directive in addition to consolidating and revising PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program with three (3) other existing UVLS standards: PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

PRC-010-1 has eight (8) requirements that incorporate and enhance the intent of the requirements of PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The revised standard requires that entities developing an Undervoltage Load Shedding Program (UVLS Program) evaluate the program's effectiveness prior to providing the program specifications and schedule to applicable entities. Applicable entities are then required to adhere to the UVLS Program specifications and implementation schedule, including those specifications and schedules associated with Corrective Action Plans (CAPs) for existing programs. The standard also requires an assessment of a UVLS Program at least once every 60 months, and an assessment to evaluate program performance within 12 months of an applicable event. If program deficiencies are identified as a result of either of these assessments, entities are required to develop and provide a CAP to applicable entities within three (3) months. In addition, there are requirements to update, provide data for, and share a UVLS Program database containing information necessary to model the program for use in event analyses and assessments.

The requirements of PRC-010-1 do not map, one-to-one, with the requirements of the legacy standards. The new requirements comingle various reliability attributes of the legacy standards with new reliability objectives, thus a requirement-to-requirement comparison of VRFs is not always possible. In developing the new VRFs for the requirements of PRC-010-1, the drafting team carefully considered the NERC criteria for developing VRFs, as well as the FERC VRF guidelines. The VRFs of FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding influenced the drafting team's VRF decisions (citing FERC VRF Guideline 3), as the drafting team used PRC-006-1 as a model with respect to PRC-010-1's language and construct.

NERC Criteria - Violation Severity Levels

VSLs define the degree to which compliance with a requirement was not achieved. Each requirement must have at least one VSL. While it is preferable to have four VSLs for each requirement, some requirements do not have multiple "degrees" of noncompliant performance, and may have only one, two, or three VSLs.

VSLs should be based on the guidelines shown in the table below:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance. The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC Order on Violation Severity Levels

In its June 19, 2008 Order on Violation Severity Levels, FERC indicated it would use the following four guidelines for determining whether to approve VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior Levels of Non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when Levels of Non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

Guideline 2a: A violation of a "binary" type requirement must be a "Severe" VSL.

Guideline 2b: Do not use ambiguous terms such as "minor" and "significant" to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

. . . unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties on a per violation per day basis is the "default" for penalty calculations.

VRF and VSL Justifications – PRC-010-1 Requirement R1	
Proposed VRF	High
NERC VRF Discussion	PRC-010-1 Requirement R1 meets the NERC criterion for a High VRF. Failure to evaluate a UVLS Program to show that it resolves the undervoltage issue it was designed for, and that it is coordinated with generator voltage ride-through capabilities and other protection and control systems, could lead to implementation of an ineffective or counterproductive program. In addition, failure to subsequently provide the UVLS Program specifications and implementation schedule to applicable entities would negate proper program implementation. Both these implications could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System (BES) instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R1 has parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R1 is similar to EOP-003-2, Requirements R3, R4, and R7, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R1 meets the NERC criterion for a High VRF. Failure to evaluate a UVLS Program to show that it resolves the undervoltage issue it was designed for, and that it is coordinated with generator voltage ride-through capabilities and other protection and control systems, could lead to implementation of an ineffective or counterproductive program. In addition, failure to subsequently provide the UVLS Program specifications and implementation schedule to applicable entities would negate proper program implementation. Both these implications could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligations in PRC-010-1 Requirement R1, which are to evaluate the effectiveness of a UVLS Program according to the criteria specified in the two parts and subsequently provide the program specifications and implementation schedule to applicable entities, are all equally critical elements that failure to meet could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or

VRF and VSL Justifications – PRC-010-1 Requirement R1	
	Cascading failures. Therefore, the assigned VRF of High is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in parts 1.1 and 1.2.
NERC VSL Guidelines Discussion	The proposed VSL for PRC-010-1 Requirement R1 meets NERC's VSL Guidelines in that there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two parts.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** The basis for the current level of compliance in relation to PRC-010-1 Requirement R1 is EOP-003-2 Requirements R3, R4, and R7, as these requirements are being retired because they map to PRC-010-1 Requirement R1. Since the VSL for PRC-010-1 Requirement R1 is binary, the current level of compliance is met or exceeded when compared to the VSLs for EOP-003-2 Requirements R3, R4, and R7.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** The proposed VSL for PRC-010-1 Requirement R1 is binary and is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL for PRC-010-1 Requirement R1 uses the term "effectiveness" from the associated requirement, which could be considered ambiguous terminology; however, Requirement R1 does qualify the term "effectiveness" by indicating that the applicable entity must include what is listed in the requirement's parts in its evaluation of effectiveness. The VSL subsequently notes that the items specified in the parts must be included. This thereby supports uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1 Requirement R1	
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSL for PRC-010-1 Requirement R1 uses similar terminology to that used in the requirement and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSL for PRC-010-1 Requirement R1 is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R2	
Proposed VRF	High
NERC VRF Discussion	PRC-010-1 Requirement R2 meets the NERC criterion for a High VRF. Failure to implement a UVLS Program by adhering to the program specifications and implementation schedule increases the risk that the program will not perform properly. Under anticipated Emergency, abnormal, or restorative conditions, this could directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R2 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R2 is similar to PRC-006-1 Requirement R9 and EOP-003-2 Requirement R5, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R2 meets the NERC criterion for a High VRF. Failure to implement a UVLS Program by adhering to the program specifications and implementation schedule increases the risk that the program will not perform properly. Under anticipated Emergency, abnormal, or restorative conditions, this could directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligations required in PRC-010-1 Requirement R2 are to adhere to the UVLS Program specifications and implementation schedule associated with program development (per Requirement R1) and corrective action (per Requirement R5). The requirement to develop a CAP in Requirement R5 is assigned a Medium VRF; therefore, execution of the corrective actions required by Requirement R2 has a commensurate VRF of Medium. However, since the obligations related to the development of a UVLS Program in Requirement R1 are assigned a High VRF, the failure to implement the program per Requirement R2 could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures. Therefore, Requirement R2 is assigned a High VRF to reflect the higher risk level associated with the more critical objective.
Proposed Lower VSL	N/A

VRF and VSL Justifications – PRC-010-1 Requirement R2	
Proposed Moderate VSL	N/A
Proposed High VSL	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.
Proposed Severe VSL	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R2 meets NERC's VSL Guidelines in that the VSLs cover aspects of the requirement that are equal in importance.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R2 is a new requirement; therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R2 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R2 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R2 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R3	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R3 meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of a UVLS Program at least once every 60 calendar months could lead to failure to identify and address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly and adversely affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to do a periodic comprehensive assessment of the program, which supplements the annual Transmission Planning (TPL) assessment required by NERC Reliability Standards, would have implications on the BES. Therefore, a violation of Requirement R3 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R3 has parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R3 is consistent with the current requirement it is replacing (PRC-010-0 Requirement R1), which has an approved VRF of Medium. Similar performance exists in PRC-006-1 Requirement R4, which has an approved VRF of High. This discrepancy is justified due to the differing nature of the programs these standards are addressing, as PRC-006-1 addresses mandatory UFLS programs and PRC-010-1 covers optional UVLS Programs. A UFLS program inherently has a more likely overall impact on the BES.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R3 meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of a UVLS Program at least once every 60 calendar months could lead to failure to identify and address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly and

VRF and VSL Justifications – PRC-010-1 Requirement R3	
	adversely affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to do a periodic comprehensive assessment of the program, which supplements the annual TPL assessment required by NERC Reliability Standards, would have implications on the BES. Therefore, a violation of Requirement R3 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligation required in PRC-010-1 Requirement R3 is to periodically evaluate the effectiveness of a UVLS Program according to the criteria specified in the two parts; the parts are equally critical elements that failure to meet could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures. However, violation of these commensurate elements is unlikely to lead to BES instability, separation, or Cascading failures. Therefore, the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in parts 3.1 and 3.2.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R3 meets NERC's VSL Guidelines in that there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two parts.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** The proposed VSL for PRC-010-1 Requirement R3 is consistent in nature with the VSL for the requirement it is replacing (PRC-010-0 Requirement R1) and therefore does not lower the current level of compliance.

VRF and VSL Justifications – PRC-010-1 Requirement R3	
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** The proposed VSL for PRC-010-1 Requirement R3 for this binary requirement is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL for PRC-010-1 Requirement R3 does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSL for PRC-010-1 Requirement R3 uses similar terminology to that used in the requirement and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSL for PRC-010-1 Requirement R3 is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R4	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R4 meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event in a timely manner could lead to failure to identify and address a necessary program modification. This could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event would have implications on the BES, as these are infrequent and would be done in addition to the annual TPL assessment required by NERC Reliability Standards. Therefore, a violation of Requirement R4 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R4 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R4 is similar to PRC-022-1 Requirement 1 and PRC-006-1 Requirement R11, which have approved VRFs of Medium.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R4 meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event in a timely manner could lead to failure to identify and address a necessary program modification. This could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or

VRF and VSL Justifications – PRC-010-1 Requirement R4	
	counterproductive program if the criteria is not met, it is less likely that failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event would have implications on the BES, as these are infrequent and would be done in addition to the annual TPL assessment required by NERC Reliability Standards. Therefore, a violation of Requirement R4 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R4 does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.
Proposed Moderate VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.
Proposed High VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.
Proposed Severe VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R4 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R4 is different in construct from the requirement it is replacing (PRC-022-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.

VRF and VSL Justifications – PRC-010-1 Requirement R4	
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R4 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R4 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R4 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R5 meets NERC's criterion for a Medium VRF. Failure to develop and subsequently provide a CAP to address the deficiencies identified as a result of a UVLS Program assessment in a timely manner could lead to failure to address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, since the development of a CAP in Requirement R5 is dependent on the outcomes of Requirement R3 or R4, the likelihood of implications on the BES is commensurate with those of Requirements R3 and R4, which are assigned Medium VRFs. Therefore, a violation of Requirement R5 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R5 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R5 is similar to PRC-022-1 Requirement R1.5, which has an approved VRF of Medium.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R5 meets NERC's criterion for a Medium VRF. Failure to develop and subsequently provide a CAP to address the deficiencies identified as a result of a UVLS Program assessment in a timely manner could lead to failure to address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, since the development of a CAP in Requirement R5 is dependent on the outcomes of Requirement R3 or R4, the likelihood of implications on the BES is commensurate with those of Requirements R3 and R4, which are assigned Medium VRFs. Therefore, a violation of Requirement R5 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R5 does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.
Proposed High VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R5 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R5 is different in construct from the requirement it is replacing (PRC-022-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R5 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R5 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R5 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R6	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R6 meets NERC's criterion for a Lower VRF. Though having a current UVLS Program database is necessary to properly inform accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to annually update a UVLS Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** The requirement has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R6 similar to PRC-006-1 Requirement R6, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R6 meets NERC's criterion for a Lower VRF. Though having a current UVLS Program database is necessary to properly inform accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to annually update a UVLS Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R6 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.
Proposed Moderate VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.
Proposed High VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90

VRF and VSL Justifications – PRC-010-1 Requirement R6	
	calendar days.
Proposed Severe VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R6 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R6 is replacing PRC-020-1 Requirement R1, which is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R6 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R6 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R6 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R7	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R7 meets NERC's criterion for a Lower VRF. Though providing current and formatted data is necessary to properly support a UVLS Program database, which subsequently informs accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to provide the data according to the format and schedule specified would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R7 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3 Consistency among Reliability Standards:** PRC-010-1 Requirement R7 is similar to PRC-006-1 Requirement R8, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R7 meets NERC's criterion for a Lower VRF. Though providing current and formatted data is necessary to properly support a UVLS Program database, which subsequently informs accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to provide the data according to the format and schedule specified would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R7 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR

VRF and VSL Justifications – PRC-010-1 Requirement R7	
	The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.
Proposed Moderate VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.
Proposed High VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.
Proposed Severe VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R7 meets NERC's VSL Guidelines in that the VSLs cover aspects of the requirement that are not equal in importance; there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R7 is different in construct from the requirement it is replacing (PRC-021-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R7 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R7 use similar terminology to that used in the requirement and are therefore consistent with the requirement.

VRF and VSL Justifications – PRC-010-1 Requirement R7	
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R7 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R8	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R8 meets NERC's criterion for a Lower VRF. Though sharing a UVLS Program database with applicable entities in a timely manner supports an integrated and coordinated approach to UVLS programs, this is a planning requirement that is administrative in nature; failure to share the database within 30 calendar days of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** The requirement has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R8 is similar to PRC-006-1 Requirement R7, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R8 meets NERC's criterion for a Lower VRF. Though sharing a UVLS Program database with applicable entities in a timely manner supports an integrated and coordinated approach to UVLS programs, this is a planning requirement that is administrative in nature; failure to share the database within 30 calendar days of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R8 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.

VRF and VSL Justifications – PRC-010-1 Requirement R8	
Proposed High VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R8 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R8 is replacing PRC-020-1 Requirement R2, which is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R8 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R8 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R8 are based on a single violation and not cumulative violations.

Exhibit F

Summary of Development History and Complete Record of Development

Exhibit F: Summary of Development History

The development record for proposed Reliability Standard PRC-010-1 is summarized below.

I. Overview of the Standard Drafting Team

When evaluating a proposed Reliability Standard, the Commission is expected to give "due weight" to the technical expertise of the ERO[1]. The technical expertise of the ERO is derived from the standard drafting team. For this project, the standard drafting team consisted of industry experts, all with a diverse set of experiences. A roster of the standard drafting team members is included in Exhibit H.

II. Standard Development History

A. Standard Authorization Request Development

A Standard Authorization Request ("SAR") for Project 2008-02 Undervoltage Load Shedding (UVLS) was posted for a 30-day informal comment period from January 20, 2010 through February 19, 2010. A revised SAR was posted from September 10, 2013 through October 9, 2013.

B. First Posting - Comment Period

Proposed Reliability Standard PRC-010-1 was posted for a 30-day informal comment period from March 17, 2014 through April 16, 2014. There were 25 sets of comments, including comments from approximately 83 different individuals and approximately 60 companies, representing 9 of the 10 industry segments.

[1] Section 215(d)(2) of the Federal Power Act; 16 U.S.C. §824(d) (2) (2012).

The standard drafting team considered stakeholder comments regarding proposed Reliability Standard PRC-010-1 and made the following observations and modifications based on those comments:

- Revised the wording of the proposed defined term UVLS Program.
- Added information to the rationale box and Guidelines and Technical Basis.
- Clarified the attributes of a UVLS Program.
- Added the phrase “impacting the Bulk Electric System”, which should help further clarify that the term excludes UVLS relays that are exclusively for equipment protection.
- Added clarification of the meaning of the phrase “Planning Coordinator or Transmission Planner” in a rationale box supporting the Applicability section.
- Adjusted Requirement R8 to include “other functional entities with a reliability need”.
- Requirement R3 has been adjusted to make it clear that the responsibility is to the entity that has a UVLS Program.
- Requirements R1, R3, R4, and R5 have been revised (along with added supporting rationale and information in the Guidelines and Technical Basis) to clarify the expectations of what should be demonstrated at distinct points in time relative to UVLS Program effectiveness to support reliability.
- Changed the word “demonstrate” to “evaluate” in Requirement R1 to further convey the flexibility for an entity to make the proper determinations with respect to program effectiveness based on system characteristics.
- Requirement R2 has been adjusted to be more explicit, and it has also been adjusted to explicitly require UVLS entities to implement the CAP from Requirement R5.
- Removed the phrase “or sooner if material changes are made to system topology or operating conditions” in Requirement R3 since a “material” change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities.
- Requirement R5 has been adjusted to be specific to the assessments performed in Requirements R3 and R4.
- Requirement R5 has added language to emphasize that there must be an implementation schedule.
- Adjusted Requirement R8 to include “other functional entities with a reliability need”.
- Changed the term “demonstrate” to “evaluate” to further convey the flexibility in making these individual determinations on how to model the system.

C. Second Posting - Comment Period, Ballot and Non-Binding Poll

Proposed Reliability Standard PRC-010-1 was posted for a 45-day public comment period from June 24, 2014 through August 7, 2014, with an initial ballot from July 29, 2014 through August 8, 2014. The additional ballot achieved a 76.37% quorum, and an approval of 76.91%. The Non- Binding Poll achieved a 75.38% quorum and 79.17% of supportive opinions. There were 38 sets of comments, including comments from approximately 127 different individuals and approximately 75 companies, representing 9 of the 10 industry segments.

The standard drafting team considered stakeholder comments regarding proposed Reliability Standard PRC-010-1 and made the following observations and non-substantive modifications based on those comments:

- The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this latitude has been further clarified in the accompanying Rationale box.
- Revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.
- The term "material changes" was removed from the standard to mitigate any subjective interpretation of the term.
- Adjusted the evidence retention period.

D. Final Ballot

Proposed Reliability Standard PRC-010-1 was posted for a 10-day final ballot period from September 8, 2014 through September 18, 2014. The proposed Reliability Standard received a quorum of 83.24% and an approval of 80.69%.

E. Board of Trustees Adoption

Proposed Reliability Standard PRC-010-1 was adopted by the NERC Board of Trustees on November 13, 2014.

Project 2008-02 Undervoltage Load Shedding (UVLS)

UVLS Status:
PRC-010-1 - Undervoltage Load Shedding was adopted by the NERC Board of Trustees November 13, 2014 and is pending regulatory approval.

UVLS information

Purpose / Industry Need:
To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of undervoltage load shedding programs used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES)

Background:
In January 2010, NERC posted the Project 2008-02 Undervoltage Load Shedding (UVLS) SAR for public comment. The SAR cited NERC technical reports and assessments of UVLS programs and standards, along with the FERC Order No. 693 directive that approved PRC-010-0 but requested that it be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Concurrently with the SAR posting, nominations were accepted for a drafting team. Work was deferred due to prioritization for the
2011–2013 Reliability Standards Development Plan (RSDP) and the effort was restarted as part of the 2013–2015 RSDP. A formal drafting team was appointed on May 21, 2013. Its members are tasked with reevaluating and revising the SAR and subsequently proceeding with standard development. The team's objective is to ensure that Project 2008-02 addresses NERC's existing UVLS standards such that they are results-based, address the appropriate regulatory directives, coordinate with present reliability standard efforts (e.g., Paragraph 81, the Independent Expert Review Panel, and Five-Year Reviews), and consider current reliability issues associated with UVLS.

Draft	Action	Dates	Results	Consideration of Comments
UFLS PRC-006-2 Clean | Redline to Last Posting Redline to PRC-006-1 Implementation Plan	Final Ballot Info>> Vote>>	10/22/14 - 10/31/14(closed)	Summary>> Ballot Results>>	
UVLS PRC-010-1 Clean **(44)** | Redline **(45)** Implementation Plan Clean **(46)** | Redline **(47)** **Supporting Materials:** Mapping Document **(48)** UVLS Project Coordination Plan **(49)** PRC-010-1 FAQ Clean **(50)** | Redline **(51)** VRF/VSL Justification **(52)**	Final Ballot Info>> **(53)** Vote>>	09/08/14 - 09/18/14 (closed)	Summary>> **(54)** Ballot Results>> **(55)**	

UFLS PRC-006-2 Clean | Redline Implementation Plan **Supporting Materials:** Unofficial Comment Form (Word) Response to Paragraph 81/Independent Expert Review Project Recommendations for PRC-006-1 VRF and VSL Justification Consideration of FERC Directive Draft RSAW	Initial Ballot and Non-Binding Poll Updated Info>> Info>> Vote>>	09/29/14 - 10/08/14 (closed)	Summary>> Ballot Results>> Non-Binding Poll Results>>	Consideration of Comments>>
	Comment Period Info>> Submit Comments>>	08/21/14 - 10/08/14 (closed)	Comments Received>>	
	Join Ballot Pools>>	08/21/14 - 09/19/14 (closed)		
	Please send RSAW feedback to: RSAWfeedback@nerc.net	09/10/14 - 10/08/14		
UVLS PRC-010-1 Clean **(26)** | Redline **(27)** Implementation Plan **(28)** **Supporting Materials:** Unofficial Comment Form (Word) **(29)** Standard Authorization Request Revised SAR **(30)** | Redline of Revised SAR **(31)** Mapping Document **(32)** VRF/VSL Justification **(33)** UVLS Project Coordination Plan **(34)**	Ballot and Non-Binding Poll Updated Info>> **(36)** Info>> **(37)** Vote>>	07/29/14 – 08/08/14 (closed)	Summary>> **(39)** Ballot Results>> **(40)** Non-Binding Poll Results>> **(41)**	Consideration of Comments>> **(43)**
	Comment Period Info>> **(38)** Submit Comments>>	06/24/14 – 08/08/14 (closed)	Comments Received>> **(42)**	
	Join Ballot Pools>>	06/24/14 – 07/23/14 (closed)		
	Please Send RSAW Feedback to:	07/10/14 - 08/07/14		

PRC-010-1 FAQ **(35)** Draft RSAW	RSAWfeedback@nerc.net			
UFLS Revised SAR Redline of revised SAR SAR Unofficial Comment Form (Word)	Comment Period Info >> Submit Comments >>	05/23/14 - 06/23/14 (closed)	Comments Received>>	
UVLS PRC-010-1 **(15)** Implementation Plan **(16)** **Supporting Materials:** Unofficial Comment Form (Word) **(17)** Standard Authorization Request **(18)** Mapping Document **(19)** VRF/VSL Justification **(20)** UVLS Project Coordination Plan **(21)** PRC-010-1 FAQ **(22)**	Comment Period Info>> **(23)** Submit Comments>>	03/17/14 - 04/16/14 (closed)	Comments Received>> **(24)**	Consideration of Comments>> **(25)**

UVLS Revised SAR **(9)** **Supporting Materials:** Draft Standard **(10)** Unofficial Comment Form (Word) **(11)**	Comment Period Info>> **(12)** Submit Comments>>	09/10/13 - 10/09/13 (closed)	Comments Received>> **(13)**	PRC-010-1 FAQ/Consideration of Comments **(14)**
UVLS **Supporting Materials:** Nomination Form (Word) **(7)**	Nomination Period Info>> **(8)** Submit Nomination>>	03/21/13 - 04/19/13 (closed)		
UVLS Draft SAR Version 1 **(1)** **Supporting Materials:** Comment Form (Word) **(2)** Nomination Form (Word) **(3)**	Comment Period Submit Comments>> Info>> **(4)**	01/20/10 - 02/19/10 (closed)	Comments Received>> **(6)**	
	Nomination Period Submit Nomination>> Info>> **(5)**	01/20/10 - 02/03/10 (closed)		

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standard Authorization Request Form

Title of Proposed Standard: (Project 2008-02) PRC-010-0 — Assessment of the Design and Effectiveness of UVLS Program PRC-022-1 — Under-Voltage Load Shedding Program Performance
Request Date January 11, 2010
SC Approval Date January 151, 2010

SAR Requester Information	**SAR Type** (*Check a box for each one that applies.*)	
Name: TBD	☐	New Standard
Primary Contact Stephen Crutchfield NERC Staff	☒	Revision to existing Standard 1. PRC-010-0 — Technical Assessment of the Design and Effectiveness of Undervoltage Load Shedding Program PRC-022-1 — Undervoltage Load Shedding Program Performance TPL-001 through TPL-004 as appropriate.
Telephone 609-651-9455 Fax	☐	Withdrawal of existing Standard
E-mail Stephen.crutchfield@nerc.net	☐	Urgent Action

Purpose

To improve the existing standards on Under Voltage Load Shedding (UVLS) to include criteria for Under Voltage Load Shedding programs such that the programs work as intended to shed load when needed and prevent voltage collapse and voltage instability in the Bulk Electric System.

Industry Need

Load characteristics have changed drastically over the last few years and FIDVR events have become increasingly more probable with the increased penetration of low-inertia air conditioner loads that lack compressor undervoltage protection. Protection and controls impacts on FIDVR events abound. Requirements are needed for FIDVR studies that include protection and controls actions and potential misoperations.

Two 2003 Blackout recommendations[1] 8b and 13c relating to UVLS need to be considered in the standard development process.

[1] From the report, "August 14, 2003 Blackout: NERC Actions to Prevent and Mitigate the Impacts of Future Cascading Blackouts February 10, 2004"

Recommendation 8b: Each regional reliability council shall complete an evaluation of the feasibility and benefits of installing under-voltage load shedding capability in load centers within the region that could become unstable as a result of being deficient in reactive power following credible multiple-contingency events. The regions are to complete the initial studies and report the results to NERC within one year. The regions are requested to promote the installation of under-voltage load shedding capabilities within critical areas, as determined by the studies to be effective in preventing an uncontrolled cascade of the power system.

Recommendation 13c: The Planning Committee, working in conjunction with the regional reliability councils, shall within two years reevaluate the criteria, methods and practices used for system design, planning and analysis; and shall report the results and recommendations to the NERC board. This review shall include an evaluation of transmission facility ratings methods and practices, and the sharing of consistent ratings information.

Technical studies addressing FIDVR and the two blackout recommendations, as well as an evaluation of the existing standards have been prepared by various NERC technical committees and identify areas where the existing standards need improvement to prevent voltage collapse and voltage instability through UVLS programs.

Brief Description

There are two standards to be revised under this SAR:

- PRC-010-0 — "Assessment of the Design and Effectiveness of UVLS Program" specifies requirements for the responsible entity to periodically conduct and document an assessment of the effectiveness of the UVLS program.
- PRC-022-1 — "Under-Voltage Load Shedding Program Performance" specifies requirements for responsible entities to analyze and document operation and misoperation of UVLS systems.

These standards should be consolidated, and specific criteria for UVLS programs and assessments of those UVLS programs should be added; "fill-in-the-blank" elements should be eliminated; the issues identified by stakeholders and FERC in Attachment 1 should be addressed; and the concepts in the following papers should be addressed:

"Fault-Induced Delayed Voltage Recovery"

"Guidelines for Developing an Under Voltage Load Shedding (UVLS) Evaluation Program"

"Evaluation of Criteria, Methods, and Practices used for System Design, Planning, and Analysis in Response to NERC Blackout Recommendation 13c"

"NERC SPCTF Technical Review of PRC-010-0 — Assessment of the Design and Effectiveness of UVLS Program"

The development 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.

The standard drafting team will also modify the standards to conform to the latest version of NERC's Reliability Standards Development Procedure, the NERC Standard Drafting Team Guidelines, and the ERO Rules of Procedure as described in the "Global Improvements" section of Volume I of the Reliability Standards Development Plan and included in this SAR as Attachment 2.

Detailed Description

PRC-010-0 —Assessment of the Design and Effectiveness of UVLS Program and PRC-022-1 —Under-Voltage Load Shedding Program Performance should be consolidated, and specific criteria for UVLS programs and assessments of those UVLS programs should be added; "fill-in-the-blank" elements should be eliminated; the issues identified by stakeholders and FERC in Attachment 1 should be addressed; and the concepts in the following papers should be addressed:

"Fault-Induced Delayed Voltage Recovery" was developed jointly by the Transmission Issues Subcommittee and the System Protection and Control Subcommittee. The report identifies a Fault Induced Delayed Voltage Recovery (FIDVR) as the phenomenon whereby system voltage remains at significantly reduced levels for several seconds after a transmission, sub transmission, or distribution fault has been cleared. Significant load loss due to motor protective device action can result, as can significant loss of generation, with a potential secondary effect of high system voltage due to load loss. A severe event can result in fast voltage collapse.

"Guidelines for Developing an Under Voltage Load Shedding (UVLS) Evaluation Program" was prepared by the Transmission Issues Subcommittee related to NERC blackout recommendation 8b (dated September 13, 2006).

> Recommendation 8b: Each regional reliability council shall complete an evaluation of the feasibility and benefits of installing under-voltage load shedding capability in load centers within the region that could become unstable as a result of being deficient in reactive power following credible multiple-contingency events. The regions are to complete the initial studies and report the results to NERC within one year. The regions are requested to promote the installation of under-voltage load shedding capabilities within critical areas, as determined by the studies to be effective in preventing an uncontrolled cascade of the power system.

"*Evaluation of Criteria, Methods, and Practices used for System Design, Planning, and Analysis in Response to NERC Blackout Recommendation 13c*" was prepared by the Transmission Issues Subcommittee of the NERC Planning Committee to address recommendation 13c (Draft Dated February 22, 2006). Section III.2 - Use of Undervoltage Load Shed (UVLS) Schemes identifies the need for greater consistency in the criteria for applying UVLS.

> Recommendation 13c: The Planning Committee, working in conjunction with the regional reliability councils, shall within two years reevaluate the criteria, methods and practices used for system design, planning and analysis; and shall report the results and recommendations to the NERC board. This review shall include an evaluation of transmission facility ratings methods and practices, and the sharing of consistent ratings information.

"NERC SPCTF Technical Review of PRC-010-0 — Assessment of the Design and Effectiveness of UVLS Program" was prepared by the System Protection and Controls Task Force of the NERC Planning Committee (dated May 17, 2007) identifies the need to expand the scope of the standards' applicability to include generator owners and improved coordination with generator station under voltage protection as well as improved coordination with other protection systems.

The development 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

The Standard will Apply to the Following Functions *(Check box for each one that applies.)*		
☒	Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐	Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐	Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
☒	Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐	Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.
☒	Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒	Transmission Owner	Owns and maintains transmission facilities.
☒	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☒	Distribution Provider	Delivers electrical energy to the End-use customer.
☒	Generator Owner	Owns and maintains generation facilities.
☒	Generator Operator	Operates generation unit(s) to provide real and reactive power.
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles

Applicable Reliability Principles *(Check box for all that apply.)*	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☒	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
☒	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
☒	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.
☒	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☒	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles? *(Select 'yes' or 'no' from the drop-down box.)*
1. A reliability standard shall not give any market participant an unfair competitive advantage. Yes
2. A reliability standard shall neither mandate nor prohibit any specific market structure. Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard. Yes
4. A reliability 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

Related Standards

Standard No.	Explanation
TPL-001-1	See SPCTF Report

Related SARs

SAR ID	Explanation
Project 2008-01	The two projects will require "monitoring" to see if coordination is required.
Project 2007-06	The two projects will require "monitoring" to see if coordination is required between the revised standards and PRC-001

Regional Variances

Region	Explanation
ERCOT	
FRCC	
MRO	
NPCC	
SERC	
RFC	
SPP	
WECC	

Attachment 1 — FERC Order 693 Directives and Stakeholder Issues

Source	Language
Other	Modify standard to conform to the latest version of NERC's Reliability Standards Development Procedure, the NERC Standard Drafting Team Guidelines, and the ERO Rules of Procedure
PRC-010-0 — Technical Assessment of the Design and Effectiveness of Undervoltage Load Shedding Program	
FERC Order 693	Require that an integrated and coordinated approach be included in all protection systems on the bulk power system, including generators and transmission lines, generators' low-voltage ride-through capabilities, and UFLS and UVLS systems. Paragraph 1509. We appreciate MEAG's feedback to our response in the NOPR. For the reasons discussed in the NOPR, as well as our explanation above, the Commission approves Reliability Standard PRC-010-0 as mandatory and enforceable. In addition, the Commission directs the ERO to develop a modification to PRC-010-0 through the Reliability Standards development process that requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and UFLS and UVLS programs.
FERC's December 20, 2007 Order in Docket Nos. RC07-004-000, RC07-6-000, and RC07-7-000	In FERC's December 20, 2007 Order, the Commission reversed NERC's Compliance Registry decisions with respect to three load serving entities in the ReliabilityFirst (RFC) footprint. The distinguishing feature of these three LSEs is that none own physical assets. Both NERC and RFC assert that there will be a "reliability gap" if retail marketers are not registered as LSEs. To avoid a possible gap, a consistent, uniform approach to ensure that appropriate Reliability Standards and associated requirements are applied to retail marketers must be followed. Each drafting team responsible for reliability standards that are applicable to LSEs is to review and change as necessary, requirements in the reliability standards to address the issues surrounding accountability for loads served by retail marketers/suppliers. For additional information see: • FERC's December 20, 2007 Order (http://www.nerc.com/files/LSE_decision_order.pdf) • NERC's March 4, 2008 (http://www.nerc.com/files/FinalFiledLSE3408.pdf), • FERC's April 4, 2008 Order (http://www.nerc.com/files/AcceptLSECompFiling-040408.pdf), and • NERC's July 31, 2008 (http://www.nerc.com/files/FinalFiled-CompFiling-LSE-07312008.pdf) compliance filings to FERC on this subject.
Fill in the Blank Team	Placeholder
Phase III/IV Team	• PRC-010 is a very weak standard — it only requires documentation and, in very broad terms, 'coordination' — it doesn't specify any level of desired performance or any specific scope for coordination. There should be some details to identify what the coordination must achieve — such as verification that the UVLS will trip when voltage drops to a specified voltage and verification that only a specified amount of load will be tripped and that other special protection systems will not be activated by the UVLS program. • There is no requirement that identifies the desired performance of a UVLS program (what voltage set points and timing are acceptable?). • What is the reliability-related need for the RRO to collect data on misoperations and operations of UVLS programs? Is this information used for anything?
Team Comments	Provide clarity where the Planning Authority is mentioned

Source	Language
Version 0 Team	• Define evidence • Exemptions for some who use shunt reactors • Level 4 vs. level 1 changes
PRC-022-1 — Under-Voltage Load Shedding Program Performance	
FERC's December 20, 2007 Order in Docket Nos. RC07-004-000, RC07-6-000, and RC07-7-000	In FERC's December 20, 2007 Order, the Commission reversed NERC's Compliance Registry decisions with respect to three load serving entities in the ReliabilityFirst (RFC) footprint. The distinguishing feature of these three LSEs is that none own physical assets. Both NERC and RFC assert that there will be a "reliability gap" if retail marketers are not registered as LSEs. To avoid a possible gap, a consistent, uniform approach to ensure that appropriate Reliability Standards and associated requirements are applied to retail marketers must be followed. Each drafting team responsible for reliability standards that are applicable to LSEs is to review and change as necessary, requirements in the reliability standards to address the issues surrounding accountability for loads served by retail marketers/suppliers. For additional information see: • FERC's December 20, 2007 Order (http://www.nerc.com/files/LSE_decision_order.pdf) • NERC's March 4, 2008 (http://www.nerc.com/files/FinalFiledLSE3408.pdf), • FERC's April 4, 2008 Order (http://www.nerc.com/files/AcceptLSECompFiling-040408.pdf), and • NERC's July 31, 2008 (http://www.nerc.com/files/FinalFiled-CompFiling-LSE-07312008.pdf) compliance filings to FERC on this subject.
FERC Order 693	Consider FirstEnergy's suggestions to revise requirement R1.3 as part of the standards development process. Paragraph 1564. FirstEnergy comments that Requirement R1.3 requires "a simulation of the event, if deemed appropriate by the RRO" and believes that the applicable entities such as transmission operators may not be able to simulate large system events. FirstEnergy suggests that Requirement R1.3 be revised to state that "a simulation of the event, if deemed appropriate, and assisted by the [regional reliability organization]."
Phase III/IV Team	• Consider incorporating into this family of standards a requirement that each TO should study, and implement if found effective, a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES. • The reliability-related need for the RRO to collect data on operations and misoperations isn't clear — should this be revised and made available instead to the Compliance Monitor or to the Planning Authority? • The TO should also be required to demonstrate that its UVLS program is coordinated with adjacent TOs.

Issues to be Considered by Drafting Team Project 2008-02 — Undervoltage Load Shedding	
Standard #	**Title**
PRC-022-1	Under-Voltage Load Shedding Program Performance

Issues

FERC Order 693

Disposition: Approved.

Consider FirstEnergy's suggestions to revise requirement R1.3 as part of the standards development process. {Paragraph 1564. FirstEnergy comments that Requirement R1.3 requires "a simulation of the event, if deemed appropriate by the RRO" and believes that the applicable entities such as transmission operators may not be able to simulate large system events. FirstEnergy suggests that Requirement R1.3 be revised to state that "a simulation of the event, if deemed appropriate, and assisted by the [regional reliability organization]."}

Phase III / IV comments

- Consider incorporating into this family of standards a requirement that each TO should study, and implement if found effective, a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES.
- The TO should also be required to demonstrate that its UVLS program is coordinated with adjacent TOs.
- The reliability-related need for the RRO to collect data on operations and misoperations isn't clear – should this be revised and made available instead to the Compliance Monitor or to the Planning Authority?

Other

- Modify standard to conform to the latest version of NERC's Reliability Standards Development Procedure, the NERC Standard Drafting Team Guidelines, and the ERO Rules of Procedure.

FERC's December 20, 2007 and April 4, 2008 Orders in Docket Nos. RC07-004-000, RC07-6-000, and RC07-7-000

- In FERC's December 20, 2007 Order, the Commission reversed NERC's Compliance Registry decisions with respect to three load serving entities in the ReliabilityFirst (RFC) footprint. The distinguishing feature of these three LSEs is that none owned physical assets. Both NERC and RFC assert that there will be a "reliability gap" if retail marketers are not registered as LSEs. To avoid a possible gap, a consistent, uniform approach to ensure that appropriate Reliability Standards and associated requirements are applied to retail marketers must be applied. Each drafting team responsible for reliability standards applicable to LSEs is to review and change as necessary, requirements in the applicable reliability standards to address the issues surrounding accountability for loads served by retail marketers/suppliers. For additional information see:
  - FERC's December 20, 2007 Order (http://www.nerc.com/files/LSE_decision_order.pdf)
  - NERC's March 4, 2008 (http://www.nerc.com/files/FinalFiledLSE3408.pdf),
  - FERC's April 4, 2008 Order (http://www.nerc.com/files/AcceptLSECompFiling-040408.pdf) and
  - NERC's July 31, 2008 (http://www.nerc.com/files/FinalFiled-CompFiling-LSE-07312008.pdf) compliance filings to FERC on this subject.

Attachment 2 — Global Improvements

Global Improvements

The standard drafting team for each of the projects identified in this plan is expected to review the assigned standards and modify the standards to conform to the latest version of NERC's Reliability Standards Development Procedure, the NERC Standard Drafting Team Guidelines, and the ERO Rules of Procedure as described in this "Global Improvements" section.

Statutory Criteria

In accordance with Section 215 of the Federal Power Act, FERC may approve, by rule or order, a proposed reliability standard or modification to a reliability standard if it determines that "the standard is just, reasonable, not unduly discriminatory or preferential, and in the public interest."

The first three of these criteria can be addressed in large part by the diligent adherence to NERC's *Reliability Standards Development Procedure*, which has been certified by the ANSI as being open, inclusive, balanced, and fair. Users, owners, and operators of the bulk power system that must comply with the standards, as well as the end-users who benefit from a reliable supply of electricity and the public in general, gain some assurance that standards are just, reasonable, and not unduly discriminatory or preferential because the standards are developed through an ANSI-accredited procedure.

The remaining portion of the statutory test is whether the standard is "in the public interest." Implicit in the public-interest test is that a standard is technically sound and ensures a level of reliability that should be reasonably expected by end-users of electricity. Additionally, each standard must be clearly written, so that bulk power system users, owners, and operators are put on notice of the expected behavior. Ultimately, the standards should be defensible in the event of a governmental authority review or court action that may result from enforcing the standard and applying a financial penalty.

The standards must collectively provide a comprehensive and complete set of technically sound requirements that establish an acceptable threshold of performance necessary to ensure the reliability of the bulk power system. "An adequate level of reliability" would argue for both a complete set of standards addressing all aspects of bulk power system design, planning, and operation that materially affect reliability, and for the technical efficacy of each standard. The Commission directed NERC to define the term, "adequate level of reliability" as part of its January 18, 2007 Order on Compliance Filing. Accordingly, NERC's Operating and Planning Committees prepared the definition and the NERC Board approved it at its February 2008 meeting for filing with regulatory authorities. The NERC Standards Committee was then tasked to integrate the definition into the development of future reliability standards.

Quality Objectives

To achieve the goals outlined above, NERC has developed 10 quality objectives for the development of reliability standards. Drafting teams working on assigned projects are charged to ensure their work adheres to the following quality objectives:

1. **Applicability** — Each reliability standard shall clearly identify the functional classes of entities responsible for complying with the reliability standard, with any specific additions or exceptions noted. Such functional classes[2] include: ERO, Regional Entities, reliability coordinators, balancing authorities, transmission operators, transmission owners, generator operators, generator owners, interchange authorities, transmission service providers, market operators, planning coordinators, transmission planners, resource planners, load-serving entities, purchasing-selling entities, and distribution providers. Each reliability standard that does not apply to the entire North American bulk power system shall also identify the geographic applicability of the standard, such as an interconnection, or within a regional entity area. The applicability section of the standard should also include any limitations on the applicability of the standard based on electric facility characteristics, such as a requirement that applies only to the subset of distribution providers that own or operate underfrequency load shedding systems.
2. **Purpose** — Each reliability standard shall have a clear statement of purpose that shall describe how the standard contributes to the reliability of the bulk power system.
3. **Performance Requirements** — Each reliability standard shall 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. Each requirement is not a "lowest common denominator" compromise, but instead achieves an objective that is the best approach for bulk power system reliability, taking account of the costs and benefits of implementing the proposal.
4. **Measurability** — Each performance requirement shall be stated so as to be objectively measurable by a third party with knowledge or expertise in the area addressed by that requirement. Each performance requirement shall have one or more associated measures used to objectively evaluate compliance with the requirement. If performance results can be practically measured quantitatively, metrics shall be provided within the requirement to indicate satisfactory performance.
5. **Technical Basis in Engineering and Operations** — Each reliability standard shall be based upon sound engineering and operating judgment, analysis, or experience, as determined by expert practitioners in that particular field.
6. **Completeness** — Each reliability standard shall be complete and self-contained. The standards shall not depend on external information to determine the required level of performance.
7. **Consequences for Noncompliance** — Each reliability standard shall make clearly known to the responsible entities the consequences of violating a standard, in combination with guidelines for penalties and sanctions, as well as other ERO and Regional Entity compliance documents.
8. **Clear Language** — Each reliability standard shall be stated using clear and unambiguous language. Responsible entities, using reasonable judgment and in keeping with good utility practices, are able to arrive at a consistent interpretation of the required performance.

[2] These functional classes of entities are derived from NERC's Reliability Functional Model. When a standard identifies a class of entities to which it applies, that class must be defined in the Glossary of Terms Used in Reliability Standards.

9. **Practicality** — Each reliability standard shall establish requirements that can be practically implemented by the assigned responsible entities within the specified effective date and thereafter.
10. **Consistent Terminology** — Each reliability standard, to the extent possible, shall use a set of standard terms and definitions that are approved through the NERC Reliability Standards Development Process.

In addition to these factors, standard drafting teams also contemplate the following factors the Commission uses to approve a proposed reliability standard as outlined in Order No. 672. A standard proposed to be approved:

1. **Must be designed to achieve a specified reliability goal**
   "321. The proposed Reliability Standard must address a reliability concern that falls within the requirements of section 215 of the FPA. That is, it must provide for the reliable operation of bulk power system facilities. It may not extend beyond reliable operation of such facilities or apply to other facilities. Such facilities include all those necessary for operating an interconnected electric energy transmission network, or any portion of that network, including control systems. The proposed Reliability Standard may apply to any design of planned additions or modifications of such facilities that is necessary to provide for reliable operation. It may also apply to cyber security protection."

   "324. The proposed Reliability Standard must be designed to achieve a specified reliability goal and must contain a technically sound means to achieve this goal. Although any person may propose a topic for a Reliability Standard to the ERO, in the ERO's process, the specific proposed Reliability Standard should be developed initially by persons within the electric power industry and community with a high level of technical expertise and be based on sound technical and engineering criteria. It should be based on actual data and lessons learned from past operating incidents, where appropriate. The process for ERO approval of a proposed Reliability Standard should be fair and open to all interested persons."

2. **Must contain a technically sound method to achieve the goal**
   "324. The proposed Reliability Standard must be designed to achieve a specified reliability goal and must contain a technically sound means to achieve this goal.

   Although any person may propose a topic for a Reliability Standard to the ERO, in the ERO's process, the specific proposed Reliability Standard should be developed initially by persons within the electric power industry and community with a high level of technical expertise and be based on sound technical and engineering criteria. It should be based on actual data and lessons learned from past operating incidents, where appropriate. The process for ERO approval of a proposed Reliability Standard should be fair and open to all interested persons."

3. **Must be applicable to users, owners, and operators of the bulk power system, and not others**
   "322. The proposed Reliability Standard may impose a requirement on any user, owner, or operator of such facilities, but not on others."

4. **Must be clear and unambiguous as to what is required and who is required to comply**
   "325. The proposed Reliability Standard should be clear and unambiguous regarding what is required and who is required to comply. Users, owners, and operators of the Bulk-Power System must know what they are required to do to maintain reliability."

5. **Must include clear and understandable consequences and a range of penalties (monetary and/or non-monetary) for a violation**
   "326. The possible consequences, including range of possible penalties, for violating a proposed Reliability Standard should be clear and understandable by those who must comply."

6. **Must identify clear and objective criterion or measure for compliance, so that it can be enforced in a consistent and non-preferential manner**
   "327. There should be a clear criterion or measure of whether an entity is in compliance with a proposed Reliability Standard. It should contain or be accompanied by an objective measure of compliance so that it can be enforced and so that enforcement can be applied in a consistent and non-preferential manner."

7. **Should achieve a reliability goal effectively and efficiently - but does not necessarily have to reflect "best practices" without regard to implementation cost**
   "328. The proposed Reliability Standard does not necessarily have to reflect the optimal method, or "best practice," for achieving its reliability goal without regard to implementation cost or historical regional infrastructure design. It should however achieve its reliability goal effectively and efficiently."

8. **Cannot be "lowest common denominator," i.e., cannot reflect a compromise that does not adequately protect bulk power system reliability**
   "329. The proposed Reliability Standard must not simply reflect a compromise in the ERO's Reliability Standard development process based on the least effective North American practice — the so-called "lowest common denominator"—if such practice does not adequately protect Bulk-Power System reliability. Although the Commission will give due weight to the technical expertise of the ERO, we will not hesitate to remand a proposed Reliability Standard if we are convinced it is not adequate to protect reliability."

9. **Costs to be considered for smaller entities but not at consequence of less than excellence in operating system reliability**
   "330. A proposed Reliability Standard may take into account the size of the entity that must comply with the Reliability Standard and the cost to those entities of implementing the proposed Reliability Standard. However, the ERO should not propose a "lowest common denominator" Reliability Standard that would achieve less than excellence in operating system reliability solely to protect against reasonable expenses for supporting this vital national infrastructure. For example, a small owner or operator of the Bulk-Power System must bear the cost of complying with each Reliability Standard that applies to it."

10. **Must be designed to apply throughout North American to the maximum extent achievable with a single reliability standard while not favoring one area or approach**

"331. A proposed Reliability Standard should be designed to apply throughout the interconnected North American Bulk-Power System, to the maximum extent this is achievable with a single Reliability Standard. The proposed Reliability Standard should not be based on a single geographic or regional model but should take into account geographic variations in grid characteristics, terrain, weather, and other such factors; it should also take into account regional variations in the organizational and corporate structures of transmission owners and operators, variations in generation fuel type and ownership patterns, and regional variations in market design if these affect the proposed Reliability Standard."

11. No undue negative effect on competition or restriction of the grid

"332. As directed by section 215 of the FPA, the Commission itself will give special attention to the effect of a proposed Reliability Standard on competition. The ERO should attempt to develop a proposed Reliability Standard that has no undue negative effect on competition. Among other possible considerations, a proposed Reliability Standard should not unreasonably restrict available transmission capability on the Bulk-Power System beyond any restriction necessary for reliability and should not limit use of the Bulk-Power System in an unduly preferential manner. It should not create an undue advantage for one competitor over another."

12. Implementation time

"333. In considering whether a proposed Reliability Standard is just and reasonable, the Commission will consider also the timetable for implementation of the new requirements, including how the proposal balances any urgency in the need to implement it against the reasonableness of the time allowed for those who must comply to develop the necessary procedures, software, facilities, staffing or other relevant capability."

13. Whether the reliability standard process was open and fair

"334. Further, in considering whether a proposed Reliability Standard meets the legal standard of review, we will entertain comments about whether the ERO implemented its Commission-approved Reliability Standard development process for the development of the particular proposed Reliability Standard in a proper manner, especially whether the process was open and fair. However, we caution that we will not be sympathetic to arguments by interested parties that choose, for whatever reason, not to participate in the ERO's Reliability Standard development process if it is conducted in good faith in accordance with the procedures approved by the Commission."

14. Balance with other vital public interests

"335. Finally, we understand that at times development of a proposed Reliability Standard may require that a particular reliability goal must be balanced against other vital public interests, such as environmental, social and other goals. We expect the ERO to explain any such balancing in its application for approval of a proposed Reliability Standard."

15. Any other relevant factors

"323. In considering whether a proposed Reliability Standard is just and reasonable, we will consider the following general factors, as well as other factors that are appropriate for the particular Reliability Standard proposed."

> "337. In applying the legal standard to review of a proposed Reliability Standard, the Commission will consider the general factors above. The ERO should explain in its application for approval of a proposed Reliability Standard how well the proposal meets these factors and explain how the Reliability Standard balances conflicting factors, if any. The Commission may consider any other factors it deems appropriate for determining if the proposed Reliability Standard is just and reasonable, not unduly discriminatory or preferential, and in the public interest. The ERO applicant may, if it chooses, propose other such general factors in its ERO application and may propose additional specific factors for consideration with a particular proposed reliability standard."

Issues Related to the Applicability of a Standard

In Order No. 672, the Commission states that a proposed reliability standard should be clear and unambiguous regarding what is required and who is required to comply. Users, owners, and operators of the bulk power system must know what they are required to do to maintain reliability. Section 215(b) of the FPA requires all "users, owners and operators of the bulk power system" to comply with Commission-approved reliability standards.

The term "users, owners, and operators of the bulk power system" defines the statutory applicability of the reliability standards. NERC's Reliability Functional Model (Functional Model) further refines the set of users, owners, and operators by identifying categories of functions that entities perform so the applicability of each standard can be more clearly defined. Applicability is clear if a standard precisely states the applicability using the functions an entity performs. For example, "Each Generator Operator shall verify the reactive power output capability of each of its generating units" states clear applicability compared with a standard that states "a bulk power system user shall verify the reactive power output capability of each generating unit." The use of the Functional Model in the standards narrows the applicability of the standard to a particular class or classes of bulk power system users, owners, and operators. A standard is more clearly enforceable when it narrows the applicability to a specific class of entities than if the standard simply references a wide range of entities, e.g., all bulk power system users, owners, and operators.

In determining the applicability of each standard and the requirements within a standard, the drafting team should follow the definitions provided in the NERC Glossary of Terms Used in Reliability Standards and should also be guided by the Functional Model.

In addition to applying definitions from the Functional Model, the revised standards must address more specific applicability criteria that identify only those entities and facilities that are material to bulk power system reliability with regard to the particular standard.

The drafting team should review the registration criteria provided in the NERC Statement of Compliance Registry Criteria, which is the criteria for applicability. The registration criteria identify the criteria NERC uses to identify those entities responsible for compliance to the reliability standards. Any deviations from the criteria used in the Statement of Compliance Registry Criteria must be identified in the applicability section of the. It is also important to note that standard drafting teams cannot set the applicability of reliability standards to extend to entities beyond the scope established by the criteria for inclusion on NERC's Compliance Registry. This is expressly prohibited by Commission Order No. 693-A.

The goal is to place obligations on the entities whose performance will impact the reliability of the bulk power system, but to avoid painting the applicability with such a broad brush that entities are obligated even when meeting a requirement will make no material contribution to bulk power system reliability.

Every entity class described in the Functional Model performs functions that are essential to the reliability of the bulk power system. This point is best highlighted with the example that might be the most difficult to understand, the inclusion of distribution providers. Section 215 of the FPA specifically excludes facilities used in the local distribution of electric energy. Nonetheless, some of the NERC standards apply to a class of entities called Distribution Providers. Distribution Providers are covered because, although they own and operate facilities in the local distribution of electric energy, they also perform functions affecting and essential to the reliability of the bulk power system. With regard to these facilities and functions that are material to the reliability of the bulk power system, a distribution provider is a bulk power system user. For example, requirements for distribution providers in the reliability standards apply to the underfrequency load shedding relays that are maintained and operated within the distribution system to protect the reliability of the bulk power system. There are also requirements for distribution providers to provide demand forecast information for the planning of reliable operations of the bulk power system.

A similar line of thinking can apply to every other entity in the Functional Model, including Load-serving Entities and Purchasing-selling Entities, which are users of the bulk power system to the extent they transact business for the use of transmission service or to transfer power across the bulk power system. NERC has specific requirements for these entities based on how these uses may impact the reliability of the bulk power systems. Other functional entities are more obviously bulk power system owners and operators, such as Reliability Coordinators, Transmission Owners and Operators, Generator Owners and Operators, Planning Coordinators, Transmission Planners, and Resource Planners. It is the extent to which these entities provide for a reliable bulk power system or perform functions that materially affect the reliability of the bulk power system that these entities fall under the jurisdiction of Section 215 of the FPA and the reliability standards. The use of the Functional Model simply groups these entities into logical functional areas to enable the standards to more clearly define the applicability.

Issues Related to Regional Entities and Reliability Organizations

Because of the transition from voluntary reliability standards to mandatory reliability standards, confusion has occurred over the distinction between Regional Entities and Regional Reliability Organizations. The regional councils have traditionally been the owners and members of NERC. They have been referred to as Regional Reliability Organizations in the Functional Model and in the reliability standards. In an era of voluntary standards and guides, it was acceptable that a number of the standards included requirements for Regional Reliability Organizations to develop regional criteria, procedures, and plans, and included requirements for entities within the region to follow those requirements. Section 215 of the FPA introduced a new term, called "Regional Entity." Regional Entities have specific delegated authorities, under agreements with NERC, to propose and enforce reliability standards within the region, and to perform other functions in support of the electric reliability organization. The former Regional Reliability Organizations have entered into delegation agreements with NERC to become Regional Entities for this purpose.

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Unofficial Comment Form for Project 2008-02 — Undervoltage Load Shedding

Please DO NOT use this form. Please use the electronic form located at the link below to submit comments on the proposed SAR for Voltage and Reactive Planning and Control. Comments must be submitted by **February 19, 2009**. If you have questions please contact Stephen Crutchfield by email at Stephen.crutchfield@nerc.net or by telephone at 609-651-9455.

Background:
The purpose of the SAR is to improve the existing standards on Under Voltage Load Shedding (UVLS) to include criteria for Under Voltage Load Shedding programs such that the programs work as intended to shed load when needed and prevent voltage collapse and voltage instability in the Bulk Electric System.

There are two standards to be revised under this SAR:

> PRC-010-0 — "Assessment of the Design and Effectiveness of UVLS Program" specifies requirements for the responsible entity to periodically conduct and document an assessment of the effectiveness of the UVLS program.
>
> PRC-022-1 — "Under-Voltage Load Shedding Program Performance" specifies requirements for responsible entities to analyze and document operation and misoperation of UVLS systems.

Conforming revisions to the TPL family of standards may be necessary.

Load characteristics have changed drastically over the last few years and Fault-Induced Delayed Voltage Recovery (FIDVR) events have become increasingly more probable with the increased penetration of low-inertia air conditioner loads that lack compressor undervoltage protection. Protection and controls impacts on FIDVR events abound. Requirements are needed for FIDVR studies that include protection and controls actions and potential misoperations.

Two 2003 Blackout recommendations 8b and 13c relating to UVLS need to be considered in the standard development process.

> Recommendation 8b: Each regional reliability council shall complete an evaluation of the feasibility and benefits of installing under-voltage load shedding capability in load centers within the region that could become unstable as a result of being deficient in reactive power following credible multiple-contingency events. The regions are to complete the initial studies and report the results to NERC within one year. The regions are requested to promote the installation of under-voltage load shedding capabilities within critical areas, as determined by the studies to be effective in preventing an uncontrolled cascade of the power system.
>
> Recommendation 13c: The Planning Committee, working in conjunction with the regional reliability councils, shall within two years reevaluate the criteria, methods and practices used for system design, planning and analysis; and shall report the results and recommendations to the NERC board. This review shall include an evaluation of transmission facility ratings methods and practices, and the sharing of consistent ratings information.

Technical studies addressing FIDVR and the two blackout recommendations, as well as an evaluation of the existing standards have been prepared by various NERC technical committees and identify areas where the existing standards need improvement to prevent voltage collapse and voltage instability through UVLS programs.

Please review the SAR and then answer the following questions.

1. Do you agree that there is a reliability-related need for the proposed standards action? If not, please explain in the comment area.

   ☐ Yes
   ☐ No
   Comments:

2. Do you agree with the scope of the proposed standards action? If not, please explain in the comment area.

   ☐ Yes
   ☐ No
   Comments:

3. Do you agree that the scope of the proposed standards action addresses the relevant directives from Order 693? If you disagree with the proposed method of addressing a directive, or if you believe that one or more of the directives isn't addressed, please identify the directive and provide a suggestion for achieving the reliability intent of that directive.

   ☐ Yes
   ☐ No
   Comments:

4. Do you agree with the applicability of the proposed standards action? If not, please explain in the comment area.

   ☐ Yes
   ☐ No
   Comments:

5. If you are aware of the need for any regional variances or business practices that should be considered with this SAR, please identify them.

   Regional Variance:

   Business Practice:

6. If you have any other comments on the SAR that you haven't already provided in response to the previous questions, please provide them here.

   Comments:

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Unofficial Nomination Form for the SAR Drafting Team for Project 2008-02 Under Voltage Load Shedding

Please **DO NOT** use this form. Please use the electronic nomination form located at the link below by **February 3, 2010**. If you have any questions, please contact David Taylor at david.taylor@nerc.net or by telephone at 609-651-5089.

http://www.nerc.com/filez/standards/Project2008-02_UVLS.html

By submitting the following information you are indicating your willingness and agreement to actively participate in the Standard Authorization Request (SAR) development process and SAR Drafting Team meetings if appointed to the SAR Drafting Team (SAR DT) by the Standards Committee. This means that if you are appointed to the SAR DT you are expected to attend all (or at least the vast majority) of the face-to-face SAR DT meetings as well as participate in all the SAR DT meetings held via conference calls and failure to do so shall result in your removal from the SAR DT.

Name:	
Organization:	
Address:	
Telephone:	
E-mail:	

Project 2008-02 Undervoltage Load Shedding - The purpose of the SAR is to improve the existing standards on Under Voltage Load Shedding (UVLS) to include criteria for Under Voltage Load Shedding programs such that the programs work as intended to shed load when needed and prevent voltage collapse and voltage instability in the Bulk Electric System.

Please briefly describe your experience and qualifications directly related to the issues to be addressed by the Under Voltage Load Shedding SAR Drafting Team. We are seeking a cross section of the industry to participate on the team, but in particular are seeking individuals who have experience with under voltage load shedding program planning, design and maintenance across the United States and/or Canada.

Experience in developing standards inside or outside (i.e., IEEE, NAESB, ANSI, etc.) of the NERC process is beneficial, but is not required, and should be highlighted in the information submitted if applicable.

Are you currently a member of any NERC or Regional Entity SAR or standard drafting team? If yes, please list each team here.

☐ No

116-390 Village Boulevard, Princeton, New Jersey 08540-5721
Phone: 609.452.8060 ▪ Fax: 609.452.9550 ▪ www.nerc.com

☐ Yes:
Have you previously worked on any NERC or Regional Entity SAR or standard drafting teams? If yes, please list them here. ☐ No ☐ Yes:

Please identify the NERC Reliability Region(s) in which your company operates and for which you are able to represent your company's position relative to the applicable issues while serving on the SAR drafting team:

☐ ERCOT	☐ MRO	☐ RFC	☐ SPP
☐ FRCC	☐ NPCC	☐ SERC	☐ WEC
☐ Not Applicable or None of the Above			

Please identify the Industry Segment(s) for which you are able to represent on behalf of your company while serving on the SAR drafting team:

☐	— Transmission Owners
☐	— RTOs and ISOs
☐	3 — Load-serving Entities
☐	4 — Transmission-dependent Utilities
☐	5 — Electric Generators
☐	Electricity Brokers, Aggregators, and Marketers

☐	7 — Large Electricity End Users
☐	8 — Small Electricity End Users
☐	Federal, State, and Provincial Regulatory or other Government Entities
☐	Regional Reliability Organizations and Regional Entities
☐	Not applicable

Which of the following Functional Entities[1] do you have expertise or responsibilities for which you are able to represent on behalf of your company while serving on the SAR drafting team:

☐ Balancing Authority	☐ Planning Coordinator
☐ Compliance Enforcement Authority	☐ Transmission Operator
☐ Distribution Provider	☐ Transmission Owner
☐ Generator Operator	☐ Transmission Planner
☐ Generator Owner	☐ Transmission Service Provider
☐ Interchange Authority	☐ Purchasing-selling Entity
☐ Load-serving Entity	☐ Resource Planner
☐ Market Operator	☐ Reliability Coordinator

Please provide the names and contact information for two references who could attest to your technical qualifications and your ability to work well in a group which you give us permission to contact in the event it is deemed necessary to do so.

Name and Title:		Office Telephone:	
Organization:		E-mail:	
Name and Title:		Office Telephone:	
Organization:		E-mail:	

[1] These functions are defined in the NERC Functional Model, which is available on the NERC Web site.

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Standards Announcement

Standards Authorization Request (SAR) Comment and Drafting Team Nomination Periods Open Project 2008-02: Undervoltage Load Shedding

Now available at: http://www.nerc.com/filez/standards/Project2008-02_UVLS.html

Nominations for SAR Drafting Team (through February 3, 2010)

The Standards Committee is seeking industry experts to serve on the Undervoltage Load Shedding SAR Drafting Team (see project background below). The SAR drafting team will assist the requester in further developing the SAR and considering stakeholder comments.

If you are interested in serving on this drafting team, please complete the following electronic nomination form **by February 3, 2010**: nomination form

Comment Period (through February 19, 2010)

The Standards Committee has posted a proposed SAR for a 30-day comment period **ending on February 19, 2010**.

Please use this electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Lauren Koller at Lauren.Koller@nerc.net. An off-line, unofficial copy of the comment form is posted on the project page (see project background below).

Project Background

The purpose of this project is to improve the existing standards on Undervoltage Load Shedding (UVLS) to include criteria for UVLS programs such that the programs work as intended to shed load when needed and prevent voltage collapse and voltage instability in the Bulk Electric System.

Further details are included in the SAR posted on the project page:
http://www.nerc.com/filez/standards/Project2008-02_UVLS.html

Standards Development Process

The Reliability Standards Development Procedure contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance,
please contact Shaun Streeter at shaun.streeter@nerc.net or at 609.452.8060.

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Standards Announcement

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For more information or assistance,
please contact Shaun Streeter at shaun.streeter@nerc.net or at 609.452.8060.

Name (12 Responses)
Organization (12 Responses)
Group Name (9 Responses)
Lead Contact (9 Responses)
Question 1 (21 Responses)
Question 1 Comments (21 Responses)
Question 2 (20 Responses)
Question 2 Comments (21 Responses)
Question 3 (17 Responses)
Question 3 Comments (21 Responses)
Question 4 (17 Responses)
Question 4 Comments (21 Responses)
Question 5 (2 Responses)
Question 5 Comments (21 Responses)
Question 6 (0 Responses)
Question 6 Comments (21 Responses)

James Sharpe
South Carolina Electric and Gas
Yes
Yes
Yes
Yes
None
Northeast Power Coordinating Council
Guy Zito
Yes
Undervoltage load shedding can contribute to reliability under certain circumstances. However, it is essential that proper coordination with other protection systems be evaluated.
Yes
Yes
No
LSE should be added.
Is it the intent of this project that UVLS is to become a required program? If UVLS is determined to be required, does the project outline how it is to be conducted?
Kirit Shah
Ameren
No
We are unclear on the overall intent behind the request to revise PRC-010. While FIDVR events are a concern, we are not aware of any widespread cascading outage which started as a FIDVR event with normal clearing for faults involving one or two BES elements. If the intent behind rewriting PRC-010 is to force the industry to install load shedding schemes to prevent FIDVR

events from occurring, we believe the proponents are working toward an unreachable goal. Induction motors designed with very low starting torque and used to drive low-inertia loads will stall as a result of the sag during a system fault. The utility cannot prevent this from occurring by installing a load shedding scheme. It may be possible to reduce the number of motors that stall by installing fast-acting dynamic var sources, but a load shedding scheme will not stop the motors from stalling. If the intent behind rewriting PRC-010 is to force the industry to install load shedding schemes to prevent a FIDVR event from propagating into a widespread cascading outage, we fully support that effort, but believe it is premature. The state of the art for modeling and simulation for FIDVR events has not reached the point where system studies can be relied upon to accurately predict the response of the load. So, there is not enough knowledge of the load response to predict with certainty that a specific design for a load shedding scheme will prevent a FIDVR event from propagating into a widespread cascading outage.
No
Any modeling and study requirements related to the FIDVR phenomenon from any new or revised reliability standard should not conflict with or be more restrictive than the system performance requirements of the TPL standards that would be in effect. In addition, any such standards should not be so prescriptive as to set forth the installation of UVLS schemes as the only approved means of meeting system requirements. Other methods of load shedding are available which could provide acceptable results without the need for reliance on complicated post-contingency voltage sensing to make a UVLS scheme functional, and which would not be subject to the burdensome reporting requirements that UVLS schemes presently require.
No
The proposed SAR goes well beyond what is needed to meet the directive to have an integrated and coordinated approach to UVLS programs.
No
The state of the art for modeling and simulation for FIDVR events has not reached the point where system studies of these events should be part of a mandatory reliability standard. A Good Utility Practice regarding dynamic load modeling has not yet been established. The determination of accurate dynamic load model parameters for particular systems or portions of systems, upon which such study work would likely be based, is problematical, and is still somewhat of an academic exercise. Since Good Utility Practice regarding dynamic load modeling has not been established, an auditor could, during a normal audit, determine that the dynamic load model used by a TP is insufficient. Therefore, each TP will be liable to varied interpretations by audit or CVI teams. Concerns about the adequacy of any dynamic load model would be heightened in the wake of a system disturbance. Differences in actual system response compared to the modeled response might result in a NERC Compliance Inquiry (CIQ) or a Compliance Violation Investigation (CVI).
None
Howard Rulf
We Energies
Yes
Yes
No
Applicability should not include Generator Owner and Generator Operator. They do not have or control load.
NERC Standards Review Subcommittee
Carol Gerou

Yes
N/A
Yes
N/A
Yes
N/A
Yes
The applicability should be limited to those registered entities where a UVLS program is needed as determined by a regional analysis as developed by entities which have a wide-area view.
N/A
N/A
Dominion
Louis Slade
Yes
Yes
Yes
Yes
There is a typo in the SC Approval Date January 15 (not 151) that should be corrected.
Martin Bauer
US Bureau of Reclamation
Yes
No
It is not necessary to consolidate the two standards (PRC-010 and PRC-022). Both standards address different aspects of UVLS systems. Combining them would render a confusing and enormously complicated standard. Keeping them separate would be consisitent with other standards such as PRC-004 and PRC-005. The Description should be modified to address in more detail the nature of the modifications to the TPL standards. The concept papers introduces appear to have a closer relevance to some of the TPL standards than the revisions proposed to PRC-022.
No
There is no mention of FERC directive in either the Brief or Detailed Description. The directive to modifying standards was to ensure "Each drafting team responsible for reliability standards that are applicable to LSEs is to review and change as necessary, requirements in the reliability standards to address the issues surrounding accountability for loads served by retail marketers/suppliers." The SAR should clarify how the FERC order is to be addressed.
No
LSE's are not included in the applicability. While it is acknowledged that they do not own physical assets, they may have a role in reliability which should be evaluated.
James H. Sorrels, Jr.
American Electric Power
Yes
AEP believes that there is a reliability-related need for the proposed standards action for UVLS that apply on the Bulk Electric System (BES). However, we do not see such a need for a UVLS

that are intended solely to address a local area issue. Some (perhaps many) Regional Entities do not expect, nor should they expect, to receive data reporting for a localized UVLS. In fact, care should be taken by the SDT to not become overly prescriptive for these localized, voluntary UVLS so as to not, inadvertently, create disincentives to registered entities for employing a localized UVLS.
Yes
AEP agrees with the scope as long as it recognizes the difference between a UVLS employed to address a localized issue, and a UVLS that is necessary for the reliability of the BES where a collapse of voltage has the potential to result in a cascading event.
Yes
Yes
None known at this time.
No additional comments at this time.
Armin Klusman
CenterPoint Energy
No
CenterPoint Energy disagrees there is a reliability-related need for the proposed standards action. CenterPoint Energy believes that the current PRC-010 and PRC-022 standards already address reliability needs related to under-voltage load shedding (UVLS) and include results-based requirements. The current standards require an assessment of UVLS for its performance, or effectiveness, and include evaluating set points and coordination with other protection and control systems in the Region. We recommend that this Request be rejected so that resources that would be consumed by this endeavor can be used for more productive and useful purposes. The SAR appears to be based upon flawed information and outdated assessments. For example, Phase III / IV Team comments include “what voltage set points and timing are acceptable” and “the TO should also be required to demonstrate that its UVLS program is coordinated with adjacent TOs”. As noted above, PRC-010 already requires an evaluation of the set points and coordination with other protection and control systems in the Region. Also, an outdated NERC SPCTF’s review of PRC-010-0 contends there is a need to expand the scope to include generator owners (see response to Question 4). CenterPoint Energy believes this proposed standards action would only result in requirements that are entirely too prescriptive, and will be, in actuality, a procedure and not a standard. The focus of any standards action should be based on the “What” and not the “How”. This SAR would only create unnecessary or overly cumbersome requirements that will add little or no value to reliability.
No
As compared with the current PRC-010, this SAR proposes doubling the number of applicable entities from four to eight. CenterPoint Energy believes the SAR is inappropriately expanding the applicability of PRC-010 and PRC-022 to other entities based upon flawed information and outdated assessments. Generator Owner (GO) and Generator Operator (GOP), for example, should not be included. The SAR has apparently based the expanded applicability upon the NERC SPCTF’s review of PRC-010-0, dated May 17, 2007, that identified the need to expand the scope to include generator owners for improved coordination with generator stations’ under-voltage protection. This issue is currently being addressed by the NERC project for PRC-024-1 Generator Frequency and Voltage Protective Relay Setting (Project 2007-09). CenterPoint Energy recommends the applicability be solely to owners of under-voltage load shedding systems, specifically Transmission Owners and Distribution Providers.
Regional Variance
CenterPoint Energy notes that one of the SAR references itself - Fault-Induced Delayed Voltage Recovery (by the Transmission Issues Subcommittee and the System Protection and Control

Subcommittee) - indicates that “Guidelines or standards should not be issued to require the same level of effort from Alaskan planners as from those in California, Texas, Arizona, or Florida.”
CenterPoint Energy believes the statements in the first sentence of the Industry Need are incorrect characterizations. The Industry Need alludes that “Load characteristics have changed drastically over the last few years” and that “FIDVR events have become increasingly more probable with the increased penetration of low-inertia air conditioner loads”. Electric utilities serving the Gulf Coast area, like CenterPoint Energy, have been aware of issues with air conditioning loads for some time. While air conditioning load issues have been known, tools to help model such loads are just now becoming available. CenterPoint Energy recommends that this Request be rejected. Instead of using industry experts to participate on an SDT for this proposed SAR, reliability would be better served by using transmission planning resources to perform under-voltage assessments with new tools that are available.
Mark Ringhausen
ODEC
No
Maybe is a better answer. Voltage problems are much more local in nature than frequency problems. So it would be better to leave an UVLS standard to the Regional Entity to handle rather than a national standard from NERC.
No
Should be regional and I am not convinced that it should be applicable to GOPs. It would be better to make this a performance based MOD standard for GO or GOP to test for undervoltage ride thru capability.
No
No, see my comments on making this not-applicable to GOPs and use a MOD standard to do this at a Regional Level.
Regional Variance
See previous comments and under voltage is much more of a Regional Issue and should be handled this way.
Roger Champagne
Hydro-Québec TransÉnergie (HQT)
Yes
Undervoltage load shedding can contribute to reliability under certain circumstances. However, it is essential that proper coordination with other protection systems be evaluated.
Yes
Yes
No
LSE should be added as it was in PRC-010 and PRC-022.
The intent of this UVLS standard must be clarified. Is it to become a required program, or is UVLS to be be required only when determine to be needed?
Richard Kafka
Pepco Holdings, Inc.
No
Low voltage problems are localized in nature, unlike frequency deviations. We believe it will be difficult to establish a continent-wide or interconneciton-wide requirements for UVLS schemes that improve bulk power reliability.
No

It is unclear whether the proposal is to create a single continent-wide (or interconnection-wide) set of performance requirements for UVLS, or to establish requirements for which each Regional Entity must develop separate regional standards. Under the description of the SAR, it states “fill-in-the-blank” elements should be eliminated.
No
A primary purpose stated in the SAR is “…existing standards need improvement to prevent voltage collapse and voltage instability through UVLS programs”. It must be recognized that there are other means to arrest voltage decline such as activating operating reserves or through manual load shedding. Automatic UVLS relays cannot be the sole means of preventing voltage collapse and voltage instability. The scope should clarify that PRC-010-0 and PRC-022-1 will establish performance characteristics for automatic UVLS programs and is not intended to conflict or supersede other NERC standards that also have an effect of stabilizing system voltage.
Edward Davis
Entergy Services
Yes
Yes
Yes
Yes
Florida Municipal Power Agency and Some Members
Frank Gaffney
Yes
No
The scope ought to include revisions to EOP-003-1 that pertain to UVLS as well. For instance, R2 of EOP-003-1 states: “Each Transmission Operator and Balancing Authority shall establish plans for automatic load shedding for underfrequency or undervoltage conditions”, R4 also refers to UVLS, etc. Presumably, the “undervoltage conditions” portion of this and other requirements in EOP-003-1 would be subsumed in the new standard effort.
Yes
No
There is no need to include Generator Owners or Generator Operators in the applicability for UVLS just as there was no need when considering UFLS.
The UVLS standard ought to distinguish between risk of voltage collapse on long, remote, radial systems that have no Adverse Reliability Impact, such as a long radial line into a small remote load, from risk of voltage collapse that can cause as Adverse Reliability Impact by causing a large supply demand mismatch that could result in a frequency related disturbance, such as the loss of a major urban center. Only the latter, those that can cause an Adverse Reliability Impact, should be regulated by the standards and not risks of voltage collapse that have no Adverse Reliability Impact.
Jun Wen
Southern California Edison

Yes
Yes
Yes
No
We don't think that the standard is applicable to Generator Owner and Generator Operator as they don't have the capability to conduct the assessment of the effectiveness of UVLS program that is owned by other parties. Clarification is needed on what will be required for Generator Owner and Generator Operator.
Electric Market Policy
Jalal Babik
No
We are not aware of any region-wide needs for UVLS schemes and question the need for a continent-wide requirement. Since low voltage problems are localized in nature, we believe it will be difficult to establish a continent-wide requirement for UVLS schemes that improves bulk power reliability.(in support of PJM's comment)
No
It is unclear whether the proposal is to create a single continent-wide (or interconnection-wide) set of performance requirements for UVLS, or to establish requirements for which each Regional Entity must develop separate regional standards. Under the description of the SAR, it states “fill-in-the-blank” elements should be (In support of PJM's comment).
No
A primary purpose stated in the SAR is “…existing standards need improvement to prevent voltage collapse and voltage instability through UVLS programs”. It must be recognized that there are other means to arrest voltage decline such as activating operating reserves or through manual load shedding. Automatic UVLS relays cannot be the sole means of preventing voltage collapse and voltage instability. The scope should clarify that PRC-010-0 and PRC-022-1 will establish performance characteristics for automatic UVLS programs and is not intended to conflict or supersede other NERC standards that also have an effect of stabilizing system voltage. (In suppport of PJM's commnet)
Yes
none
There is a typo in the SC Approval Date January 15 (not 151) that should be corrected.
FirstEnergy
Sam Ciccone
Yes
No
The scope of the SAR is incomplete. In Attachment 1 on page SAR-7 there is a "Source" listed of "Fill in the Blank Team" with a "Language" entry of "Placeholder." This indicates there is more information to come in this area. If this is true, the information should be added to the SAR and the SAR reposted. If this is not true, the entry in the table should be deleted and the SAR reposted.
Yes
1. Regarding the proposed applicability to the Generator Owner (GO) and the Generator Operator (GOP), it should be clear in the SAR that: a. Their applicability is limited to GO and GOP that have

undervoltage protection and control setpoints and time that must directly coordinate with UVLS programs. b. Their involvement in the "coordination" with the Transmission Planner (TP) is limited to supplying Generator UV trip settings when requested by the TP. 2. Load Serving Entity should be added to the applicability of this SAR as they may own UVLS systems and have some responsibility to report and investigate misoperation of any system that they own.
We believe that the purpose statement is too broad and suggest it be revised as follows: "To improve the existing standards on Under Voltage Load Shedding (UVLS) to include criteria for Under Voltage Load Shedding programs such that the programs are coordinated, installed, maintained, and updated in a manner that supports reliability by shedding load when needed to prevent voltage collapse and voltage instability in the Bulk Electric System." As currently written, the purpose statement could lead the drafting team to the conclusion that a UVLS system must work when called upon. While this is the idealistic goal, all that an entity can do is minimize the risk of the UVLS system not working by designing and maintaining the system and updating the relay settings for system connectivity and load changes.
Dan Rochester
Independent Electricity System Operator
Yes
Yes
We agree with the general scope and the purpose, but would suggest that the purpose of the proposed standard be expanded to include “coordination” of UVLS programs. For example, the purpose statement may be expanded by adding: ”…. such that the programs are coordinated among the deploying entities and work as intended to shed load when needed and….” We believe detailed requirements on “coordination” are needed to address FERC’s directives and the recommendations by the Phase III/IV Team.
Yes
Yes
ISO RTO Council Standards Review Committee
Charles Yeung
No
We are not aware of any region-wide needs for UVLS schemes and question the need for a continent-wide requirement. NERC can request new region-wide studies be performed for UVLS schemes to determine if the post-2003 Blackout reports for UVLS are still valid. Since low voltage problems are localized in nature, we believe it will be difficult to establish a continent-wide requirement for UVLS schemes that improves bulk power reliability.
No
It is unclear whether the proposal is to create a single continent-wide (or interconnection-wide) set of performance requirements for UVLS, or to establish requirements for which each Regional Entity must develop separate regional standards. Under the description of the SAR, it states “fill-in-the-blank” elements should be eliminated, however, there is no indication of how the existing or future Regional Standards for UVLS should be revised to complement the proposed SAR. Studies for the need for UVLS schemes on a regional basis were reviewed by NERC and some regions did not require a region-wide UVLS scheme. Any continent-wide standard for UVLS relay protection schemes must allow regions to determine the extent and applicability of the requirements.
No
A primary purpose stated in the SAR is “…existing standards need improvement to prevent voltage collapse and voltage instability through UVLS programs”. It must be recognized that there

are other means to arrest voltage decline such as activating operating reserves or through manual load shedding. Automatic UVLS relays cannot be the sole means of preventing voltage collapse and voltage instability. The scope should clarify that PRC-010-0 and PRC-022-1 will establish performance characteristics for automatic UVLS programs and is not intended to conflict or supersede other NERC standards that also have an effect of stabilizing system voltage.
Please note some members of the ISO RTO Council are not a part of these comments and may have elected to file separate comments.
Bonneville Power Administration
Denise Koehn
Yes
Yes
Yes
Yes
Not aware of any.
Public Service Enterprise Group Companies
Kenneth D. Brown
No
The PSEG companies disagree with the SAR unless it is clarified that UVLS has at best limited application, and then only in sub-regional or local areas that have unique situations that cannot be solved by conventional solutions. While UVLS may have applications in systems characterized by long lines with little networking and VAR support, they are not applicable in dense networks characterized by short lines and a multiplicity of parallel paths, e.g. eastern PJM. The standard should not be construed to require UVLS except in those unique circumstances.
No
The PSEG companies disagree with the SAR unless it is clarified that UVLS has at best limited application, and then only in sub-regional or local areas that have unique situations that cannot be solved by conventional solutions. While UVLS may have applications in systems characterized by long lines with little networking and VAR support, they are not applicable in dense networks characterized by short lines and a multiplicity of parallel paths, e.g. eastern PJM. The standard should not be construed to require UVLS except in those unique circumstances.

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Nomination Form

Project 2008-02 Under Voltage Load Shedding Standard Drafting Team

Please return this form as soon as possible. If you have any questions, please contact Howard Gugel at howard.gugel@nerc.net.

By submitting the following information, you are indicating your willingness and agreement to actively participate in the Standard Drafting Team (SDT) meetings if appointed to the SDT by the Standards Committee. This means that if you are appointed to the SDT, you are expected to attend all (or at least the vast majority) of the face-to-face SDT meetings as well as participate in all the SDT meetings held via conference calls, and failure to do so shall result in your removal from the SDT.

Project 2008-02 Under Voltage Load Shedding

The purpose of this project, as outlined in the associated Standards Authorization Request (SAR), is to improve the existing standards on Under Voltage Load Shedding (UVLS) to include criteria for UVLS programs such that the programs work as intended to shed load when needed and prevent voltage collapse and voltage instability in the Bulk Electric System.

We are seeking a cross section of the industry to participate on the team, but in particular are seeking individuals who have experience and expertise with UVLS program planning, design, and maintenance across the United States and/or Canada.

Experience with developing standards inside or outside (e.g., IEEE, NAESB, ANSI, etc.) of the NERC process is beneficial, but is not required, and should be highlighted in the information submitted if applicable.

Individuals who have facilitation skills and experience and/or legal or technical writing backgrounds are also strongly desired. Please include this in the description of qualifications as applicable.

Name:	
Organization:	
Address:	
Telephone:	
E-mail:	

Please briefly describe your experience and qualifications to serve on the requested Standard Drafting Team:
If you are currently a member of any NERC drafting team, please list each team here: ☐ Not currently on any active SAR or standard drafting team. ☐ Currently a member of the following SAR or standard drafting team(s):
If you previously worked on any NERC drafting team please identify the team(s): ☐ No prior NERC SAR or standard drafting team. ☐ Prior experience on the following team(s):

Select each NERC Region in which you have experience relevant to the Project for which you are volunteering:

☐ ERCOT	☐ NPCC	☐ SPP
☐ FRCC	☐ RFC	☐ WECC
☐ MRO	☐ SERC	☐ NA – Not Applicable

Select each Industry Segment that you represent:

☐	1 — Transmission Owners
☐	2 — RTOs, ISOs
☐	3 — Load-serving Entities
☐	4 — Transmission-dependent Utilities
☐	5 — Electric Generators
☐	6 — Electricity Brokers, Aggregators, and Marketers
☐	7 — Large Electricity End Users
☐	8 — Small Electricity End Users
☐	9 — Federal, State, and Provincial Regulatory or other Government Entities
☐	10 — Regional Reliability Organizations and Regional Entities
☐	NA – Not Applicable

Select each Function[1] in which you have current or prior expertise:	
☐ Balancing Authority ☐ Compliance Enforcement Authority ☐ Distribution Provider ☐ Generator Operator ☐ Generator Owner ☐ Interchange Authority ☐ Load-serving Entity ☐ Market Operator ☐ Planning Coordinator	☐ Transmission Operator ☐ Transmission Owner ☐ Transmission Planner ☐ Transmission Service Provider ☐ Purchasing-selling Entity ☐ Reliability Coordinator ☐ Reliability Assurer ☐ Resource Planner

Provide the names and contact information for two references who could attest to your technical qualifications and your ability to work well in a group:			
Name:		Telephone:	
Organization:		E-mail:	
Name:		Telephone:	
Organization:		E-mail:	

[1] These functions are defined in the NERC Functional Model, which is available on the NERC web site.

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Standards Announcement

Project 2008-02 Under Voltage Load Shedding Standard Drafting Team

Nomination Period Open through April 19, 2013

Link to Official Nomination Form
Link to Word Version of Nomination Form

Background

The purpose of this project, as outlined in the associated Standards Authorization Request (SAR), is to improve the existing standards on Under Voltage Load Shedding (UVLS) to include criteria for UVLS programs such that the programs work as intended to shed load when needed and prevent voltage collapse and voltage instability in the Bulk Electric System.

We are seeking a cross section of the industry to participate on the team, but in particular are seeking individuals who have experience and expertise with UVLS program planning, design, and maintenance across the United States and/or Canada.

Experience with developing standards inside or outside (e.g., IEEE, NAESB, ANSI, etc.) of the NERC process is beneficial, but is not required, and should be highlighted in the information submitted if applicable.

Individuals who have facilitation skills and experience and/or legal or technical writing backgrounds are also strongly desired. Please include this in the description of qualifications as applicable.

Instructions for Submitting a Nomination

If you are interested in serving on the Standard Drafting Team, please complete this nomination form by **April 19, 2013**. The nomination form should be submitted describing the individual's experience or qualifications related to the project.

An unofficial Word version of the nomination form is also posted on the Standard Drafting Team Vacancies page.

Standards Process

The Reliability Standards Development Plan explains NERC's work plan for standards development in 2013 and beyond, and the Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our gratitude to all those who participate.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, at wendy.muller@nerc.net or at 404-446-2560.

North American Electric Reliability Corporation
3353 Peachtree Rd.NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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Standards Authorization Request Form

When completed, please email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved reliability standards. Please use this form to submit your request to propose a new or a revision to a NERC's Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard:	Automatic Undervoltage Load Shedding		
Date Submitted:	Revised SAR posted for comment September 2013		
SAR Requester Information			
Name:	Undervoltage Load Shedding Standard Drafting Team (UVLSSDT)		
Organization:			
Telephone:	404-823-1132	E-mail:	Erika.Chanzes@nerc.net
SAR Type (Check as many as applicable)			
☐ New Standard		☒ Withdrawal of existing Standard	
☒ Revision to existing Standard		☐ Urgent Action	

SAR Information
Industry Need (What is the industry problem this request is trying to solve?):
A need for clear and comprehensive requirements for the application and coordination of undervoltage loading shedding (UVLS) as an option to mitigate or address a number of different voltage control concerns, as evidenced by the following: **Of the events analyzed by NERC over the last 10 years, voltage issues have continued to contribute to disturbances.**

SAR Information
NERC SPCS Report to the Planning Committee: Technical Review of UVLS-Related Standards: PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 (December 2010): *"Specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems."* **FERC Order No. 693, Paragraph 1509:** *". . . the Commission directs the ERO to develop a modification to PRC-010-0 through the Reliability Standards development process that requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs."* **August 14 Blackout: Causes and Recommendations, Blackout Recommendation 21:** *"[NERC should] determine the goals and principles needed to establish an integrated approach to relay protection for generators and transmission lines and the use of under-frequency and under-voltage load shedding (UFLS and UVLS) programs. An integrated approach is needed to ensure that at the local and regional level these interactive components provide an appropriate balance of risks and benefits in terms of protecting specific assets and facilitating overall grid survival."*
Purpose or Goal (How does this request propose to address the problem described above?):
1) Establish requirements to ensure an integrated approach to the design, evaluation, and reliable operation of automatic, distributed UVLS programs. 2) Ensure coordination with generator voltage ride-through capabilities and protection and control systems, including, but not limited to, Special Protection Systems (SPSs) and other UVLS programs.
Identify the Objectives of the proposed standard's requirements (What specific reliability deliverables are required to achieve the goal?):
The objective of the proposed standard's requirements is to codify the existing UVLS program requirements to focus on an integrated and coordinated approach to automatic, distributed UVLS programs. Subsequently, successful implementation of the modified standard will improve reliable operation of these programs.

SAR Information
Brief Description (Provide a paragraph that describes the scope of this standard action.)
PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1, and PRC-022-1 and be revised to PRC-010-1, which will provide specific requirements for the design, evaluation, and coordinated operation of automatic, distributed UVLS programs. The revised standard will be accompanied by a recommendation to retire PRC-020-1, PRC-021-1, and PRC-022-1.
Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)
The four existing NERC UVLS standards will be consolidated to create one comprehensive standard, which will reduce the total number of standards and eliminate the PRC-020 applicability to the Regional Reliability Organization (RRO). PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1, and PRC-022-1, and the existing UVLS requirements and measures will be revised to establish a results-based standard that clearly defines the responsibilities of applicable entities to: • Pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of automatic, distributed UVLS programs. • Ensure the coordination of automatic, distributed, UVLS programs with generator voltage ride-through capabilities and protection and control systems, including, but not limited to, SPSs and other UVLS programs. • Establish proper and meaningful automatic, distributed UVLS database requirements. The revised standard **WILL**: • Establish continent-wide requirements applicable to entities responsible for the design and implementation of automatic, distributed UVLS programs. • Address automatic, distributed UVLS program requirements after the need for UVLS has been determined by the appropriate planning studies. • Coordinate and align with standards that have overlapping requirements (i.e., EOP-003-2). The revised standard **WILL NOT**: • Require a UVLS program. • Apply to undervoltage relays not part of a coordinated program that are used to protect local loads.

SAR Information
• Apply to centrally-controlled or centrally-armed load shedding programs. • Apply to the Generator Owner or Generator Operator; Generator Owner data reporting necessary for UVLS coordination is addressed in PRC-024-1. • Include the previously applicable Load-Serving Entity since this function does not own physical assets. If a Load-Serving Entity is also registered as a Distribution Provider, the entity will be included under that applicable function. • Include the previously applicable Transmission Operator because the requirements are more accurately applicable to asset owners (Transmission Owner and Distribution Provider). No market interface impacts are anticipated.

Reliability Functions	
The Standard will Apply to the Following Functions (Check each one that applies.)	
☐ Regional Reliability Organization	Conducts the regional activities related to planning and operations, and coordinates activities of Responsible Entities to secure the reliability of the Bulk Electric System within the region and adjacent regions.
☐ Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐ Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐ Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
☒ Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐ Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.

Reliability Functions		
☒	Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒	Transmission Owner	Owns and maintains transmission facilities.
☐	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☒	Distribution Provider	Delivers electrical energy to the End-use customer.
☐	Generator Owner	Owns and maintains generation facilities.
☐	Generator Operator	Operates generation unit(s) to provide real and reactive power.
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles	
Applicable Reliability Principles (Check all that apply).	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☒	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
☒	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
☒	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.

Reliability and Market Interface Principles	
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☒	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles?	Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.	Yes
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	Yes
4. A reliability 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

Related Standards	
Standard No.	Explanation
EOP-003-2	Per recommendations from the Emergency Operations Five-Year Review Team for Project 2009-03 Emergency Operations, EOP-003-2 Requirements R2, R4, and R7 will be moved to Project 2008-02 UVLS because they overlap with requirements in PRC-010-0. The UVLSSDT will address these overlapping requirements as part of the revision and mapping process.
TPL-001-2	Development of PRC-010-1 is based on implementation of NERC BOT-adopted TPL-001-2.

Related SARs	
SAR ID	Explanation
None	

Regional Variances	
Region	Explanation
ERCOT	None
FRCC	
MRO	
NPCC	
RFC	
SERC	
SPP	
WECC	

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. Standard Authorization Request (SAR) posted for comment on January 20, 2010.

Description of Current Draft

This draft provides initial drafted portions of the standard to support an informal 30-day comment period of the revised SAR.

Anticipated Actions	Anticipated Date
30-day Informal Comment Period for Revised SAR	September 2013
45-day Formal Comment Period with Parallel Initial Ballot	January 2014
Recirculation Ballot	April 2014
BOT Adoption	June 2014

Effective Dates

First day of the first calendar quarter that is twelve months beyond the date that this standard is approved by applicable regulatory authorities. In those jurisdictions where regulatory approval is not required, the standard becomes effective on the first day of the first calendar quarter that is twelve months beyond the date this standard is approved by the NERC Board of Trustees, or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities.

Version History

Version	Date	Action	Change Tracking
1.0	TBD	Completed revision, merging and updating PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.	

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Rationale:

This definition for the term Automatic UVLS Program includes automatic load shedding programs that utilize voltage inputs local to load shedding buses. Therefore, its implementation and reliable performance is inherently not susceptible to Misoperation or inadvertent operation due to a single component failure.

The definition excludes:

- Centrally-controlled or centrally-armed load shedding programs, because their load-shedding logic may utilize 1) voltage inputs from locations other than the load shedding buses; and/or 2) inputs other than voltages, such as generator reactive reserves, facility loadings, and equipment statuses. As such, their implementation is susceptible to Misoperation or inadvertent operation due to a single component failure, which renders them similar in nature to SPSs for achieving reliable performance
- Local load shed that is not part of a coordinated plan to protect the BPS from wide-area severe undervoltage conditions

Automatic Undervoltage Load Shedding (UVLS) Program: A coordinated automatic load shedding program consisting of distributed controls or relays that protects the Bulk-Power System (BPS) from the potential effects of severe undervoltage conditions. The following are excluded:

- Centrally-controlled or centrally-armed UVLS controls or relays
- UVLS controls or relays that are used to address localized undervoltage conditions that would not adversely affect the BPS

When this standard has received ballot approval, the text boxes will be moved to the Application Guidelines Section of the Standard.

A. Introduction

1. **Title: Automatic Undervoltage Load Shedding**
2. **Number: PRC-010-1**
3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Automatic Undervoltage Load Shedding (UVLS) Programs.
4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 UVLS entities shall mean all entities that are responsible for the ownership, operation, or control of UVLS equipment as required by the Automatic UVLS Program established by the Transmission Planner or Planning Coordinator. Such entities may include one or more of the following:

   4.1.3.1 Distribution Provider

   4.1.5.2 Transmission Owner

5. **Background:**

   TBD

B. Requirements and Measures

Rationale for R1: In P 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The UVLSSDT contends that a lack of coordination among protection systems is a key risk to reliability of the Bulk Electric System (BES). Requirement R1 requires each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program to consider coordination with generator voltage ride-through capabilities and other protection and control systems, including but not limited to, transmission line protection and auto-reclosing, Special Protection Systems (SPSs), and other UVLS programs. If an entity determines that there is no applicable coordination with generator voltage ride-through capabilities or other protection systems or that its Automatic UVLS Program is inherently coordinated, the requirement is satisfied.

R1. Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall coordinate the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities. *[Violation Risk Factor:] [Time Horizon:]*

M1. Each Planning Coordinator or Transmission Planner that develops an Automatic UVLS Program shall have evidence for Requirement R1 that must include, but is not limited to, documentation of the specific considerations given to coordination between the Automatic UVLS Program and other protection and control systems and generator voltage ride-through capabilities.

Rationale for R2: UVLS entities need specifications, including but not limited to, voltage tripping levels, timing, and the amount and location of load to be shed to implement an Automatic UVLS Program. The specifications must be kept current with program modifications. Requirement R2 requires that each Planning Coordinator or Transmission Planner communicates current specifications of the Automatic UVLS Program to applicable UVLS entities.

R2. Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall provide specifications of the Automatic UVLS Program to UVLS entities. *[Violation Risk Factor:] [Time Horizon:]*

M2. Each Planning Coordinator or Transmission Planner that develops an Automatic UVLS program shall have evidence for Requirement R2 that must include a dated copy of the documentation provided to each UVLS entity regarding specifications associated with the Automatic UVLS Program.

Rationale for R3: Requirement R3 requires the Planning Coordinator or Transmission Planner to provide a schedule for implementation of the Automatic UVLS Program to the applicable UVLS entities so that each UVLS entity can develop a plan to design, install, and test necessary equipment.

R3. Each Planning Coordinator or Transmission Planner that develops an Automatic UVLS Program shall provide a schedule for implementation of the Automatic UVLS Program to each UVLS entity. *[Violation Risk Factor:] [Time Horizon:]*

M3. Each Planning Coordinator or Transmission Planner that develops an Automatic UVLS Program shall have dated evidence, such as emails, letters, or other dated documentation that demonstrates that a schedule for implementation of the Automatic UVLS Program was provided to each UVLS entity.

Rationale for R4: Requirement R4 requires UVLS entities to implement the program according to the specifications provided by the Planning Coordinator or Transmission Planner. Lack of adherence to the program specifications and schedule may prevent the program from restoring acceptable voltage, which may lead to instability, uncontrolled separation, or cascading outages.

R4. Each UVLS entity shall implement automatic tripping of load in accordance with the Automatic UVLS Program specifications and schedule as determined by its Planning Coordinator or Transmission Planner. *[Violation Risk Factor:] [Time Horizon:]*

M4. Each UVLS entity required to shed load as part of an Automatic UVLS Program shall have dated evidence, such as reports or other dated documentation that demonstrates that automatic tripping of load was implemented in accordance with the Automatic UVLS Program specifications and schedule.

Rationale for R5: The intention of Requirement R5 is to re-evaluate, at least once every five years, the need for and effectiveness of an Automatic UVLS Program. The Automatic UVLS Program's commissioning date will trigger the assessment requirement, covering years zero through five in the five-year cycle. Subpart 5.2 reinforces the coordinated approach directed by P 1509 from Order No. 693 (referenced in the rationale for Requirement R1). Communication of assessment results among UVLS entities will be covered by Requirement R2.

R5. Each Planning Coordinator or Transmission Planner shall perform an assessment of each Automatic UVLS Program in its area every five years, or sooner if significant changes are made to system topology or operating characteristics, to: *[Violation Risk Factor:] [Time Horizon:]*

5.1. Assess each Automatic UVLS Program's continued need and effectiveness.

5.2. Assess the continued coordination of the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities.

M5. Each Planning Coordinator or Transmission Planner shall have dated evidence such as assessment reports or other dated documentation that demonstrates it performed the assessment of the need for and effectiveness of the Automatic UVLS Program and continued coordination of the program with other protection and control systems and generator voltage ride-through capabilities.

Rationale for R6: The UVLSSDT asserts that the scenario of an Automatic UVLS Program not functioning as expected during an applicable event presents a critical risk to system reliability. Requirement R6 requires a program performance analysis after these events to evaluate whether or not the Automatic UVLS Program responded as intended. It is expected that this analysis would also identify relay Misoperations. The one-year time frame from the date of the event to conduct the analysis accounts for the Planning Coordinator or Transmission Planner working jointly with applicable UVLS entities.

R6. Each Planning Coordinator or Transmission Planner in whose area an undervoltage event results in voltage excursion below the initializing set points of the Automatic UVLS Program shall analyze its performance within one year of the event to evaluate the effectiveness of the Automatic UVLS Program. *[Violation Risk Factor:] [Time Horizon:]*

M6. Each Planning Coordinator or Transmission Planner shall have dated evidence, such as event analysis reports, data gathered from an event, or other dated documentation to show that it conducted an event analysis to evaluate the effectiveness of the Automatic UVLS Program.

Rationale for R7: If program deficiencies are identified during the analysis required by Requirement R6, Requirement R7 requires the Planning Coordinator or Transmission Planner to conduct an assessment of the Automatic UVLS Program to address the deficiencies. The two-year time frame from the date of the event to perform the assessment accounts for the one-year time frame to conduct the event analysis per Requirement R6 (providing a minimum of one year to perform the program assessment).

R7. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its analysis of the Automatic UVLS Program per Requirement R6 shall conduct an Automatic UVLS Program design assessment to address the identified deficiencies within two years of the event. *[Violation Risk Factor:] [Time Horizon:]*

M7. Each Planning Coordinator or Transmission Planner shall have dated evidence, such as assessment reports or other dated documentation that a design assessment has been completed to address deficiencies identified in Requirement R6.

Rationale for R8: Necessary and up-to-date Automatic UVLS Program data must be readily available to perform studies and for use in event analyses. Requirement R8 ensures that any changes to the Automatic UVLS Program are captured in order to maintain an accurate database.

R8. Each Planning Coordinator or Transmission Planner shall maintain an Automatic UVLS Program database containing data necessary to model its Automatic UVLS Program for use in event analyses and assessments of the Automatic UVLS Program at least once each calendar year, with no more than 15 months between maintenance activities. *[Violation Risk Factor:] [Time Horizon:]*

M8. Each Planning Coordinator or Transmission Planner shall have dated evidence, such as spreadsheets, database reports, or other dated documentation to show that it maintained a UVLS database necessary to model its Automatic UVLS Program.

Rationale for R9: In order to maintain an accurate and up-to-date Automatic UVLS Program database to perform studies and for use in event analyses, Requirement R9 requires UVLS entities to provide appropriate program data in a timely manner to the Planning Coordinator or Transmission Planner.

R9. Each UVLS entity shall provide data to its Planning Coordinator or Transmission Planner according to the format and schedule specified by the Planning Coordinator or Tranmission Planner to support maintenance of each Automatic UVLS Program database. *[Violation Risk Factor:] [Time Horizon:]*

M9. Each UVLS entity shall have dated evidence, such as emails, letters, or other dated documentation that demonstrates it provided data to its Planning Coordinator or Transmission Planner according to the format and schedule specified by the Planning Coordinator or Transmission Planner to support maintenance of the Automatic UVLS Program database.

Rationale for R10: Requirement R10 supports the integrated and coordinated approach to Automatic UVLS Programs directed by P 1509 of Order No. 693 by requiring that Automatic UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time frame of a request.

R10. Each Planning Coordinator or Transmission Planner shall provide its Automatic UVLS Program database to other Planning Coordinators or Transmission Planners within its Interconnection within 30 days of a request. *[Violation Risk Factor:] [Time Horizon:]*

M10. Each Planning Coordinator or Transmission Planner shall have dated evidence, such as emails, letters, or other dated documentation to show that it provided its Automatic UVLS Program database to other Planning Coordinators or Transmission Planners within its Interconnection within 30 days of a request.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

TBD

1.3. Compliance Monitoring and Assessment Processes:

Compliance Audits

Self-Certifications

Spot Checking

Compliance Violation Investigations

Self-Reporting

Complaint

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	**TBD**					
R2						
R3						
R4						
R5						
R6						
R7						
R8						
R9						
R10						

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

TBD

Requirement R1:

Requirement R2:

Requirement R3:

Requirement R4:

Requirement R5:

Requirement R6:

Requirement R7:

Requirement R8:

Requirement R9:

Requirement R10:

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Unofficial Comment Form

Project 2008-02 Undervoltage Load Shedding Revised SAR

Please **DO NOT** use this form for submitting comments. Please use the electronic form to submit comments on the Project 2008-02 Undervoltage Load Shedding (UVLS) revised Standard Authorization Request (SAR) and supporting draft requirements. The electronic comment form must be completed by 8:00 p.m. ET on **Wednesday, October 9, 2013**.

If you have questions, please contact Erika Chanzes via email or by telephone at 404-823-1132.

The project page may be accessed by clicking here.

Background Information

In January 2010, NERC posted the Project 2008-02 UVLS SAR for public comment. The SAR proposed to consolidate PRC-010-0 and PRC-022-1 and revise the standard to include specific criteria for UVLS programs and the assessments of those programs. A key element cited in the SAR was the Federal Energy Regulatory Commission (FERC) directive relating to PRC-010-0 from Order No. 693, which is explained in more detail in the revised SAR.

Concurrently with the SAR posting, nominations were accepted for a drafting team. No further actions were taken until the effort was recently restarted as part of the 2013–2015 Reliability Standards Development Plan (RSDP) that addresses pending projects.

A formal drafting team was appointed on May 21, 2013, and its members were tasked with reevaluating the SAR. The team's objective was to ensure that Project 2008-02 addresses the existing UVLS standards such that they are results-based, address the appropriate regulatory directives, align with present reliability standard efforts (e.g., Paragraph 81 and Five-Year Review Teams), and consider current reliability issues associated with UVLS.

Based on these considerations, the drafting team has revised the SAR to propose consolidation and revision of the four existing UVLS standards. To support the revised SAR, the team is also providing initial draft requirements for a proposed PRC-010-1. Also included with the requirements are a proposed new NERC Glossary term, measures, and supporting rationales.

This informal comment period seeks stakeholder feedback on the revised SAR and supporting draft requirements during the development stage.

You do not have to answer all questions. Enter comments in simple text format. Bullets, numbers, and special formatting will not be retained.

Questions

1. Do you have any specific questions or comments relating to the scope of the revised SAR?

☐ Yes
☐ No

Comments:

2. Proposed PRC-010-1 consolidates and replaces the requirements previously addressed by PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 in addition to incorporating revisions to meet the Order No. 693 directive and other inputs referenced in the SAR. Do you agree with this approach? If not, please explain your concerns.

☐ Yes
☐ No

Comments:

3. Do you support the revised NERC Glossary term Automatic UVLS Program? If no, please indicate in the comment section what suggested changes would put you in favor of the new glossary term.

☐ Yes
☐ No

Comments:

4. Do you agree with the Applicability of the proposed PRC-010-1? If not, please explain your concerns.

☐ Yes
☐ No

Comments:

5. Please specify if you have comments or suggested changes to any of the draft requirements for the proposed PRC-010-1.

☐ Yes
☐ No

Comments:

6. Do you support the revised SAR and the direction of the proposed PRC-010-1? If no, please indicate what suggested changes would put you in favor of the revised SAR and draft standard.

☐ Yes
☐ No

Comments:

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Standards Announcement

Project 2008-02 Undervoltage Load Shedding

SAR Informal Comment Period: September 10, 2013 – October 9, 2013

Now Available

A 30-day informal comment period for the Project 2008-02 Undervoltage Load Shedding (UVLS) revised Standard Authorization Request (SAR) is now open through **8 p.m. Eastern on Wednesday, October 9, 2013.**

In response to a FERC directive relating to PRC-010-0 from Order No. 693, the original Project 2008-02 UVLS SAR was posted for public comment in early 2010. Due to other priorities, no further action was taken until the effort was recently restarted, with a formal drafting team appointed earlier this year. The drafting team has revised the SAR and is seeking industry feedback. To support the SAR's intention, the team is also providing and requesting feedback on draft requirements and additional supporting language for a proposed PRC-010-1.

This is an informal comment period with no requirement for the drafting team to provide a formal response. The team will take the input received under consideration as the project continues to develop.

Background information for this project can be found on the project page.

Instructions for Commenting

An informal comment period is open through **8 p.m. Eastern on Wednesday, October 9, 2013.** Please use the electronic form to submit comments. If you experience any difficulties in using the electronic form, please contact Wendy Muller. An off-line, unofficial copy of the comment form is posted on the project page.

Standards Development Process

The Standard Processes Manual contains all the procedures governing the standards development process. The success of the NERC standards development process depends on stakeholder participation. We extend our thanks to all those who participate.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, at wendy.muller@nerc.net or at 404-446-2560.

North American Electric Reliability Corporation
3353 Peachtree Rd, NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

Individual or group. (31 Responses)
Name (17 Responses)
Organization (17 Responses)
Group Name (14 Responses)
Lead Contact (14 Responses)
Question 1 (27 Responses)
Question 1 Comments (30 Responses)
Question 2 (25 Responses)
Question 2 Comments (30 Responses)
Question 3 (25 Responses)
Question 3 Comments (30 Responses)
Question 4 (26 Responses)
Question 4 Comments (30 Responses)
Question 5 (24 Responses)
Question 5 Comments (30 Responses)
Question 6 (23 Responses)
Question 6 Comments (30 Responses)

Individual
Chris Mattson
Tacoma Power
Yes
A) This standard is the correct document to address all types of UVLS schemes whether they depend on local relaying, local relaying in conjunction with remote arming, or use transfer trip between substations. Including only fully distributed UVLS programs leaves a reliability gap for other types of UVLS programs. Tacoma Power proposes removing the word "distributed" throughout the SAR. Alternatively, the word "distributed" could be added to this standard's name to make clear that this standard only applies to a subset of automatic UVLS programs. If this standard only applies to a small subset of UVLS programs, another standard will have to be created to fully address FERC order 693. B) Under the description of what "The revised standard WILL NOT: -1) Revise the second bullet point to read "Apply to relays that are used exclusively to protect local areas." Although coordination of local relays is obviously preferable to miscoordination, the existing bullet point suggests undervoltage relays protecting local loads would be covered if they are coordinated. -2) In the third bullet, the term "centrally controlled or centrally-armed" should be replaced with "centrally tripped. " Although not designed explicitly as a central arming scheme, many utility SCADA systems have capabilities equivalent to a central arming scheme.
Yes
Tacoma Power fully supports combining all UVLS requirements into a single standard. The flowchart from the webinar incorrectly classifies some UVLS programs as SPSs; the NERC

Glossary definition of SPS specifically states that an SPS does not include undervoltage load shedding. The flowchart from the webinar implies the need for new definition of “Centrally Controlled UV-based ALSP.” Although using remote quantities or values other than voltage can present different risks than strictly using undervoltage relays, excluding such systems from this standard undermines the SAR objective of an “integrated and coordinated approach.” UVLS programs are often designed as safety nets rather than as responses to required category B or C contingencies. The result of overclassifying UVLS programs as SPSs may result in utilities removing UVLS programs to avoid the complex requirements associated with SPSs.

No

A) The definition should use BES rather than BPS. In the webinar, the presenter indicated BPS was chosen so that the definition included “facility and control systems” rather than just Transmission Elements. Although UVLS programs consist of control systems, the point of control systems is to protect the Transmission Elements. Considering that the industry has spent significant effort to precisely define BES, using the term BPS injects unnecessary ambiguity. B) The word “coordinated” should be removed from the definition. Including the word “coordinated” in both the definition and in requirement R1 is redundant. A UVLS plan would be exempt simply if it was intentionally uncoordinated. C) A major reason for this revision is to consolidate all the UVLS requirements into a single standard. Unfortunately, the proposed definition excludes many UVLS programs and instead categorizes them as SPSs or as unregulated “Centrally Controlled UV-based ALSP.” Tacoma Power proposes removing all references to centrally armed or centrally controlled relays and instead substituting the term “centrally tripped.” Using the term “centrally tripped” indicates near real-time central control, whereas “centrally armed” indicates that the final tripping decision occurs via relays at the local level. Alternatively, an additional standard could be developed to cover the excluded UVLS programs. As written, the standard fails to meet the Industry Need as stated in the SAR for “clear and comprehensive requirements.” D) Many SCADA systems include the capability to either change Relay Settings Groups via an RTU control point or to remotely change settings in a microprocessor based relay. Although not designed explicitly as a central arming scheme, these capabilities can be interpreted as centralized control of a UVLS program. Again, Tacoma Power proposes removing all references to centrally armed or centrally controlled relays. E) The definition as written attempts to include a requirement to avoid single points of failure. However, there are situations where a single failure would still result in failure of the UVLS program. Instead of embedding requirements in the definition, there should be numbered requirements similar to PRC-012-1 R1.2& R1.4 requiring all UVLS programs to consider single points of failure. In the currently proposed standard, some distributed schemes may fail to arrest voltage collapse if a single voltage transformer or a single undervoltage relay is used to shed a large portion of the required load to be shed. The proposed new requirements are: R11. The UVLS programs shall be designed so that a single component failure does not prevent the BES from meeting the performance requirements as defined in Reliability Standards TPL-001-4. R12. The inadvertent operation of the UVLS program shall meet the same performance requirements (TPL-001-4) as that required of the contingency for which it was designed. F) The prohibition on using only voltage inputs from

locations other than the load shedding bus should be removed for the following reasons: 1) In a distribution station, the proposed rationale would not allow using the high side voltage for tripping the low voltage feeders. Interrupting the high voltage side results in less flexibility to continue supplying critical loads and may lengthen restoration times. 2) A common configuration for an undervoltage load shedding program is to trip a radial transmission line emanating from a major substation. In system models, the loads are at the individual downstream distribution substation buses. The draft standard would consider this "Centrally Controlled UV-based ALSP." G) The exclusion definition would be clearer using the defined term Adverse Reliability Impact rather than "adversely affect the BPS." H) The term "local" should be revised to "local area." Including the word "area" indicates that the undervoltage condition can apply to multiple substations and is similar to the language used in the BES definition. As per various NERC documents, the term "local" can mean anything from a single distribution feeder up to a Transmission Operator's entire system as indicated in the following definitions: 1) NERC Guidelines for Developing an Under Voltage Load Shedding (UVLS) Evaluation Program (2006) – definition of "Locally applied UV relay schemes": intended to protect the local load – such as large induction motors, typically on a single distribution feeder. 2) NERC Glossary of terms-definition of "BES LN": A group of contiguous transmission Elements operated at or above 100 kV but less than 300 kV that distribute power to Load rather than transfer bulk power across the interconnected system. LN's emanate from multiple points of connection at 100 kV or higher to improve the level of service to retail customer Load and not to accommodate bulk power transfer across the interconnected system. 3) TPL-004-1 – examples of "local area events": Loss of a major load center. 4) NERC Glossary of terms - definition of "Transmission Operator": The entity responsible for the reliability of its "local" transmission system, and that operates or directs the operations of the transmission facilities. I) The revised rationale would state: This definition for the term Automatic UVLS Program includes automatic load shedding programs that utilize distributed voltage inputs near to load shedding buses. Therefore, its implementation and reliable performance is inherently not susceptible to Misoperation or inadvertent operation due to a single component failure. The definition excludes: * Centrally-tripped load shedding programs primarily based on quantities other than voltage such as generator reactive reserves, facility loadings, or equipment status. * Local area load shedding that is not part of a plan to protect the BES from wide-area severe undervoltage conditions. J) The revised definition would state: An automatic load shedding program consisting of distributed controls or relays that protects the Bulk-Electric System (BES) from the potential effects of severe undervoltage conditions. The following are excluded: * UVLS controls or relays that are used to address local area undervoltage conditions that would not have an Adverse Reliability Impact.
Yes
Yes
Please see comments in section 3. Any requirements to address single points of failure should be stated as requirements rather than embedded in the definition section.

Yes
Tacoma Power supports the use of UVLS programs as a “safety net” for multiple contingencies and extreme events but we are concerned that the existing UVLS regulations have already encouraged utilities to remove “safety net” UVLS capabilities in order to reduce the risk of noncompliance. Increasing the compliance burden for UVLS systems would likely further reduce the number of utilities using “safety net” UVLS programs.
Group
Northeast Power Coordinating Council
Guy Zito
No
Yes
No
The term Bulk Power System (BPS) should not be used in the definition. The term “Bulk Power System” as defined in NERC’s Glossary of Terms comes from the Energy Policy Act of 2005. The Energy Policy Act extends the authority of NERC and FERC over the BPS, which as confirmed by FERC reaches farther than those facilities that are included in the Bulk Electric System (BES). The BES identifies who must comply with NERC Reliability Standards. Replace the reference to BPS under Definitions of Terms Used in Standard with either Bulk Electric System (BES), or as an alternative, with “interconnected transmission system” as proposed in the Purpose statement of Standard MOD-032-1.
Yes
Yes
The Standard needs to be reviewed for the proper use of BES versus BPS. Regarding PRC-010-1 R1 and the automatic switching of devices such as shunt reactors, it is similar to what is mentioned in Requirement R10 of PRC-006-1. Requirement R1 of PRC-010-1 reads: R1. Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall coordinate the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities. Requirement R10 of PRC-006-1 reads: R10. Each Transmission Owner shall provide automatic switching of its existing capacitor banks, Transmission Lines, and reactors to control over-voltage as a result of underfrequency load shedding if required by the UFLS program and schedule for application determined by the Planning Coordinator(s) in each Planning Coordinator area in which the Transmission Owner owns transmission. How is the flow chart used to classify Automatic Load Shedding Programs (ALSP) provided during the webinar on September 17, 2013, planned to be incorporated into the proposed draft Standard PRC-010-1? Regarding Requirement R4, Suggest to add the words “the capability of” after “implement”. R4 will then read: Each UVLS entity shall implement the capability of automatic tripping of load in accordance…” The proposed change is to avoid the misinterpretation that the UVLS entity

needs to implement the actual tripping of load even when not initiated by the threshold voltage or system conditions. The same wording change also applies to Measure M4.
Yes
Group
Southern Company
Wayne Johnson
Yes
PRC-024-1 includes requirements for both the setting specifications (limitations) for generator owner voltage relays and for data reporting. The second part of the statement in the second bullet on page 4 of the revised SAR can better represent PRC-024-1 by stating that "Generator Owner voltage relay setting specifications (limitations) and data reporting requirements necessary for UVLS coordination are addressed in PRC-024-1".
No comment
No comment.
No
The numbering for 4.1.3.2 is incorrectly shown as 4.1.5.2 in Draft 1 of PRC-010-1. Although discussed in the revised SAR that the GO and GOP are not included in the scope of PRC-010-1, it is not apparent from the open endedness of the Applicability section 4.1.3. Please explicitly indicate that GOs and GOPs are not included in 4.1.3. (perhaps using 4.1.3.3).
No comment.
No
Not necessarily "NO", however; since this standard is primarily accountable to the Transmission Planner (8 of ten requirements); and the only UVLS Entity (TO, DP) responsibility is implementing (R4) and reporting to the TP (R9); the standard should be considered to be moved to the TPL family.
Group
PacifiCorp
Kelly Cumiskey
No
Yes
No
PacifiCorp seeks clarification from the SDT on their use of BPS rather than BES in the definition of Automatic UVLS Program. PacifiCorp is concerned that the use of BPS over BES unnecessarily expands the scope of what consists of an Automatic Undervoltage Load Shedding. Also the current exclusion relating to “localized undervoltage conditions that

would not adversely affect the BPS" is too broad and difficult to determine exclusion. PacifiCorp feels the use of BES would be more appropriate.
Yes
No
Yes
Individual
Thomas Foltz
American Electric Power
No
Yes
Yes
Yes
Yes
R1: We recommend replacing "protection and control systems" with "Protection System" from the NERC Glossary. R8: What purpose would the database serve? Perhaps it is simply a means to an end, but the standard does not clearly show the tangible benefits of having such a database nor how it would be used. Its inclusion in the standard is possibly for the sake of completeness, but could it possibly be left outside the standard? Does the team plan to coordinate their efforts on R8 and R10 with MOD-032 project team? We believe it is presumptuous to state that Automatic UVLS Programs that include automatic load shedding programs and that utilize local voltage inputs are "inherently not susceptible to Misoperation or inadvertent operation due to a single component failure." Individual relays *are* susceptible to misoperation or inadvertent operation, however we *would* agree that such load shedding programs would be less susceptible to failure due to components not directly associated with a local bus (i.e., due to system-wide failures).
Yes
Individual
Michael Falvo
Independent Electricity System Operator
No

Yes
Yes
Yes
We generally agree with the Applicability Section but suggest the SDT to review the need to add Transmission Operator to the list of applicable entities on the basis that a TOP may be required to make UVLS selections (enable or disable it) under circumstances it sees appropriate or directed by the Reliability Coordinator. While the PC and TP develop the UVLS program and the TO provides the capability to trip load in accordance with the program, the actual selection of the UVLS may fall under the TOP's responsibility.
Yes
Requirement R4: Suggest to add the words "the capability of" after "implement". R4 will read thus read: "Each UVLS entity shall implement the capability of automatic tripping of load in accordance…" The proposed change is to avoid the misinterpretation that the UVLS entity needs to implement the actual tripping of load even when not initiated by the threshold voltage or system conditions. The same wording change also applies to Measure M4.
Yes
We support the revised SAR and the direction of the proposed PRC-010-1. However, we have the following additional comments: The proposed effective date may conflict with the implementation date of NERC Reliability Standards in Ontario, Canada. To remove this potential conflict, we suggest the phrase "or as otherwise made effective pursuant to the laws applicable to such ERO governmental authorities." In the Effective Dates Section be moved to immediately after "by applicable regulatory authorities".
Individual
Don Schmit
Nebraska Public Power District
Yes
Requirements 8 through 10 are all administrative in nature and should be handled outside of the NERC Standards.
Group
Dominion
Connie Lowe

No
Yes
No
Dominion suggests Bulk-Power System (BPS) be replaced with BES.
Yes
Yes
4.1.3 reads “UVLS entities shall mean all entities that are responsible for the ownership, operation, or control of UVLS equipment …” yet applies only to asset owners (DP and TO). The SDT needs to determine whether they intended for UVLS entity to include operating entity and if so, whether they should add TOP.
Yes
Generally yes, but primarily based upon recommendations of the Industry Experts Review Panel. To a lesser extent; FERC Order 693 and the fact that PRC-020 was remanded, rendering standards that rely upon it is somewhat ambiguous.
Group
DTE Electric
Kathleen Black
No
No comments
Yes
Yes
Yes
No
No comments
Yes
Group
c
c
Individual
David Jendras
Ameren

Yes
(1) We believe the need for this standard is vague and recommend analyzing this way; “Of the y (fill in number) events analyzed by NERC over the last 10 years, x (fill in number) voltage issues have continued to contribute to disturbances. (2) We ask the SDT to clarify ‘The revised standard WILL NOT:’ 2nd bullet (bottom of p 3). We suggest “Apply to undervoltage relays not part of a coordinated program. Such undervoltage relay is used to protect local loads.” (3) We believe the title needs to be changed to reflect that it is intended for UVLS for Wide-Area BPS Protection, as UVLS controls and relays for local under-voltage events are excluded. (4) We ask the SDT the following: (a) How do you believe the BPS will be more reliable with this standard? (b) How many reliability events have been triggered by the “lack of coordination” of UVLS programs? (c) How many UVLS relay misoperations have prevented the program from restoring acceptable voltage and have led to instability, uncontrolled separation, or cascading outages?
Yes
(1) We agree with the consolidation approach.
Yes
No
(1) We believe that the Planning Coordinator’s role in this standard should be limited to those activities as defined in the NERC Functional Model, including coordinating and collecting data, coordinating plans, receiving plans and data from Transmission Planners, etc. Planning Coordinators should not be involved in the design, development, or implementation of UVLS programs. Therefore, the Planning Coordinator should be removed from requirements R1, R2, R3, R4, R6, and R7.
Yes
(1) It’s unclear to UVLS entities whether the PC or TP will perform many of the requirements. We prefer the TP only for R1, R2, R3, R4, R6, and R7. Change R10 to state that TP provides to other PC and TP within its Interconnection. (2) We request the SDT to add to requirement R5.1, “Transmission Planner will work to modify UVLS program as needed if deficiencies in performance are identified in the assessment”. (3) We request the SDT to change R8 “or” to “and” in the first line so that the requirement reads “Each Planning Coordinator and Transmission Planner shall maintain an Automatic UVLS Program database containing data necessary to model its Automatic UVLS Program for use in event analyses and assessments of the Automatic UVLS Program at least once each calendar year, with no more than 15 months between maintenance activities”. (4) We request the SDT to change R9 “or” to “and” at the end of the first line so that the requirement reads “Each UVLS entity shall provide data to its Planning Coordinator and Transmission Planner according to the format and schedule specified by the Planning Coordinator or Transmission Planner to support maintenance of each Automatic UVLS Program database”.
Yes

(1) As mentioned above, we generally support the consolidation approach, subject to our comments.
Group
Arizona Public Service Company
Janet Smith, Regulatory Affairs Supervisor
No
Yes
Yes
Yes
Yes
The standard has unnecessary requirements. Other than the Requirements R1 and R5, all other requirements are administrative and are against the spirit of the Results Based Standards. For example, R9, and R10 are about the data submittal and should be covered in MOD standards. Similarly R2, R3, R4, R6, R7, and R8 are administrative in nature and should be removed.
Yes
Individual
Teresa Czyz
Georgia Transmission Corporation
No
Yes
Yes
Yes
Yes
For R1 “…..shall coordinate with other protection….etc” Who are the “other” that the requirement is referring to? Reconsider the use of the word “other” or define what “other” is. For R5 “…an assessment of each Automatic….” In R1-R4….the requirements seem to refer to a SINGLE Automatic UVLS Program. But in R5….it refers to multiple programs. Please provide further clarity.

Yes
Individual
Trevor Schultz
Idaho Power
No
Yes
Yes
Yes, I support the proposed definition of the term Automatic UVLS Program. However, this definition leaves confusion as to how a centrally-armed or centrally-controlled UVLS scheme should be classified since the current NERC Glossary definition for SPS specifically excludes "undervoltage load shedding". The generic use of the phrase "undervoltage load shedding" in the SPS definition could be interpreted as referring to either distributed or centrally armed/controlled UVLS schemes. If "Automatic UVLS Program" is added to the NERC Glossary, the SPS definition should be changed such that "undervoltage load shedding" is replaced with "Automatic UVLS Program". Likewise, other Reliability Standards should be checked for usage of the generic acronym "UVLS" or generic phrase "undervoltage load shedding", and these terms should be replaced with "Automatic UVLS Program", "SPS", or some other more specific phrase.
Yes
Yes
Individual
Andrew Z. Pusztai
American Transmission Company, LLC
No
Yes
Yes
Yes

Individual
Oliver Burke
Entergy Services, Inc.
No
Yes
Yes
Yes
No
Yes
Individual
Anthony Jablonski
ReliabilityFirst
ReliabilityFirst offers the following comments for consideration: 1. Requirement R1 - ReliabilityFirst believes the use of the term “coordinate” in Requirement R1 is ambiguous and could lead to unintended compliance implications. ReliabilityFirst recommends the SDT consider further clarifying the intent behind such intended coordination. The concept of coordination has historically caused confusion within industry and led to a variety of interpretations. This needs to be clarified. 2. Requirement R2 - ReliabilityFirst believes the requirement should specify the minimum mandatory “specifications of the Automatic UVLS Program” and they should be prescribed in the requirement consistent with the associated rationale. ReliabilityFirst recommends the following for consideration: “Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall provide [at a minimum, voltage tripping levels, timing, and the amount and location of load to be shed] specifications of the Automatic UVLS Program to UVLS entities.” 3. Requirement R5 - ReliabilityFirst believes the use of the term “significant” in Requirement R5 is ambiguous and could lead to unnecessary delays in performing a needed assessment. ReliabilityFirst recommends the SDT further define what the SDT constitutes as a significant change made to system topology or operating characteristic. Absent further clarification, this may also lead to unintended compliance implications. 4. Requirement R7 - ReliabilityFirst believes that once the Planning Coordinator or Transmission Planner conducts an Automatic

UVLS Program design assessment, it is necessary for the entity to resolve any deficiencies as well. There is little value in performing an assessment unless action is taken to resolve the identified deficiency. ReliabilityFirst recommends the following for consideration: “Each Planning Coordinator or Transmission Planner that identifies deficiencies through its analysis of the Automatic UVLS Program per Requirement R6 shall conduct an Automatic UVLS Program design assessment to address [and resolve] the identified deficiencies within two years of the event.” 5. Requirement R10 - ReliabilityFirst believes the word “calendar” should be added in front of the word “days”. This will help alleviate any confusion on the number of days in which the entity has to provide its UVLS database. ReliabilityFirst recommends the following for consideration: “Each Planning Coordinator or Transmission Planner shall provide its Automatic UVLS Program database to other Planning Coordinators or Transmission Planners within its Interconnection within 30 [calendar] days of a request.”
Group
ISO RTO Council Standards Review Committee (limited members set)
Charles Yeung
No
Yes
Yes
No
Our response and discussion provided for Question 5 explains our support for the applicability of PRC-010-1.
No
We have one proposed change to a requirement and a commentary on the overall scope of the proposed requirements: Some PCs design their system to avoid the need for UVLS and therefore do not have a UVLS program. The standard needs to address the situation when the TP/PC/TOP does not have a UVLS program but the UVLS entity has their own UVLS schemes. The concepts contained within PRC-010-0 R1 should be incorporated within the new standard to ensure that individual UVLS entity schemes that are developed outside or in lieu of a TP/PC/TOP program are coordinated with their TP/PC/TOP. The proposed scope certainly supports reliability of the BES and addresses the FERC Order 693 directive related to coordination of undervoltage protection schemes. Further we support the Results-based approach to reconstitute the related requirements from four existing standards all under PRC-010-1. However, we ask the SDT and NERC in general, to consider making requirements that are not core to the reliability result that is desired, in new ways that obligate entities to perform them, but do not rise to a level of a full numbered requirement that will be subject to FERC approval and the NERC compliance program obligations. The industry is trying to move towards requirements that more sharply focuses its limited resources onto tracking

and documenting the requirements which most directly impact and benefit the reliability of the BES. Requirements that are supportive in nature or administrative in nature – although an important part of what needs to be performed to satisfy reliability – may not always have to be included in a standard as a distinct and measurable requirement. NERC should begin a conversation with industry and regulators to find ways to complement the core reliability impactive requirements with peripheral and supportive requirements through other mechanisms. These other mechanisms would not be requirements in the sense of having to be measured and penalized, but failure to perform such procedures could in fact cause a finding of a violation of the core reliability requirement. As an example, R5 states "Each Planning Coordinator or Transmission Planner shall perform an assessment of each Automatic UVLS Program in its area every five years, or sooner if significant changes are made to system topology or operating characteristics," to: [Violation Risk Factor:] [Time Horizon:] 5.1. Assess each Automatic UVLS Program's continued need and effectiveness. 5.2. Assess the continued coordination of the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities. This requirement would have to be audited and tracked and documented that it is performed –requiring the full compliance resources as a core requirement, R1. Such an assessment every five years is certainly beneficial for reliability – but is not the core results-based requirement for BES reliability. The R1 requirement which dictates what the assessment should entail is the penultimate requirement for which R5 intends to ensure. If R5 was found to be in violation, the ultimate test of a threat to reliability does not end at not having a document showing the assessment was performed five years from the last date, but an actual reliability threat would be a demonstration that R1 was violated because that five year assessment was missed. Conversely, the measure M5 states: M5. Each Planning Coordinator or Transmission Planner shall have dated evidence such as assessment reports or other dated documentation that demonstrates it performed the assessment of the need for and effectiveness of the Automatic UVLS Program and continued coordination of the program with other protection and control systems and generator voltage ride-through capabilities. In other words, such dated evidence to show to an auditor is no assurance that R1 is not in violation. It merely shows an entity has careful record keeping procedures. Truly not the intended "result" of PRC-010-1. So for this example, a possible alternative to having a specific requirement in PRC-010-1 to reassess UVLS studies every five years is to instead have an overall NERC "maintenance" program where all standards which require the performance of a study have a schedule for registered entities to perform reviews of its subject requirements. In this way, the obligation for supplemental activities to meet reliability objectives reside in supporting programs. Other alternatives may be possible as well.
No
Our response and discussion provided for Question 5 explains our support for the direction of PRC-010-1.
Group
Minnkota Power Cooperative, Inc.
Aaron Vander Vorst

No
Yes
No
-Definition Change 1 Replace: “A coordinated automatic load shedding program consisting of distributed controls or relays that…” With: “A set of coordinated, distributed controls or relays that automatically shed load following the detection of low or decaying voltage in order to …” Purpose: A term should not be included in its own definition. UVLS is not defined in the NERC glossary, so it also needs to be spelled out. "or decaying voltage" was added from existing language in EOP-003-2 R4, and may not be necessary. -Definition Change 2 Replace: “…protects the Bulk-Power System (BPS) from the potential effects of severe undervoltage conditions.” With: “…protect the Bulk-Power System (BPS) against Adverse Reliability Impacts caused by severe undervoltage conditions.” (could alternately use the NERC term “Emergency” conditions) Purpose: Use of NERC defined term “Adverse Reliability Impact” provides clarity to what the purpose of the Automatic UVLS Program is. It also helps to clarify what is meant by “localized” in the exclusions section of the definition. -Definition Change 3 Replace: “UVLS controls or relays that are used to address localized undervoltage conditions that would not adversely affect the BPS” With: “UVLS controls or relays that are used to address localized undervoltage conditions” Purpose: TPL-001-4 gives explicit permission for the use of UVLS for local planning purposes including protection of the BES/BPS. Further, forcing all UVLS relays which protect the BPS to be categorized as a program is not consistent with the Rationale statement for the definition, which says “Local load shed that is not part of a coordinated plan to protect the BPS from wide-area severe undervoltage conditions.” The wide-area aspect is captured through use of the term “Adverse Reliability Impact” in the main portion of the definition. -Definition Question Why is BPS used instead of BES? It seems NERC is moving towards use of BES in their formal definition. BES is the preferred term.
Yes
Yes
-Version History Change Under version 1.0 Action, add something to the effect of “and UVLS-related requirements from EOP-003-2”. -R2 Change Add the following to the end of requirement R2: “, including but not limited to, voltage tripping levels, timing, and the amount and location of load to be shed.” Purpose: Minimum specifics listed in the Rationale portion will not exist following the removal of the Rationale section. If the expectation is that these items will be included, they should be explicitly listed. -R4 Change Add the following to the end of requirement R2: “in Requirements R2 and R3” Purpose: Removes any question as to the intent of the requirement -R5 Correction Typo: There is a space missing before the final word “to” of the requirement. -R5.2 Change Replace: “…with other protection and control systems and generator voltage ride-through capabilities.” With: “…as specified in Requirement R1.” Purpose: Repetition of identical language can lead to inconsistent

language when one statement is changed. Referencing R1 instead of repeating the language makes sure there is no inconsistency. -R8 Change Replace: “Each Planning Coordinator or Transmission Planner shall…” With: “Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall…” Purpose: Ensures consistency with other PC/TP requirements in the standard, doesn’t force this requirement on all PC/TPs.
Yes
I am generally very pleased with the proposed changes, but would strongly prefer to see the aforementioned changes included to provide more clarity to the standard.
Individual
Andrew Z. Pusztai
American Transmission Company
Yes
ATC has the following comment for consideration by the SDT: The direction of the proposed standard is to ensure that an Automatic UVLS Program created by the Planning Coordinator or Transmission Planner is well planned. ATC would like to confirm that this proposed standard will not preclude the use of temporary UVLS installations in the Operating Horizon by the Transmission Operator to ensure BPS reliability during periods of construction or other work on the transmission system.
No
ATC recommends that the subject definition be revised to exclude temporary UVLS used to support outages in the Operating Horizon.
Group
SPP Standards Review Group
Robert Rhodes
No
Yes
No
We feel the definition should refer to the Bulk Electric System (BES) rather than the Bulk Power System (BPS). The drafting team refers to BES later in the draft standard itself. The drafting team has attempted to clarify the exclusion of certain types of protection systems in the exclusions in the definition. Try as they may, it still isn’t crystal clear exactly what the definition is trying to exclude. Could the drafting team include additional clarification? For example, the use of Misoperation is a bit confusing in that UVLS schemes can misoperate but they apparently do not Misoperate? We concur with the following comments on this issue

provided by AEP: “We believe it is presumptuous to state that Automatic UVLS Programs that include automatic load shedding programs and that utilize local voltage inputs are “inherently not susceptible to Misoperation or inadvertent operation due to a single component failure.” Individual relays *are* susceptible to misoperation or inadvertent operation, however we *would* agree that such load shedding programs would be less susceptible to failure due to components not directly associated with a local bus (i.e., due to system-wide failures).”
Yes
Yes
We wonder if R8 and R10 are, or have been, coordinated with the MOD B project? In fact, we believe that R8 should be included in the package of standards associated with the MOD B project.
No
We could probably support the proposed PRC-010-1 providing the drafting team addresses the issues we raised in Questions 3 and 5 above. Specifically, use BES rather than BPS, provide additional clarification regarding misoperation and coordinate with the MOD B project including moving R8 to that effort.
Group
Duke Energy
Michael Lowman
Yes
Yes
No
Duke Energy believes that bullet 2 of the Automatic Undervoltage Load Shedding definition needs to be reworded for clarity. It is unclear what “not adversely affect” means in this definition.
Yes
Yes
Duke Energy suggests combining R1 and M1 into one requirement as follows, “R1. Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall: R1.1: Coordinate the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities. R1.2: Maintain documentation describing/listing the specific considerations given in the coordination of the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities as evidence of compliance.” By combining R1 and M1, it adds clarity on the expectations of the Automatic UVLS Program. Duke Energy also recommends

rewording R7 to read, “Each Planning Coordinator or Transmission Planner that identifies deficiencies in its analysis of the Automatic UVLS Program per Requirement R6 shall conduct an Automatic UVLS Program design assessment to address and implement the identified deficiencies within two years of the event.” By adding the word implement, it is clear that deficiencies need to be addressed and implemented within 2 years of event. Finally, Duke Energy would like the SDT to discuss whether 2 years is an appropriate time frame to address and implement an identified deficiency. If the deficiency identified is a change to a relay setting, we agree that 2 years is an appropriate amount of time for the change to be made. However, if a line needs to be upgraded or added to the Automatic UVLS Program to address those deficiencies, then 2 years may not be an adequate amount of time to address and implement.
Yes
Group
ACES Standards Collaborators
Jason Marshall
Yes
1) We do not believe there is sufficient data to support the need for a standard for an automatic UVLS program. We do not believe there is a significant amount of UVLS installed on the grid that is not local in nature. If this is indeed the case, then an international standard is unnecessary especially since the standard proposes that it would not apply to UVLS installed for “localized undervoltage conditions”. If a region does have significant UVLS, a regional standard could be written. Has NERC determined how much UVLS is installed on the BES and how much load is covered? If not, we suggest NERC evaluate the regional entity databases on UVLS data that the regional entities are required to maintain per PRC-020. If there is not sufficient data in those databases, than a data request to determine the amount of UVLS installed that protects the BES can be issued. Analysis of this data is necessary since the standard is not intended to require installation of automatic UVLS programs. If there is not significant amount of existing UVLS that protects the BES, then no standard is necessary. 2) If the SAR moves forward, we think there are many changes needed to clarify the SAR. 3) The point in the industry need section stating that voltage issues have contributed to events over the last ten years is vague and needs to be clarified. This is an obvious statement. Voltage issues will always contribute to events in one form or another. Is this an indication that UVLS has failed during events contributing to expansion of the event or that UVLS was needed in some location as a result of the events? If so, please provide additional clarification. If not, then why is it mentioned in a SAR for UVLS? 4) The statement in the industry need section that there is a “need for clear and comprehensive requirements for the application and coordination of undervoltage load shedding (UVLS) as an option to mitigate or address a number of different voltage control concerns” should be modified. UVLS is always an option and the proposed standard will do nothing to further support this as an option. In fact, it will make responsible entities look for other solutions to avoid the compliance burden. This statement should simply state that the need is for “coordation of

undervoltage load shedding when the Planning Coordinator determines there is a need for it". As another option, the purpose statement for the proposed standard could be used. 5) There is one significant issue with writing a standard for UVLS. FERC required NERC to modify the TPL standards such that non-consequential load shedding was only allowed in limited quantities and applications. The standards essentially limit the non-consequential load shedding to 75 MW. The 75 MW was based on a section 1600 data request requiring responsible entities to indicate if they use non-consequential load shedding. Shedding 75 MW of load is most likely going to be performed to address local issues where there is not a significant amount of transmission. Since an automatic UVLS program will result in shedding firm demand for contingencies that do not interrupt the firm demand, the automatic UVLS program would be non-consequential load shed. Thus, can a PC or TP create an automatic UVLS program "that protects the Bulk-Power System (BPS) from the potential effects of severe undervoltage conditions and not violate the 75 MW limitation in the TPL standards? We think the answer is no. 6) The purpose and goal section should state very clearly in bullet 1 that requirements are intended to apply only when the responsible entity determines that an automatic UVLS program is necessary. We understand that it is documented in other places in the SAR that the standard will not require UVLS installation. However, we think this should be documented in additional locations because excerpts of SARs and standards can be quoted and taken out of context. We also think a similar modification should be made to the first bullet of detailed description section. 7) We agree with retiring PRC-020-1, PRC-021-1 and PRC-022-1 and EOP-003-2 R2, R4 and R7.
No
We agree that these standards are not needed and should be retired. However, we question the need for any UVLS standards. We do not believe there is widespread use of "automatic UVLS programs" designed to support the reliability of the BES and to which this standard would apply. NERC could request data on such programs or to evaluate the existing data in the regional entity databases required by PRC-020. This data would then help determine if a UVLS standard is truly needed.
No
1) The question states that this is a revised definition. We can find no such definition in the glossary of terms. If it does exist, we would be interested in seeing the red-line version of the definition so we can see what changed. 2) BPS should not be used in the definition. Because BPS can be much broader than BES, is more ambiguous and could potentially draw in non-BES assets, BES should be used. NERC has provided guidance in the form of a memo to the standards committee that in general standards apply to the BES unless other further specific applicability is necessary to support BES reliability. The additional applicability must be specified in the standard itself. Thus, there should be great justification provided for using BPS rather than BES. Furthermore, we do not see how use of BPS provides specific applicability. In fact, it is not specific but ambiguous and its use will only lead to inconsistent enforcement. We can find no justification in an application guidelines section of the standard or a whitepaper. While we understand that BPS may have been used because much of the UVLS may be installed on the distribution system, its use is not necessary because the

purpose is to protect the BES not the BPS. If drafting team believes the standard should be applicable to non-BES facilities, then additional applicability should be specified in detail in the standard to avoid inconsistent enforcement.
No
1) The PC should be responsible for the design of the automatic UVLS program and not the TP. Dual applicability will only lead to the same confusion that exists with the TPL standards. Both the TP and PC will have to prove compliance with the standard even if the PC has agreed with the TP to perform the design. It will result in unnecessary compliance burdens on the TP and could even lead to conflicting automatic UVLS programs if both entities develop their own programs. This could harm reliability. 2) Section 4.1.5.2 should be 4.1.3.2. 3) Sections 4.1.3, 4.1.3.1 and 4.1.3.2 (written as 4.1.5.2) are confusing. Is the purpose of adding the DP and TO as sub-sections to indicate that these are the only potential UVLS entities? If so, why not write the applicability similar to the DP for PRC-005. It states in one section that the standard is only applicable DPs that own transmission Protection Systems. This would be clearer and consistent with other standards. 4) Section 215(i)(2) of the energy policy act of 2005 specifically prohibits NERC from requiring construction of transmission capacity. Section 4.1.3 could be viewed as requiring the UVLS entity to build transmission capacity because it makes the UVLS entity “responsible for ownership”. Making the UVLS entity responsible for ownership is the same as requiring them to build UVLS which could ultimately serve to expand transmission capacity by preserving SOLs or increasing SOLs.
Yes
1) In R1, BES should be added before generator to clarify that coordination is necessary only with BES generators. Otherwise, the standard could be interpreted to apply to all kinds of distributed generation. Coordination with distributed generation is not practical. 2) R2 meets Paragraph 81 criteria B1 (administrative) and B4 (reporting). It requires the PC or TP to report specifications to UVLS entities which clearly meets the reporting criterion. It is administrative in nature because it is unnecessary. Why would a PC or TP develop or modify their Automatic UVLS program per R1 and not report the changes needed to the UVLS entities? It would make developing or modifying the program superfluous. Thus, R2 is administrative and unnecessary. 3) R3 meets Paragraph criterion B1 (administrative) and criterion B3 (documentation). It requires the PC or TP to provide a schedule for implementation which is the same as documenting the schedule, and it is administrative in nature because it is unnecessary. Why would a PC or TP develop or modify their Automatic UVLS program per R1 and not give a schedule to the UVLS entities? It would make developing or modifying the program superfluous. Thus, R2 is administrative and unnecessary. 4) While we believe R2 and R3 should be removed because they meet Paragraph 81 criteria, they should be combined with R1 if they persist to avoid instances of double jeopardy. R2 and R3 could be made sub-parts of R1. If a registered entity fails to coordinate its Automatic UVLS Program, it will also fail to provide specifications to UVLS entities per R2 and to provide a schedule for implementation to the UVLS entities per R3. Since violations are assessed per requirement, one compliance failure could result in three separate compliance violations of R1, R2, and R3. Thus, if R2 and R3 are written as sub-parts

of R1, failure to coordinate its Automatic UVLS Program and to provide specifications and an implementation schedule will be assessed as a single violation of the combined requirement. 5) To be clear that this standard does not require the creation of a new Automatic UVLS Program where none currently exist, we recommend adding “existing” as an adjective to the Automatic UVLS Program in R5. 6) The rationale for R6 conflicts with the rationale for the definition of Automatic UVLS Program. The rationale states that the analysis conducted in R6 would also include evaluation of relay Misoperations. However, the rationale for the definition states that the “implementation and reliability performance” of the Automatic UVLS Program “is inherently not susceptible to Misoperation”. If it is not susceptible to Misoperations why would analysis conducted for R6 include evaluation of Misoperations? 7) R6 has the potential to become a zero defect requirement and does not reflect the actual responsibilities of the PC and TP as defined in the functional model. As written, the PC and TP will have to identify all voltage excursions regardless of their magnitude, identify the subset of voltages excursions below the UVLS setpoints, and present this information to auditors. If they do not show evidence of having reviewed all voltage excursions, how can the PC and TP demonstrate to auditors that they have identified all voltage excursions below the UVLS setpoints? This presents a further problem in that the PC and TP may not have access to the real-time voltage data to monitor the excursions since they are not operating entities. How will the PC and TP know a voltage excursion has occurred when they don’t monitor the system or have access to the data? A more practical approach would be to require the PC or TP to evaluate the effectiveness of the Automatic UVLS Program only if the relays actuate not just if there are voltage excursions. This analysis would still result in significant benefit without the threat of zero-defect enforcement of requirements that largely results in paper compliance violations that do little to support reliability. 8) Requirement R7 is vague and ambiguous which will lead to inconsistent enforcement and differing compliance outcomes. The requirement compels the PC and TP to identify efficiencies in its analysis of the Automatic UVLS program in R6. What is meant by efficiencies? This term is vague and will be interpreted differently by different regions and even different auditors within the regions. This will lead to regions or auditors to define what is meant by efficiencies after the fact which will be different from registered entity interpretations and will result in paper compliance violations that do little to support reliability. The drafting team should define very specifically what efficiencies that registered entities should evaluate and identify. 9) Requirements R6 and R7 should be combined to avoid instances of double jeopardy. R7 could be made a sub-part of R6. If a registered entity fails to evaluate the effectiveness of its Automatic UVLS Program per R6 not only will it be assessed a violation of R6, it will also be assessed a violation of R7 because it cannot identify efficiencies without having conducted the analysis. Compliance violations are identified on a requirement basis. Thus, if R7 is written as a sub-part of R6, failure to conduct the effectiveness evaluation and, as a result, failure to identify the associated efficiencies will be assessed as a single violation of the combined requirement. 10) We recommend that R8 should be modified to clarify that it is only required to be performed if the PC and TP have existing Automatic UVLS Programs. This could be accomplished by adding “if they have an existing Automatic UVLS Program” to the beginning of the requirement. 11) R9 meets Paragraph 81 critera B1 (administrative) and B4

(reporting). It requires the UVLS entity to provide data to its PC or TP according to their format and schedule. It is administrative in nature because it is unnecessary. For instance, if the UVLS entity provides the data in a different format than requested by the PC or one day late according to the PC schedule, reliability will not be impacted at all. This only facilitates administration of the PC or TP program. It clearly meets the reporting criterion because it involves data being supplied to a third party by their requested data and in their format. The UVLS entity would have no reason for refusing to supply the data. Refusal to supply the data could only have negative reliability impacts on the UVLS entity because their UVLS relays may become uncoordinated and actuate before otherwise necessary. Any issues can be worked out with simple discussions between the PC, TP and UVLS entities. Furthermore, the PC and TP should already have the data since they supplied the settings requirements previously. Thus, R9 is administrative and unnecessary. Furthermore, this requirement is similar to PRC-006-1 R8 which was proposed to be retired in phase II of the Project 2013-02 Paragraph 81. 12) R10 meets Paragraph 81 criteria B1 (administrative) and B4 (reporting). It requires the PC or TP to provide its UVLS database to other PCs and TPs if they request the data which clearly meets the reporting criterion. It is administrative in nature because it is unnecessary and does not support reliability. It only further perpetuates paper driven compliance. It is very likely that a PC or TP will never receive any requests but they will still have to demonstrate compliance which means they will have to prove they did not receive any requests. Furthermore, why would a PC or TP refuse to supply the database to other TPs and PCs? They have no incentive to refuse. Thus, the requirement is truly superfluous, administrative and unnecessary. Furthermore, this requirement is similar to PRC-006-1 R7 which was proposed to be retired in phase II of the Project 2013-02 Paragraph 81. 13) R8 is similar to the requirement PRC-006-1 R6 which was identified as meeting Paragraph 81 criteria by the Independent Experts Panel. They have recommended it for retirement. Given that these are similar requirements, significant justification should be provided for why it is necessary and does not meet the criteria. Otherwise, it should be deleted.
No
NERC should determine how much UVLS is installed on the BES to protect the BES and how much load is covered before moving forward with an international standard. This data should be readily available because the regional entities should have been collecting the data per PRC-020. After analyzing the data, NERC could determine the appropriate course of action which could include developing an international standard, developing one or more regional standards or not developing a standard at all. If no standard is developed, NERC could use the data to demonstrate to the Commission how the directives have essentially been met because there is not a significant amount of automatic UVLS programs installed to affect the reliability of the BES making the standard superfluous.
Group
Florida Municipal Power Agency
Frank Gaffney

EOP 003-2 also addresses UVLS; changes to EOP-003 have not been posted yet. Assume the next posting will include changes to EOP-003 to eliminate duplication with this new standard.
Individual
Texas Reliability Entity
Texas Reliability Entity
No
Yes
No
The proposed definition needs further clarification. (1) To state in the rationale that a UVLS system is not susceptible to Misoperation is not correct. For example, in the ERCOT region we had a UVLS event where approximately 30% of the entity feeders automatically reclosed following activation of the UVLS protection due to an error in the control logic in the relay. (2) We would suggest removal of both exclusions, and adding references to the BES and TPL Standards. The overarching need for any UVLS protection system is to meet the BES performance requirements as stated in the TPL standards and the UVLS definition should be stated on that basis, whether the UVLS systems is applied for a steady-state, post-contingency, stability, or transient condition. We propose the following definition for Automatic UVLS Program: “A coordinated automatic load shedding program consisting of distributed controls or relays on the Bulk-Power System (BPS) that protects the Bulk Electric System (BES) from the potential effects of severe undervoltage conditions consistent with the Transmission Planning Standards (TPL)”. (3) If the SDT feels that the exclusions should remain, we offer the following comments: (a) The use of the term “localized undervoltage conditions” in the 2nd exclusion needs further clarification as it is open to interpretation. In ERCOT, there are UVLS protection systems in the Dallas-Fort Worth metroplex, Houston, Laredo, and lower Rio Grande Valley areas. Would these systems be considered “localized” and excluded from the Standard? We are proposing the following revision to the 2nd exclusion: “UVLS controls or relays that are not used to address undervoltage conditions in the BES.” (b) Under what Standard will “Centrally-controlled or centrally-armed UVLS controls or relays” be covered if they are excluded from this Standard? They are currently excluded in most regions from being classified as an SPS. Also, in the SPS definition proposed by the NERC SPCS whitepaper, UVLS systems as well as “operator aids” will not be classified as an SPS, so where would these types of systems fit?
Yes

Yes
(1) The overarching need for any UVLS protection system is to meet the TPL standards. This Standard is mute on this topic. The TP/PC must demonstrate that implementation of a UVLS will provide BES performance that is consistent with the requirements in the TPL standards. The requirements in this Standard should be stated in a manner such that the design, periodic assessment, and analysis of actual events for the UVLS system provides the required BES performance, whether the UVLS was developed for either a steady-state, post-contingency, stability, or transient need. (2) In R6, the one-year time frame for analyzing the UVLS performance for an actual event is too long. We suggest following timelines similar to the NERC Events Analysis Process. (3) In R8, we suggest adding additional information to clarify the requirement. The term “maintain” is unclear and ambiguous. What exactly is expected?
Individual
Andrew Gallo
City of Austin dba Ausitn Energy
No
Yes
Yes
Yes
The requirements applicable to "Each Planning Coordinator or Transmission Planner" may provide unnecessary compliance burden on some entities. For example, in a region where the PC solely fulfills the requirement, there is no mechanism for the Transmission Planner to keep that requirement out of scope during compliance activities (e.g. audits) other than for the Transmission Planner to say "trust me, I'm not responsible." Given that we are dealing with two distinct registrations, a CFR matrix will not help. This is particularly applicable to R5, R6, R8 and R10; the others include clarifying phrases such as "...that develops or modifies an Automatic UVLS Program." Austin Energy requests the SDT consider whether it is better: (1) to make the PC the only responsible entity for these requirements or (2) add a clarifying phrase to the TP role.
Yes
Individual
Alice Ireland
Xcel Energy
No

Yes
No
Xcel Energy supports in general the revised definition but suggests enhancing the second bulleted item as follows: Suggestion 1 (preferred): “UVLS controls or relays that are used to address localized undervoltage conditions do not have an Adverse Reliability Impact.” Suggestion 2: “UVLS controls or relays that are used to address localized undervoltage conditions that are not part of a coordinated plan to protect the BPS from wide-area severe undervoltage conditions”
Yes
Yes
1)Given the similarity of structure and verbiage within R1, R2, R3, we note that they lend themselves to be condensed into a single requirement with two parts. Recommend that R1, R2, R3 be combined into one requirement to provide “one-stop” concise listing of all activities to be performed by the applicable entity (PA or TP), as suggested below: [R1. Each Planning Coordinator or Transmission Planner that develops or modifies an Automatic UVLS Program shall: 1.1 coordinate the Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities 1.2 provide specifications and schedule for implementation of the Automatic UVLS Program to each UVLS entity] 2)Requirements R5, R6, R7, R8, R9 and R10 should be modified to state “Each Planning Coordinator or Transmission Planner that develops a UVLS Program…”, so that the responsibility for the action in the requirement is upon the function that created the UVLS Program. 3) R10 is confusing…if the TP is the function that developed the UVLS database, is the TP only obligated to provide its UVLS Program database to other PCs “or” TPs? What if the appropriate neighboring entity would be a PC but the database was provided to the TP?
Group
Puget Sound Energy
Eleanor Ewry
No
Yes
Yes
Yes
Yes

Regarding R1, how is it proposed that entities demonstrate coordination between their UVLS program and other protection and control systems? Is it anticipated that this coordination should be demonstrated through a simulation of the interaction between the two, or is coordination of the settings sufficient (i.e timing and set points demonstrate that the schemes will not operate within the same time period)? If actual simulation is required, will consideration be made for the availability of models for the various protection systems? Also, will consideration be made for the ability of software tools to achieve robust solutions for extreme contingency conditions?
Yes
Individual
Larisa Loyferman
CenterPoint Energy
No
Yes
See response to Question 5
Yes
Yes
Yes
General comment: CenterPoint Energy believes that PRC-010-1 SDT has not met the directive of FERC in Order 693 to ensure that an integrated and coordinated approach is being performed. CenterPoint Energy believes that the Planning Coordinator must have the ultimate responsibility to ensure the coordination of ALL Automatic UVLS programs throughout a region. Each Transmission Planner that develops or modifies an Automatic UVLS Program is responsible for coordinating its Automatic UVLS Program with other protection and control systems and generator voltage ride-through capabilities in its area. To avoid confusion, CenterPoint Energy recommends clearly identifying corresponding responsibilities for each of the Functional Entities. Specific comments: 1. Regarding R3, CenterPoint Energy is concerned that the current proposed wording may unilaterally dictate an implementation schedule without conferring with the UVLS entity as to the feasibility of the schedule. CenterPoint Energy recommends a collaborative approach between the Planning Coordinator and UVLS entity to determine a mutually agreeable schedule for implementation of the developed Automatic UVLS Program. 2. Furthermore, due to the possibilities of unforeseen circumstances CenterPoint Energy proposes Requirement R4 to be worded as follows: “Each UVLS entity shall implement automatic tripping of load in accordance with the Automatic UVLS Program specifications and schedule, barring unforeseen circumstances, as determined by its Planning Coordinator.” 3. The rationale for Requirement R6 indicates that UVLS misoperations would be included in the UVLS

“performance” review following a voltage excursion event. CenterPoint Energy believes UVLS misoperation analysis is already addressed by other NERC initiatives and should not be included in PRC-010. UVLS misoperation analysis and review is part of NERC misoperations reporting. 4. CenterPoint Energy suggests the UVLS “performance” review should simply be whether the UVLS successfully resolved the system emergency and if any load shed obligations are met. We recommend that the UVLS “assessment” in Requirement R7 would only be triggered if the UVLS does not resolve the emergency or if a minimum load shed obligation is not met.
Yes
Individual
Catherine Wesley
PJM Interconnection
No
Yes
No
The definition includes the term “localized” which is not a defined term. It potentially could be interpreted differently by auditors and the applicable functional entities. The term needs to be defined clearly to eliminate ambiguity.
Yes
Yes
The PJM Regional Transmission Expansion Plan designs the PJM RTO system to avoid the need for UVLS and therefore PJM does not have a UVLS program. The standard needs to address the situation when the TP/PC does not have a UVLS program but the UVLS entity has their own UVLS schemes. The concepts contained within PRC-010-0 R1 should be incorporated within the new standard to ensure that individual UVLS entity schemes that are developed outside or in lieu of a TP/PC program are coordinated with their TP/PC.
Yes
Individual
Richard Vine
California Independent System Operator
Yes
We question whether the scope should encompass all UVLS relay schemes to ensure coordination between the local and centrally-controlled UVLS relay schemes. We think that all UVLS relay schemes should be contained within the same UVLS database. We think

additional rationale regarding the definition of Automatic UVLS Program would be beneficial to understand why centrally-controlled UVLS schemes and local UVLS schemes are excluded.
Yes
No
We find the definition confusing in that it excludes the centrally-controlled and local UVLS relay schemes. Additional rationale regarding the definition of Automatic UVLS Program would be helpful to understand why centrally-controlled and local UVLS schemes are excluded. With the consolidation of the four PRC standards (PRC-020-1, PRC-010-0, PRC-021-1 and PRC-022-1) into one new PRC-010-1 standard, which standard(s) would now apply to the centrally-controlled UVLS and local UVLS schemes, since they are excluded from the Automatic UVLS Program definition in PRC-010-1.
No
We suggest adding the Transmission Operator (TOP) functional entity as an Applicable entity. An example for why we believe the TOP functional entity should be added is provided in the Requirement and Rationale for R6, which requires within a one-year time frame (operating horizon) from the date of an event to conduct a program performance analysis to evaluate whether or not the UVLS Program responded as intended, and that this analysis would also identify relay Misoperations.
Yes
We have a proposed change to a requirement and a commentary on the overall scope of the proposed requirements: Some PCs design their system to avoid the need for UVLS and therefore do not have a UVLS program. The standard needs to address the situation when the TP/PC/TOP does not have a UVLS program, but the UVLS entity has their own UVLS schemes. The concepts contained within PRC-010-0 R1 should be incorporated within the new standard to ensure that individual UVLS entity schemes that are developed outside or in lieu of a TP/PC/TOP program are coordinated with their TP/PC/TOP. The industry is trying to move towards requirements that more sharply focuses its limited resources onto tracking and documenting the requirements which most directly impact and benefit the reliability of the BES. Requirements that are supportive in nature or administrative in nature – although an important part of what needs to be performed to satisfy reliability – may not always have to be included in a standard as a distinct and measurable requirement.
No
See above response comments to questions 1 -5. (i.e. comments regarding the definition of Automatic UVLS Program.)

Additional comments received from Exelon:

1. Do you have any specific questions or comments relating to the scope of the revised SAR?

☒ Yes
☐ No

Comments: Does R1 really meet FERC's direction for an integrated and coordinated approach to the UVLS systems? R1 discusses coordination, but it does not discuss an integrated approach, which might mean that UVLS should be part of an overall system that protects the BPS from significant events. FERC's requirement for an integrated and coordinated scheme may also conflict with the exclusion of centrally-armed UVLS systems from the standard.

2. Proposed PRC-010-1 consolidates and replaces the requirements previously addressed by PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 in addition to incorporating revisions to meet the Order No. 693 directive and other inputs referenced in the SAR. Do you agree with this approach? If not, please explain your concerns.

☒ Yes
☐ No

Comments:

3. Do you support the revised NERC Glossary term Automatic UVLS Program? If no, please indicate in the comment section what suggested changes would put you in favor of the new glossary term.

☐ Yes
☒ No

Comments: The proposed standard is unclear as to where centrally-controlled or centrally-armed UVLS systems fit in compliance space. If a centrally-controlled UVLS needs to be treated as an SPS, then the revised PRC-010 should say that. The fate of centrally-controlled UVLS is uncertain with the wording in the draft standard. The definition should also incorporate some of the elements in the rationale to provide definition for what is or is not a centrally controlled load shedding program .

4. Do you agree with the Applicability of the proposed PRC-010-1? If not, please explain your concerns.

☐ Yes
☒ No

Comments: The applicability section does not cover legacy UVLS systems that were installed by a utility that has since turned over the responsibility for its planning functions to a

transmission planner and is now registered as a transmission owner if the transmission planner does not require UVLS.

5. Please specify if you have comments or suggested changes to any of the draft requirements for the proposed PRC-010-1.

☐ Yes
☒ No

Comments:

6. Do you support the revised SAR and the direction of the proposed PRC-010-1? If no, please indicate what suggested changes would put you in favor of the revised SAR and draft standard.

☐ Yes
☒ No

Comments: The revised SAR is fine. The definition excluding centrally-armed UVLS systems from the standard may require these UVLS systems to be forced into requirements more typical of SPSs, such as redundancy and the more strenuous reporting. This would occur even if the purpose of the central arming is to prevent the UVLS from operating during light load conditions.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

PRC-010-1 FAQ

In Response to Comments

Project 2008-02 Undervoltage Load Shedding

March 14, 2014

RELIABILITY | ACCOUNTABILITY




3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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Introduction

The Project 2008-02 Undervoltage Load Shedding (UVLS) Standard Drafting Team (drafting team) thanks all commenters who submitted comments on the revised Standard Authorization Request (SAR). The revised SAR and accompanying drafted portions of a proposed PRC-010-1 were posted for a 30-day informal comment period from September 10, 2013 through October 9, 2013. Stakeholders were asked to provide feedback on the revised SAR and supporting draft standard through a special electronic comment form. There were 30 sets of responses, including comments from approximately 93 different people from approximately 57 companies representing 9 of the 10 Industry Segments as shown in the table on the following pages.

All comments submitted may be reviewed in their original format on the project page.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel your concern has not been addressed, you can contact the Standards Developer, Erika Chanzes, at 404-446-2583 or at erika.chanzes@nerc.net.

FAQ in Response to Comments

The drafting team appreciates industry comments on the revised SAR and proposed PRC-010-1 standard. The drafting team reviewed all comments carefully and made changes to the standard accordingly; however, the Standard Processes Manual (SPM) does not require the drafting team to respond to each comment during an informal comment period. Comments or suggested changes with which the drafting agreed are reflected in a subsequent informal comment period posting of a proposed PRC-010-1. To succinctly address key issues needing clarification with respect to drafting team approach and intent, common comment themes that required drafting team response are reflected on the following pages in the construct of a frequently-asked questions format (FAQ).

Purpose of Standard Revision

What is the basis for a revision of the existing UVLS standards?

The initial input into a revision of the existing UVLS standards is FERC Order No. 693, Paragraph 1509, which directed the ERO to develop a modification of PRC-010-0 that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs." In addition, the August 14 Blackout Report showed that proper coordination would have mitigated effects if UVLS was used as a tool.

Additional inputs included 1) recommendations from the NERC System Protection and Control Subcommittee (SPCS) in its December 2010 *Technical Review of UVLS-Related Standards* to combine the four existing UVLS standards, revise the applicability to entities responsible for UVLS program design, implementation, and coordination, specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, and differentiate post-event validation of UVLS program design from verifying correct operation of UVLS equipment; 2) the existing UVLS standards were not in the current results-based format; 3) the preceding revision of the underfrequency load shedding (UFLS) standards had similar types of requirements and had been completed under the construct of a consolidation; and 4) the Independent Expert Review Panel recommendations, which included an evaluation of the existing standards' applicability and level of specificity.

The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability. As part of the revision to address this, the drafting team also agreed that an evaluation and consolidation of the existing UVLS standards was necessary to meet current Reliability Standard development initiatives and to provide clear, comprehensive requirements to address the application and coordination of UVLS.

UVLS programs are not mandatory—is compliance for an optional tool necessary?

The drafting team asserts that a key takeaway from the August 14 Blackout Report is that coordination of UVLS with other protection systems could have mitigated the effects if UVLS was used as a tool. Although the use of UVLS is not mandatory, when one is installed, the program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term UVLS Program, which limits the standard's applicability to only those undervoltage-based load shedding programs whose performance have an impact on system reliability.

Coordination with Project 2009-03 Emergency Operations

EOP-003-2 has potential redundant requirements with the proposed PRC-010-1—how is this being addressed?

As part of its five-year review, Project 2009-03 Emergency Operations (EOP) identified EOP-003-2, Requirements R2, R4, and R7 as being more properly covered by Project 2008-02 UVLS. Now that both projects are in formal development, they are strategically coordinating to move in lockstep from a timing perspective to address these requirements. Project 2009-03 EOP, which is proposing to revise and consolidate EOP-001-2.1b, EOP-002-3, and EOP-003-2 to create EOP-011-1, will retire the noted EOP-003-2 requirements (among other revisions), and the Project 2008-02 UVLS Mapping Document will show how PRC-010-1 encompasses the retired content accordingly. Slated to have aligning effective dates, both EOP-011-1 and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition. Please see the posted Project 2008-02 UVLS Project Coordination Plan for more information.

"UVLS Program" Definition

Why is the introduction of the new NERC Glossary term "UVLS Program" necessary?

PRC-010-1 introduces a new NERC Glossary term, UVLS Program, to clearly establish which UVLS programs PRC-010-1 will apply to: automatic load shedding programs consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions.

It is also noted in the definition that this term excludes centrally-controlled undervoltage-based load shedding. As part of the development to clearly establish PRC-010-1's applicability, the drafting team found it is necessary to establish a bright line with respect to the characteristics of centrally-controlled undervoltage-based load shedding with regard to its reliability requirement-related needs. Because the reliable performance of centrally-controlled undervoltage-based load shedding could be affected by a single component failure, the drafting team maintains that this type of load shedding is consistent with the nature of Special Protection Systems (SPSs) and should be covered by SPS-related Reliability Standards.

For further explanation, please see the rationale box for the UVLS Program definition on page 3 of the PRC-010-1 draft standard document and the portion of the Guidelines and Technical Basis that addresses the definition within the standard document on pages 16–17.

Where will centrally-controlled undervoltage-based load shedding be covered?

As explained immediately above, the requirements of PRC-010-1 are applicable to the proposed new NERC Glossary term "UVLS Program," which excludes centrally-controlled undervoltage-based load shedding because it is consistent in nature with SPSs. The current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Protection Systems: Phase 2 (Special Protection Systems), which is also currently under formal development, will revise the NERC Glossary definition of "Special Protection System" to exclude UVLS Programs (among other planned revisions).

As a result, the existing SPS-related standards (PRC-012 through PRC-017) will be applicable to centrally-controlled undervoltage-based load shedding upon the effective date of the revised definition of "Special Protection System." Similar to the coordination effort with Project 2009-03 EOP explained above, Project 2008-02 UVLS and Project 2010-05.2 SPS are working together in lockstep from a timing perspective to ensure that the revised SPS-definition and retirement of legacy UVLS standards align, and that both the proposed revised SPS definition and PRC-010-1 are posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition.

If the definition excludes certain types of UVLS, does this preclude an "integrated" approach (FERC Order No. 693, Paragraph 1509)?

The defined term UVLS Program clarifies which UVLS systems are subject to the requirements in PRC-010-1. The resulting exclusions from PRC-010-1 do not preclude an "integrated" approach because the standard requires that an entity coordinate with all other protection and control systems, which include other types of UVLS (i.e., locally-applied UVLS relays and centrally-controlled undervoltage-based load shedding).

Applicability

What is meant by the phrase "Planning Coordinator or Transmission Planner"?

PRC-010-1 is applicable to both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs. The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

Why is the Transmission Operator not included?

While the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance that was necessary to capture within PRC-010-1. To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001.

What about UVLS programs owned by Transmission Owners and Distribution Providers that are not required by the planner?

Requirement R3 requires the Planning Coordinator or Transmission Planner to perform a comprehensive assessment to evaluate the effectiveness of each existing UVLS Program *in its area* at least once every 60 calendar months (or sooner). It is noted that this is regardless of whether the planner initially developed the program; the planner has ultimate responsibility for the effectiveness of all UVLS Programs residing within its area.

Clarifications on Requirements R1, R3, R4, and R5

How would the coordination referenced in Requirement R1, Part 1.2 be demonstrated?

Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to demonstrate the program's viability and effectiveness prior to implementation. This demonstration should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. The studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis. For further guidance on and examples of coordination considerations, please see the portion of the Guidelines and Technical Basis section that addresses Requirement R1 on pages 17–18 of the draft PRC-010-1 standard document.

Requirements R1, R3, and R4 seem to all require demonstrations of program effectiveness—how are they different?

Requirements R1, R3, and R4 do all require demonstrations of program effectiveness, but they are each at distinct points in time.

Requirement R1 requires demonstration of program effectiveness (by way of the qualifying sub requirements) at the onset of program development, or during the initial planning stage, prior to implementation. Requirement R3 requires the same objectives of a demonstration of effectiveness, but at the point of a mandatory periodic review (every 60 calendar months or sooner as required). Requirement R4 addresses a UVLS Program's performance after an event (applicable voltage excursion) to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event.

It is noted that, because of the separate objectives of each requirement, UVLS Program deficiencies found as a result of the assessments performed in Requirement R3 or R4 would not be violations of Requirement R1.

Requirement R4 would require the Transmission Planner and Planning Coordinator to review all voltage excursions—isn't this unduly burdensome?

While Requirement R4 essentially requires the Planning Coordinator or Transmission Planner to review all voltage excursions to see if they fall below the initializing set points of the UVLS Program, the drafting team contends that it will be clearly evident if voltage falls below the UVLS threshold because either a) UVLS devices will operate; or b) the system will experience the adverse conditions the UVLS Program was installed to mitigate.

In addition, the drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have access to the real-time voltage data to monitor the excursions since they are not operating entities. However, the drafting team also contends that there should be an established feedback notification line from the Transmission Operator or Distribution Provider with regard to real-time voltage data to monitor excursions.

PRC-022-1 required the analysis of UVLS Misoperations. How is this addressed in PRC-010-1?

One of the SPCS recommendations was to clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities addressed in PRC-010-1) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

Relative to a UVLS Program, PRC-010-1, Requirements R4 and R5 require event analysis and a Corrective Action Plan (CAP) to address any identified program deficiencies. The UVLS drafting team maintains that verifying correct operation of UVLS equipment should be addressed in PRC-004 and is coordinating an applicability change to this standard with respect to the development timeline of Project 2010-05.1 Protection Systems (Misoperations), which is in the later stages of development of PRC-004-3. Please see the posted PRC-010-1 Mapping Document and Project 2008-02 UVLS Project Coordination Plan for further information.

Concerns with Requirements R6, R7, and R8

Do Requirements R6, R7, and R8 overlap with the requirements of MOD-032-1?

While both MOD-032-1 and Requirements R6, R7, and R8 of PRC-010-1 address data requirements, MOD-032-1 establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas the PRC-010-1 requirements address the need to maintain and share data and databases for the purposes of studies for use in event analyses for UVLS Programs specifically. While Reliability Standards in general may have overlap in this manner, the activities in these requirements remain distinctly different.

Requirements R6, R7, and R8 appear to be administrative—doesn't this conflict with Paragraph 81 criteria?

Proper maintenance and timely sharing of UVLS Program data as required by Requirements R6, R7, and R8 is necessary to inform the Planning Coordinator or Transmission Planner's studies and analyses. While administrative tasks are required, the tasks have a core reliability-based need.

In addition, Requirements R6, R7, and R8 were written to emulate FERC-approved PRC-006-1 Automatic Underfrequency Load Shedding data requirements. While these analogous requirements in PRC-006-1 are listed as candidates for Paragraph 81, they are not yet approved as meeting the criteria; furthermore, the Independent Expert Review Panel has recommended that these Paragraph 81 candidates not be included for deletion, citing that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters".

Attachment A – Drafting Team Members

Table 1: Project 2008-02 UVLS Standard Drafting Team		
	Participant	**Entity**
Chair	Greg Vassallo	Bonneville Power Administration
Member	José Conto	Electric Reliability Council of Texas, Inc.
Member	Bill Harm	PJM Interconnection, LLC
Member	Sharma Kolluri	Entergy Corporation
Member	Charles-Eric Langlois	Hydro-Quebec TransEnergie
Member	Manish Patel	Southern Company Transmission
Member	Fabio Rodriguez	Duke Energy Florida
Member	Hari Singh	Xcel Energy, Inc.
Member	Matthew H. Tackett	MISO

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. Standard Authorization Request (SAR) posted for comment on January 20, 2010.
2. Revised SAR with supporting draft standard language posted for informal comment on September 10, 2013.

Description of Current Draft

This posting provides a complete draft standard and supporting documentation for an additional 30-day informal comment period to elicit further feedback from industry.

Anticipated Actions	Anticipated Date
45-day Formal Comment Period with Parallel Ballot	June 2014
Final Ballot	September 2014
BOT Adoption	November 2014

Effective Dates

The standard shall become effective on the first day of the first calendar quarter that is 12 months after the date that the standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is 12 months after the date the standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Version History

Version	Date	Action	Change Tracking
1.0	TBD	Completed revision, merging and updating PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.	

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Centrally-controlled undervoltage-based load shedding is not included.

Rationale for Definition: As part of the development of PRC-010-1, the drafting team found it necessary to introduce the term Undervoltage Load Shedding Program (UVLS Program) to clearly establish PRC-010-1's applicability. The following discussion and characteristics were critical elements to the development of the proposed definition.

The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. Therefore, the failure of a single component is unlikely to affect the reliable performance of the program.

Centrally-controlled undervoltage-based load shedding is excluded, because the load shedding logic may utilize 1) voltage inputs from multiple locations; and/or 2) inputs other than voltages, such as generator reactive reserves, facility loadings, and equipment statuses. As such, its reliable performance could be affected by a single component failure, which is consistent with the nature of Special Protection Systems. Therefore, the drafting team has recommended that Project 2010-05.2 Protection System (Special Protection Systems) include centrally-controlled undervoltage-based load shedding in the definition of a Special Protection System.

The definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.

In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program in NUC-001-2.1. This standard is part of an open standard revision project, and the finalized definition of UVLS Program will be forwarded to that drafting team for consideration. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.

When this standard has received ballot approval, the text boxes will be moved to the Application Guidelines Section of the Standard.

A. Introduction

1. **Title: Undervoltage Load Shedding**

2. **Number: PRC-010-1**

3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).

Rationale for Applicability: This standard is applicable to Planning Coordinators and Transmission Planners that have or are developing a UVLS Program, and to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as UVLS entities for the purpose of this standard.

The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.

The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 Undervoltage load shedding (UVLS) entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

5. Background:

UVLS Programs must work correctly to properly protect system reliability. Ensuring program effectiveness and coordination, and ensuring accurate and timely program implementation, assessment, and data will improve UVLS Program performance.

PRC-010-1 – Undervoltage Load Shedding is a consolidation and revision of the following Reliability Standards:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

The UVLS Standard Drafting Team (or drafting team) developed the revised PRC-010-1 to meet the following objectives:

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally-controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS systems.
- Create a single, results-based standard that addresses current reliability issues associated with UVLS.

As noted above, the drafting team found it is necessary to establish a bright line with respect to the characteristics of centrally-controlled undervoltage-based load shedding in regard to its reliability requirement-related needs. Because the reliable performance of centrally-controlled undervoltage-based load shedding could be affected by a single component failure, the drafting team maintains that this type of load shedding is consistent with the nature of Special Protection Systems (SPSs) and should be covered by SPS-related Reliability Standards.

Therefore, PRC-010-1 introduces a new NERC Glossary term, UVLS Program, to clearly establish PRC-010-1's applicability to automatic load shedding programs consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. It is noted that this term excludes centrally-controlled undervoltage-based load shedding.

Subsequently, since the current NERC Glossary definition of Special Protection System excludes UVLS, Project 2010-05.2 Protection Systems: Phase 2 (Special Protection Systems) will adjust the definition to exclude only UVLS Programs as defined above and therefore include centrally-controlled undervoltage-based load shedding.

Requirements of the revised Reliability Standard PRC-010-1 meet the following objectives:

- Demonstrate a UVLS Program's effectiveness prior to implementation, including the program's coordination with other protection systems and generator voltage ride-through capabilities.
- Adhere to UVLS Program specifications and implementation schedule.
- Perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies.
- Maintain and share UVLS Program data.

Also of note, Project 2009-03 Emergency Operations is retiring specific requirements and revising EOP-003-2 – Load Shedding Plans to eliminate identified redundancy between PRC-010-1 and EOP-003-2. In addition, the UVLS drafting team's intention is for PRC-004 to address appropriate types of UVLS Program Misoperations (as previously addressed by PRC-022-1); the introduction of this revision to PRC-004 is pending outcomes of PRC-004-3, which is currently in final stages of development under Project 2010-05.1 Protection Systems: Phase 1 (Misoperations).

B. Requirements and Measures

Rationale for R1: In Paragraph 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability, and that each Planning Coordinator or Transmission Planner that develops a UVLS Program should demonstrate the program's viability and effectiveness prior to implementation. This demonstration should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate items, the drafting team recognizes that the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall demonstrate its effectiveness prior to implementing the program. This demonstration shall include, but is not limited to, studies and analyses that show: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. The implementation of the UVLS Program resolves the identified undervoltage issues that led to the UVLS Program's design.

1.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other undervoltage-based load shedding programs.

M1. Acceptable evidence may include, but is not limited to, studies and analyses, date-stamped reports, or other documentation detailing the effectiveness of the UVLS Program.

Rationale for R2: UVLS entities must implement a UVLS Program according to the specifications and schedule provided by the Planning Coordinator or Transmission Planner. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

M2. Acceptable evidence may include, but is not limited to, date-stamped documentation identifying the feeders armed with UVLS relays, the UVLS relay settings, and the associated Load summaries.

Rationale for R3: A periodic comprehensive assessment (detailed analysis) should be conducted to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed, and should include an evaluation of each UVLS Program to ensure the continued integration through coordination. This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems.

Based on the drafting team's knowledge and experience, and in keeping with time frames contained in similar requirements from other PRC Reliability Standards, 60 calendar months was determined to be the maximum amount of time allowable between assessments. The drafting team asserts that there will be circumstances other than a periodic assessment, such as material changes to system topology or operating conditions, that could affect the performance of a UVLS Program and trigger assessments prior to the end of the 60-calendar month period. If so, the 60-calendar month time frame would reset after each assessment.

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each existing UVLS Program in its area at least once every 60 calendar months or sooner if material changes are made to system topology or operating conditions. The assessment shall include, but is not limited to, studies and analyses that evaluate whether: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs.

M3. Acceptable evidence may include, but is not limited to, date-stamped reports or other documentation detailing the assessment of the UVLS Program.

Rationale for R4: A UVLS Program not functioning as expected during a voltage excursion event for which the UVLS Program was designed to operate presents a critical risk to system reliability. Therefore, a timely assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the applicable event is essential. The 12 calendar months (from the date of the event) provides adequate time to coordinate with other Planning Coordinators and Transmission Planners, Transmission Operators, and UVLS entities, simulate pre- and post-event conditions, and complete the performance assessment.

R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate, perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M4. Acceptable evidence may include, but is not limited to, date-stamped event data, event analysis reports, or other documentation detailing the assessment of the UVLS Program.

Rationale for R5: If program deficiencies are identified during any assessment of a UVLS Program, a CAP must be developed to address the deficiencies. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and time needed to consider potential solutions, coordinate resources, and develop a CAP.

R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment shall develop a Corrective Action Plan (CAP) to address the deficiencies within three calendar months of identification. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M5. Acceptable evidence must include a CAP that addresses identified deficiencies and may also include date-stamped reports or other documentation supporting the CAP.

Rationale for R6: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R6 supports this reliability need by requiring the UVLS entity to provide UVLS Program data in accordance with specified parameters.

R6. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of each UVLS Program database. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M6. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.

Rationale for R7: Having accurate and current data is required for the Planning Coordinator to perform studies and for use in event analyses. Requirement R7 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year.

R7. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M7. Acceptable evidence may include, but is not limited to, date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated.

Rationale for R8: Requirement R8 supports the integrated and coordinated approach to UVLS programs directed by Paragraph 1509 of Order No. 693 by requiring that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time frame of a request.

R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection within 30 calendar days of a request. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M8. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating that the UVLS Program database was provided as requested within 30 calendar days.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The applicable entity shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

- The applicable entity shall keep data or evidence to show compliance with Requirements R1, R2, R3, R5, R6, R7, and R8 since the last audit.
- The applicable entity shall keep data or evidence to show compliance with Requirement R4 for six calendar years.

If an applicable entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

"Compliance Monitoring and Assessment Processes" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	High	N/A	N/A	N/A	The applicable entity that developed the UVLS Program failed to demonstrate the program's effectiveness prior to implementation in accordance with Requirement R1, including the items specified in Parts 1.1 and 1.2.
R2	Long-term Planning	High	N/A	N/A	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the UVLS Program implementation schedule in accordance with Requirement R2.	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.

R3	Long-term Planning	Medium	N/A	N/A	N/A	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in Parts 3.1 and 3.2.
R4	Operations Planning	Medium	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.

R5	Operations Planning	Medium	The applicable entity developed a CAP in accordance with Requirement R5, but was late by less than or equal to 15 calendar days.	The applicable entity developed a CAP in accordance with Requirement R5, but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity developed a CAP in accordance with Requirement R5, but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity developed a CAP in accordance with Requirement R5, but was late by more than 45 calendar days. OR The responsible entity failed to develop a CAP in accordance with Requirement R5.
R6	Operations Planning	Lower	The applicable entity provided data in accordance with Requirement R6, but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R6, but the data was not according to the specified format.	The applicable entity provided data in accordance with Requirement R6, but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R6, but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R6, but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R6.

R7	Operations Planning	Lower	The applicable entity updated the database in accordance with Requirement R7, but was late by less than or equal to 30 calendar days.	The applicable entity updated the database in accordance with Requirement R7, but was late by more than 30 calendar days but less than or equal to 60 calendar days.	The applicable entity updated the database in accordance with Requirement R7, but was late by more than 60 calendar days but less than or equal to 90 calendar days.	The applicable entity updated the database in accordance with Requirement R7, but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R7.
R8	Operations Planning	Lower	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by less than or equal to 15 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by more than 60 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

Introduction

PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in its legacy standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard also addresses a FERC directive from Order No. 693, Paragraph 1509. This paragraph directs NERC to develop a modification to PRC-010-0 that requires an integrated and coordinated approach to all protection systems, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs.

Since FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding was developed under a similar construct of combining existing standards and addressing a FERC Order No. 693 directive, the drafting team looked to this standard as a guide. With the understanding that UVLS and UFLS programs have fundamental differences, the drafting team adopted PRC-006-1's industry-vetted reliability principles and language as applicable to UVLS Programs.

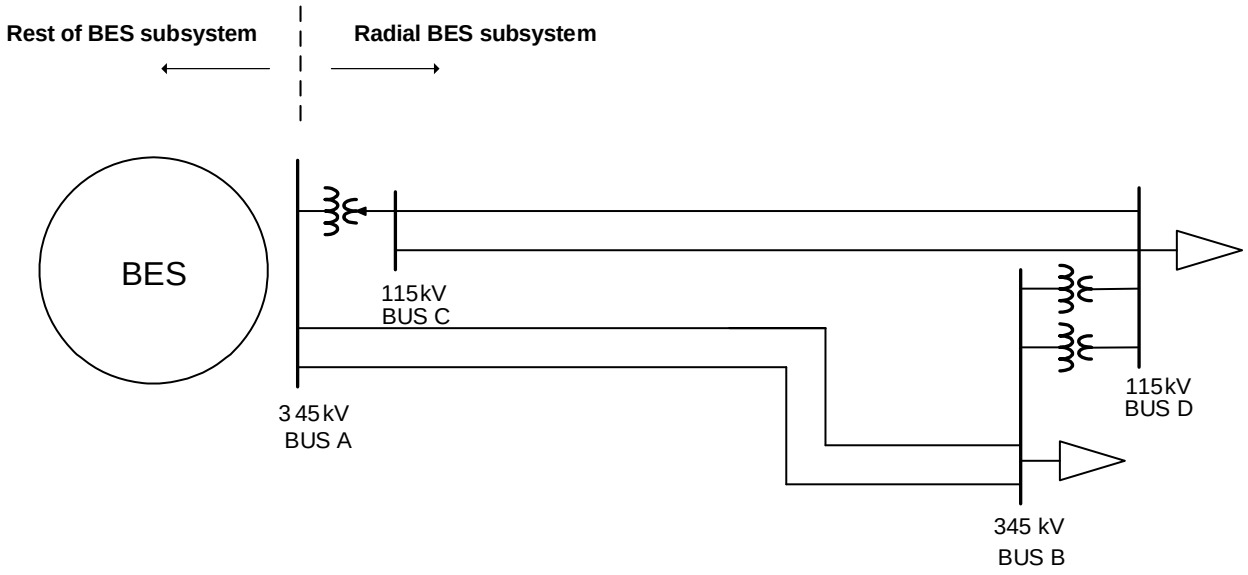
The drafting team's established purpose for PRC-010-1 is to clearly define the responsibilities of applicable entities to pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs. Since the need for and design of UVLS Programs is unique to each system preservation footprint, the intent of the standard is to provide a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. The drafting team emphasizes that PRC-010-1 does not require a mandatory UVLS Program, nor does this standard address the need to have a UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The drafting team provides the following discussion to support the approach to the standard. The information is meant to enhance the understanding of the reliability needs and deliverable expectations of each requirement, supported as necessary by technical principles and industry experience.

Guidelines for UVLS Program Definition

To ensure that the UVLS Program standard's applicability is to only those undervoltage-based load shedding programs whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one more of the following: Cascading, voltage instability, wide area voltage collapse, or uncontrolled separation. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

Below is an example of a radial Bulk Electric System (BES) subsystem for which a UVLS system could be used as a solution to mitigate various issues following the loss of the 345 kV double circuit line between bus A and bus B (TPL category C Contingency). If the consequence of this Contingency is limited to undervoltage conditions, loss of load, or overloading of facilities within the contained area formed by buses A to D, a UVLS system (at buses B and D) used to mitigate this case would not fall under the definition of a UVLS Program. However, if this same UVLS system would be used to mitigate Adverse Reliability Impact outside this contained area, it would be classified as a wide-area undervoltage problem and would fall under the definition of UVLS Program.



High Level Requirement Overview

Requirement	Entity	Demonstrate Program Effectiveness	Adhere to Program Specifications and Schedule	Program Assessment (Periodic or Performance)	CAP to Address Program Deficiencies	Update and/or Share Program Data
R1	PC or TP	X				
R2	UVLS entity		X			
R3	PC or TP	X		X		
R4	PC or TP	X		X		
R5	PC or TP				X	
R6	UVLS entity					X
R7	PC					X
R8	PC					X

Guidelines for Requirement R1:

A UVLS Program may be developed and implemented to either serve as a safety net system protection measure against unforeseen extreme Contingencies or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under TPL Reliability Standards. Regardless of the purpose, it is important that the UVLS Program being implemented is effective in terms that it mitigates the risk of Cascading, voltage instability, wide-area voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Consideration should be given to voltage set points and time delays, rate of voltage decay or recovery, power flow levels, etc. when designing a UVLS Program.

For the UVLS Program to be effective in achieving its goal, it is also necessary that the UVLS Program is coordinated with generator voltage ride-through capabilities and other protection and control systems that may have an impact on the performance of UVLS Program. Some of these protection and control systems may include, but are not limited to, transmission line protection, SPSs, other undervoltage-based load shedding programs, auto-reclosing, and controls of shunt capacitors, reactors, and SVSs.

For example, if the purpose of a UVLS Program is to mitigate fault-induced delayed voltage recovery (FIDVR) events in a large load center that also includes local generation, it is important that such a UVLS Program is coordinated with local generators' voltage ride-through capabilities. Generators in the vicinity of a load center are critical to providing dynamic voltage support to the system during FIDVR events. To maximize the benefit of online generation, the best practice may be to shed load prior to generation trip. However, occasionally, it may be best to let generation

trip prior to load shed. Therefore, the impact of generation tripping should be considered while designing a UVLS Program.

Another example that can be highlighted is the coordination of a UVLS Program with automatic shunt reactor tripping devices if there are any on the system. Most likely, any shunt reactors on the system will trip off automatically after some time delay during low voltage conditions. In such cases, shunt reactors should be tripped before the load is shed to preserve the system. This may require coordination of time delays associated with the UVLS Program with shunt reactor tripping devices.

Examples given above demonstrate that, for a UVLS Program to be effective, proper consideration should be given to coordination of a UVLS Program with generator ride-through capabilities and other protection and control systems.

Guidelines for Requirement R2:

Once a Planning Coordinator or Transmission Planner has identified a need for a UVLS Program, the Planning Coordinator or Transmission Planner will develop a program that includes specifications and an implementation schedule, which are then provided to UVLS entities. Specifications may include voltage set points, time delays, amount of load to be shed, the location at which load needs to be shed, etc. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

Guidelines for Requirement R3:

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments (detailed analyses) are required to ensure its continued effectiveness. This assessment should be completed at least once every 60 calendar months to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed. There may also be material changes to system topology or operating conditions that would necessitate this same comprehensive assessment at any point in time. Regardless of the trigger, the assessment should include an evaluation of each UVLS Program to ensure the continued integration through coordination.

This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. The 60-month period is the same time frame used in TPL-001-4 and in PRC-006-1.

The material change terminology is also used in the TPL-001-4 standard. The industry concluded that the term material change is not transportable on a continent wide basis. Requirement R2, Part 6.2 of TPL-001-4 specifies that documentation to support the technical rationale for determining material changes shall be included. Similar documentation should also support a UVLS Program assessment that is a result of a material change.

As specified in Requirement R3, a comprehensive assessment must be performed at least once every 60 calendar months. If a comprehensive assessment necessitated by a material change is

conducted within the 60-month window, the 60-month time period would restart upon completion of this assessment.

Guidelines for Requirement R4:

The goal of the assessment required in Requirement R4 is to evaluate whether the UVLS Program resolved the undervoltage issues for an event that occurred on the system. It is expected that the assessment should include event data analysis, such as the relevant sequence of events leading to the undervoltage conditions (e.g., Contingencies, operation of protection systems, and SPSs) and field measurements useful to analyzing the behavior of the system. A comprehensive description of the UVLS Program operation should be presented, including conditions of the trigger (e.g., voltage levels, time delays) and amount of load shed for each affected substation. Simulations of the event shall be performed to evaluate the level of performance of the program for the event of interest and to identify deficiencies to be included in a CAP per Requirement R5.

The studies and analyses showing the effectiveness of the UVLS Program can be similar to what is required in Requirements R1 and R3, but should include a clear link between the demonstration of effectiveness (in studies using simulations) and the analysis of the event (with measurements and event data) that actually occurred. For example, differences between the expected and actual system behavior for the event of interest should be discussed and modeling assumptions should be evaluated. Important discrepancies between the simulations and the actual event should be investigated.

Considering the importance of an event that involves the operation of a UVLS Program, the 12-calendar month period provides adequate time to analyze the event and perform an assessment while identifying deficiencies within a reasonable time. This time period is also required in PRC-006-1.

Guidelines for Requirement R5:

Requirement 5 promotes the prudent correction of an identified problem during assessment evaluations of each UVLS Program. An assessment of an active UVLS Program is triggered:

- After material changes are made to system topology or operating conditions. Since every UVLS is unique, the Planning Coordinator or Transmission Planner will decide the degree to which the change in topology or operating condition becomes a material change sufficient to trigger an assessment of the existing UVLS Program.

- Within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate.

- At least once every 60 months. The default time frame of 60 months or less between assessments has the intention to assure that the cumulative changes to the network and operating condition affecting the UVLS Program are evaluated.

The 60-calendar month time frame would reset after each assessment.

A CAP is a list of actions and an associated timetable for implementation to remedy a specific problem. It is a proven tool for resolving operational problems. The responsible entity is required to implement and complete a CAP to accomplish the purpose of this requirement, which is to prevent future deficiencies in the UVLS Program, thereby minimizing risk to the system. The responsible entity is also required to complete the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion.

Deferrals or other relevant changes to the CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful CAP execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence. Documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency.

CAP examples:

CAP Example 1 - Corrective actions for a quick triggering problem; preemptive actions for similar installations:

Fault records showed that a group of UVLS relays did trigger at the right undervoltage level but with shorter delays that expected. On-site inspections were completed in three weeks, confirming that the delay time programmed on the relays was 60 cycles instead of 90 cycles. A plan was scheduled for the next eight weeks to correct to a 90-cycle time delay setting of those UVLS relays identified to have shorter time delay settings.

Applicability to other UVLS relays: Based on our risk assessment, we scheduled to verify and adjust all remaining UVLS relays time delay settings within a one-year period.

CAP Example 2 - Corrective actions for a firmware problem; preemptive actions for similar installations:

Fault records were provided to the manufacturer on 6/4/2014. On 6/11/2014, the manufacturer responded that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. Version 3 firmware was installed on 6/12/2014.

> Applicability to other UVLS relays: Based on our risk assessment, we plan to install firmware version 3 at all of our installations that are determined to be version 2. Proposed completion date is 12/31/2014.
>
> The firmware replacements were completed on 12/4/2014.

Based on industry experience and operational coordination timeframes, the drafting team believes that within three calendar months from the date the problem was identified is a reasonable time frame for development of a CAP, including time to consider alternative solutions and coordination of resources. The "within three calendar months" time frame is solely to develop a CAP and it does not include the time needed for its implementation.

Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found.

Guidelines for Requirements R6–R8

An accurate UVLS Program database is necessary for the Planning Coordinator or Transmission Planner to perform system reliability assessment studies and event analysis studies. Without accurate data, there is a possibility that annual reliability assessment studies that are performed by the Planning Coordinator can lead to erroneous results and therefore impact reliability. Also, without the accurate data, it is very difficult for the Planning Coordinator or Transmission Planner to match a UVLS event and determine the root cause of the problem.

To support a UVLS Program database, it is necessary for each UVLS entity to provide accurate data to its Planning Coordinator. Each UVLS entity will provide the data according to the specified format and schedule provided by the Planning Coordinator. This is required in order for the Planning Coordinator to maintain and support a comprehensive UVLS Program database. By having a comprehensive database, the Planning Coordinator can embark on a reliability assessment or event analysis/benchmarking studies, identify the issues with the UVLS Program, and develop remedial action plans.

Items to be included in the UVLS database are as follows:

- Owner and operator of the UVLS Program
- Size and location of customer load, or percent of connected load, to be interrupted
- Corresponding voltage set points and overall scheme clearing times
- Time delay from initiation to trip signal
- Breaker operating times
- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and SPSs.

Additionally, the UVLS Program database should be updated annually (once every calendar year) by the Planning Coordinator. The intent here is for UVLS entities to review the data annually and provide changes to the Planning Coordinators so that Planning Coordinators can keep the databases current and accurate for performing event analysis and other assessments.

Finally, a Planning Coordinator is required to provide information to other Planning Coordinators and Transmission Planners within its Interconnection within 30 calendar days of a request. The 30 calendar days was selected as an acceptable time frame as it is considered to be reasonable and well-accepted by the industry. Also, this requirement of sharing the database with other Planning Coordinators and Transmission Planners supports the directive provide by FERC that requires an integrated and coordinated approach to UVLS programs (Paragraph 1509 of FERC Order No. 693).

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Implementation Plan

Undervoltage Load Shedding

PRC-010-1

Please see the Project 2008-02 Undervoltage Load Shedding Project Coordination Plan. Upon the formal comment period and ballot for PRC-010-1, this Implementation Plan will be updated as necessary with respect to the status of the coordination efforts (e.g., PRC-004).

Standards Involved

Approval:

- PRC-010-1 – Undervoltage Load Shedding

Retirements:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

Prerequisite Approvals

- Revised definition of "Special Protection System" in Project 2010-05.2 – Protection Systems: Phase 2 (Special Protection Systems)
- EOP-011-1 in Project 2009-03 Emergency Operations

Revisions to the NERC Glossary of Terms

The following term is proposed for addition:

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Centrally-controlled undervoltage-based load shedding is not included.

Applicable Entities

Planning Coordinator
Transmission Planner
UVLS entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

Conforming Changes to Other Standards

Project 2009-03 Emergency Operations (EOP-011-1) retires EOP-003-2. Requirements R2, R4, and R7 are not absorbed by EOP-011-1, since these requirements map to PRC-010-1, Requirement R1.

PRC-010-1's requirements are applicable to the standard's proposed new NERC Glossary term Undervoltage Load Shedding Program (UVLS Program), which excludes centrally-controlled undervoltage-based load shedding because it is consistent in nature with Special Protection Systems (SPSs). The current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Protection Systems: Phase 2 (Special Protection Systems) revises the NERC Glossary definition of "Special Protection System" to exclude only UVLS Programs. As a result, the existing SPS-related standards (PRC-012 through PRC-017) will be applicable to centrally-controlled undervoltage-based load shedding upon the effective date of the revised definition of "Special Protection System".

Effective Date

PRC-010-1 and the definition of "Undervoltage Load Shedding Program" shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date that the standard and definition are approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard and the definition shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date the standard and definition are adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Retirement of Existing Standards:

PRC-010-1 is a consolidation of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance. PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 shall be retired at midnight of the day immediately prior to the effective date of PRC-010-1 in the particular jurisdiction in which the new standard is becoming effective.

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Unofficial Comment Form

Project 2008-02 Undervoltage Load Shedding
Informal Comment Period: PRC-010-1

Please **DO NOT** use this form for submitting comments. Please use the electronic form to submit comments on the Project 2008-02 Undervoltage Load Shedding (UVLS) draft standard PRC-010-1. The electronic comment form must be completed by 8 p.m. Eastern on Wednesday, April 16, 2014.

If you have questions, please contact Erika Chanzes via email or by telephone at 404-446-2583.

The project page may be accessed by clicking here.

Background Information

In January 2010, NERC posted the Project 2008-02 UVLS Standard Authorization Request (SAR) for public comment. The SAR cited NERC technical reports and assessments of UVLS programs and standards, along with the FERC Order No. 693 directive that approved PRC-010-0 but requested that it be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Work was deferred due to prioritization for the 2011–2013 Reliability Standards Development Plan (RSDP) and the effort was restarted as part of the 2013–2015 RSDP. The formal drafting team members were tasked with reevaluating and revising the SAR and subsequently proceeding with standard development. The team's objective was to ensure that Project 2008-02 addresses NERC's existing UVLS standards such that they are results-based, address the appropriate regulatory directives, coordinate with present reliability standard efforts (e.g., Paragraph 81, the Independent Expert Review Panel recommendations, and other active standard development projects), and consider current reliability issues associated with UVLS.

Based on these considerations, the drafting team posted a revised SAR and draft requirements for an informal comment in September 2013. Since then, the drafting team has considered the feedback from industry and made appropriate revisions in addition to completing all supporting documents.

This informal comment period seeks stakeholder feedback on the proposed draft standard PRC-010-1 during the development stage.

You do not have to answer all questions. Enter comments in simple text format. Bullets, numbers, and special formatting will not be retained.

Questions

1. The drafting team has revised the wording of the proposed defined term UVLS Program and added information to the rationale box and Guidelines and Technical Basis. Specifically, the team has clarified the attributes of a UVLS Program, including that the definition is independent of how the program is armed, and how the exclusion of centrally-controlled undervoltage-load shedding will be addressed. Does the definition now provide the needed clarity necessary to understand which types of UVLS are applicable to the standard? If no, please indicate in the comment section what is unclear and provide specific suggested changes.

☐ Yes
☐ No

Comments:

2. The drafting team has added clarification of the meaning of the phrase "Planning Coordinator or Transmission Planner" in a rationale box supporting the Applicability section. In addition, Requirements R7 and R8 are now applicable to only the Planning Coordinator. In light of these clarifications and revisions, do you agree with the Applicability of proposed PRC-010-1? If no, please indicate your concerns in the comment section.

☐ Yes
☐ No

Comments:

3. Requirements R1, R3, R4, and R5 have been revised (along with added supporting rationale and information in the Guidelines and Technical Basis) to clarify the expectations of what should be demonstrated at distinct points in time relative to UVLS Program effectiveness to support reliability. Do you support the current approach to these requirements? If no, please indicate your concerns in the comment section and provide specific suggested changes.

☐ Yes
☐ No

Comments:

4. Do you have comments on other issues not addressed by the previous questions (e.g., the remaining requirements or the coordination that is occurring with other projects)? If so, please indicate your concerns in the comment section.

☐ Yes
☐ No

Comments:

5. Do you support the proposed PRC-010-1? If no, please indicate what specifically would put you in favor of the standard.

☐ Yes
☐ No

Comments:

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Standards Authorization Request Form

When completed, please email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved reliability standards. Please use this form to submit your request to propose a new or a revision to a NERC's Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard:	Undervoltage Load Shedding		
Date Submitted:	Revised SAR posted for informal comment September 2013 and March 2014		
SAR Requester Information			
Name:	Undervoltage Load Shedding Standard Drafting Team (UVLSSDT)		
Organization:			
Telephone:	404-823-1132	E-mail:	Erika.Chanzes@nerc.net
SAR Type (Check as many as applicable)			
☐ New Standard		☒ Withdrawal of existing Standard	
☒ Revision to existing Standard		☐ Urgent Action	

SAR Information
Industry Need (What is the industry problem this request is trying to solve?):
A need for clear and comprehensive requirements for the application and coordination of undervoltage loading shedding (UVLS) as an option to mitigate or address a number of different voltage control concerns, as evidenced by the following: **Of the events analyzed by NERC over the last 10 years, voltage issues have continued to contribute to disturbances.** **NERC SPCS Report to the Planning Committee: Technical Review of UVLS-Related Standards: PRC-010-**

SAR Information
0, PRC-020-1, PRC-021-1, and PRC-022-1 (December 2010): *"Specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems."* **FERC Order No. 693, Paragraph 1509:** *". . . the Commission directs the ERO to develop a modification to PRC-010-0 through the Reliability Standards development process that requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs."* **August 14 Blackout: Causes and Recommendations, Blackout Recommendation 21:** *"[NERC should] determine the goals and principles needed to establish an integrated approach to relay protection for generators and transmission lines and the use of under-frequency and under-voltage load shedding (UFLS and UVLS) programs. An integrated approach is needed to ensure that at the local and regional level these interactive components provide an appropriate balance of risks and benefits in terms of protecting specific assets and facilitating overall grid survival."*
Purpose or Goal (How does this request propose to address the problem described above?):
1) Establish a results-based standard with requirements that ensure an integrated approach to the design, evaluation, and reliable operation of applicable UVLS programs. 2) Ensure coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Special Protection Systems (SPSs), and other UVLS programs.
Identify the Objectives of the proposed standard's requirements (What specific reliability deliverables are required to achieve the goal?):
• Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated approach to all protection systems. • Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1. • Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding). • Clearly identify and separate centrally-controlled undervoltage-based load shedding due to the

SAR Information
reliability requirements needed for this type of load shedding as compared to other UVLS programs. • Create a single, results-based standard that addresses current reliability issues associated with UVLS programs.
Brief Description (Provide a paragraph that describes the scope of this standard action.)
PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1, and PRC-022-1 and be revised to PRC-010-1, which will provide specific requirements for the design, evaluation, and coordinated operation of the UVLS programs to which the standard is applicable. The revised standard will be accompanied by a recommendation to retire PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.
Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)
The four existing NERC UVLS standards will be consolidated to create one comprehensive standard, which will reduce the total number of standards and eliminate PRC-020-1 and PRC-021-1's applicability to and involvement of the RRO. PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1, and PRC-022-1, and the existing requirements and measures will be revised to establish a results-based standard that clearly defines the responsibilities of applicable entities to: • Pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS programs to which the standard is applicable. • Ensure the coordination of these UVLS programs with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs. • Perform periodic program assessment and performance analysis. • Establish proper and meaningful database requirements for these UVLS programs. The revised standard **WILL**: • Establish continent-wide requirements applicable to entities responsible for the design and implementation of the UVLS programs to which the standard is applicable. • Address requirements for these programs after the need for UVLS has been determined by the appropriate planning studies.

SAR Information
• Be developed with due consideration to any necessary coordinating changes with other standards or standards projects to meet its design. The revised standard **WILL NOT**: • Require a UVLS program. • Apply to centrally-controlled undervoltage-based load shedding programs (see Related SARs section below). • Apply to the Generator Owner or Generator Operator; Generator Owner data reporting necessary for UVLS coordination is addressed in PRC-024-1. • Include the previously applicable Load-Serving Entity since this function does not own physical assets. If a Load-Serving Entity is also registered as a Distribution Provider, the entity will be included under that applicable function. • Include the previously applicable Transmission Operator because the requirements are more accurately applicable to asset owners (Transmission Owner and Distribution Provider). No market interface impacts are anticipated.

Reliability Functions	
The Standard will Apply to the Following Functions (Check each one that applies.)	
☐ Regional Reliability Organization	Conducts the regional activities related to planning and operations, and coordinates activities of Responsible Entities to secure the reliability of the Bulk Electric System within the region and adjacent regions.
☐ Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐ Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐ Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.

Reliability Functions		
☒	Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐	Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.
☒	Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒	Transmission Owner	Owns and maintains transmission facilities.
☐	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☒	Distribution Provider	Delivers electrical energy to the End-use customer.
☐	Generator Owner	Owns and maintains generation facilities.
☐	Generator Operator	Operates generation unit(s) to provide real and reactive power.
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles	
Applicable Reliability Principles (Check all that apply).	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☒	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems

Reliability and Market Interface Principles	
	reliably.
☒	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
☒	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☒	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles?	Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.	Yes
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	Yes
4. A reliability 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

Related Standards	
Standard No.	Explanation
TPL-001-4	Development of PRC-010-1 is based on implementation of FERC-approved TPL-001-4.
EOP-003-2	Project 2009-03 Emergency Operations (proposed EOP-011-1) will retire EOP-003-2, and Requirements R2, R4, and R7 will be moved to Project 2008-02 UVLS (proposed PRC-010-1). The UVLSSDT will address these overlapping requirements as part of the revision and mapping process.
PRC-004-2.1a	The UVLSSDT will consider if PRC-004 is the more appropriate standard to

Related Standards	
	address UVLS Misoperations and will coordinate with Project 2010-05.1 Protection Systems (Misoperations) (proposed PRC-004-3).
PRC-005-2 and other standards as identified	The UVLSSDT will evaluate the use of references to UVLS with respect to any proposed defined terms by PRC-010-1 and will coordinate with Project 2007-17.3 Protection System Maintenance and Testing (Sudden Pressure Relays) (proposed PRC-005-4) and other standards or standard development projects as necessary.

Related SARs	
Project	Explanation
Project 2010-05.2 Protection Systems (Special Protection Systems)	The UVLSSDT is recommending that Project 2010-05.2 Protection Systems (Special Protection Systems) adjust the definition of Special Protection System to include centrally-controlled undervoltage-based load shedding.

Regional Variances	
Region	Explanation
ERCOT	None
FRCC	None
MRO	None
NPCC	None
RFC	None
SERC	None
SPP	None
WECC	None

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Project 2008-02 Undervoltage Load Shedding

Mapping Document

This mapping document shows translation of the requirements of PRC-010-0 – Assessment of the Design and Effectiveness of Undervoltage Load Shedding Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, PRC-022-1 – Under-Voltage Load Shedding Program Performance, and specific requirements from EOP-003-2 – Load Shedding Plans to the requirements of PRC-010-1 – Undervoltage Load Shedding.

Project 2008-02 Undervoltage Load Shedding (PRC-010-1) retires PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. Project 2009-03 Emergency Operations (EOP-011-1), which is following a concurrent development timeline with Project 2008-02, retires EOP-003-2, Requirements R2, R4, and R7, and the respective performance required is reflected in PRC-010-1; this translation is illustrated in this document and will also be referenced in Project 2009-03's mapping document.

The requirements of PRC-010-1 are applicable to the standard's proposed new NERC Glossary term Undervoltage Load Shedding Program (UVLS Program), which excludes centrally-controlled undervoltage-based load shedding. Centrally-controlled undervoltage-based load shedding is consistent in nature with Special Protection Systems (SPSs). Therefore, the drafting team has transferred coverage of PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1's requirements, as applicable to centrally-controlled undervoltage-based load shedding, to the appropriate SPS-related reliability standards (PRC-012 through PRC-017). This is dependent on a conforming revision to the definition of the term Special Protection System being completed under Project 2010-05.2: Phase 2 Protection Systems (SPSs), which is following a concurrent development timeline with Project 2008-02.

In addition, the drafting team's intention is for PRC-004 to address appropriate types of UVLS Program Misoperations (as previously addressed by PRC-022-1). This is not reflected in the informal posting documents of PRC-010-1. PRC-004-3 is currently in final stages of development under Project 2010-05.1 Protection Systems: Phase 1 (Misoperations) and was posted for ballot at the time these documents were developed. The formal posting and ballot period of PRC-010-1 will address the approach to revising PRC-004 with respect to the UVLS Program element accordingly.

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of Undervoltage Load Shedding Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall periodically (at least every five years or as required by changes in system conditions) conduct and document an assessment of the effectiveness of the UVLS program. This assessment shall be conducted with the associated Transmission Planner(s) and Planning Authority(ies). **R1.1.** This assessment shall include, but is not limited to: **R1.1.1.** Coordination of the UVLS programs with other protection and control systems in the Region and with other Regional Reliability Organizations, as appropriate. **R1.1.2.** Simulations that demonstrate that the UVLS programs performance is consistent with Reliability Standards TPL-001-0, TPL-002-0, TPL-003-0 and TPL-004-0. **R1.1.3.** A review of the voltage set points and timing.	PRC-010-0, R1 maps to PRC-010-1, R3. Applicability changed to PC or TP since the PC or TP is responsible for the program design. PRC-010-0, R1.1.1 maps to PRC-010-1, R3, part 3.2. PRC-010-0, R1.1.2 and R1.1.3 are inherently embedded in PRC-010-1, R3 (comprehensive assessment). The specific items listed in R1.1.2 and R1.1.3 are described in PRC-010-1's Guidelines and Technical Basis.	**R3.** Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each existing UVLS Program in its area at least once every 60 calendar months or sooner if material changes are made to system topology or operating conditions. The assessment shall include, but is not limited to, studies and analyses that evaluate whether: **3.1.** The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed. **3.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs.

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of Undervoltage Load Shedding Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall provide documentation of its current UVLS program assessment to its Regional Reliability Organization and NERC on request (30 calendar days).	FERC-approved retirement of R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Regional Reliability Organization shall establish, maintain and annually update a database for UVLS programs implemented by entities within the region to mitigate the risk of voltage collapse or voltage instability in the BES. This database shall include the following items: **R1.1.** Owner and operator of the UVLS program. **R1.2.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.3.** Corresponding voltage set points and overall scheme clearing times. **R1.4.** Time delay from initiation to trip signal. **R1.5.** Breaker operating times. **R1.6.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	PRC-010-0, R1 maps to PRC-010-1, R7. Applicability changed from the RRO to the PC since the PC is responsible for maintaining information about programs in its area (and requirements can no longer be applicable to the RRO). PRC-020-1, R1.1– R1.6 are inherently embedded in PRC-010-1, R7. The specific items listed in R1.1–R1.6 are described in PRC-010-1's Guidelines and Technical Basis.	**R7.** Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year.

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Regional Reliability Organization shall provide the information in its UVLS database to the Planning Authority, the Transmission Planner, or other Regional Reliability Organizations and to NERC within 30 calendar days of a request.	PRC-020-1, R2 maps to PRC-010-1, R8. Applicability changed from the RRO to the PC since the PC is responsible for maintaining information about programs in its area (and requirements can no longer be applicable to the RRO). Replaced the RRO with the PC as the receiving entity since the PC is assigned responsibility for maintaining the database. Eliminated NERC as a receiving entity since the ERO Rules of Procedures, Section 401:3. Data Access, provide the ability for NERC to obtain this information.	**R8.** Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection within 30 calendar days of a request.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Owner and Distribution Provider that owns a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall annually update its UVLS data to support the Regional UVLS program database. The following data shall be provided to the Regional Reliability Organization for each installed UVLS system: **R1.1.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.2.** Corresponding voltage set points and overall scheme clearing times. **R1.3.** Time delay from initiation to trip signal. **R1.4.** Breaker operating times. **R1.5.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	PRC-021-1, R1 maps to PRC-010-1, R6. PRC-021-1, R1.1–R1.5 are inherently embedded in PRC-010-1, R6. The specific items listed in R1.1–R1.5 are described in PRC-010-1's Guidelines and Technical Basis. Replaced the RRO with the PC as the receiving entity since the PC is assigned responsibility for maintaining the database.	**R6.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of each UVLS Program database.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Owner and Distribution Provider that owns a UVLS program shall provide its UVLS program data to the Regional Reliability Organization within 30 calendar days of a request.	PRC-021-1, R2 maps to PRC-010-1, R6. Replaced the RRO with the PC as the receiving entity since the PC is assigned responsibility for maintaining the database.	**R6.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of each UVLS Program database.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall analyze and document all UVLS operations and Misoperations. The analysis shall include: **R1.1.** A description of the event including initiating conditions. **R1.2.** A review of UVLS set points and tripping times. **R1.3.** A simulation of the event, if deemed appropriate by the Regional Reliability Organization. For most events, analysis of sequence of events may be sufficient and dynamic simulations may not be needed. **R1.4.** A summary of the findings. **R1.5.** For any Misoperation, a Corrective Action Plan to avoid future Misoperations of a similar nature.	PRC-022-1, R1 maps to PRC-010-1, R4 and R5. Applicability changed to PC or TP since the PC or TP is responsible for the program design. PRC-022-1, R1.1 and R1.4 are part of the measure for PRC-010-1, R4. PRC-022-1, R1.2 and R1.3 are inherently embedded in PRC-010-1, R4. The specific items listed in R1.2 and R1.3 are described in PRC-010-1's Guidelines and Technical Basis. PRC-022-1, R1.5 is included as part of PRC-010-1, R5.	**R4**. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate, perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event. **R5.** Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment shall develop a Corrective Action Plan (CAP) to address the deficiencies within three calendar months of identification.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall provide documentation of its analysis of UVLS program performance to its Regional Reliability Organization within 90 calendar days of a request.	FERC-approved retirement of R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator shall establish plans for automatic load shedding for undervoltage conditions if the Transmission Operator or its associated Transmission Planner(s) or Planning Coordinator(s) determine that an under-voltage load shedding scheme is required.	EOP-003-2, R2 maps to PRC-010-1, R1. Applicability is changed to the PC or TP because the PC or TP is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall demonstrate its effectiveness prior to implementing the program. This demonstration shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to the UVLS Program's design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R4. A Transmission Operator shall consider one or more of these factors in designing an automatic under voltage load shedding scheme: voltage level, rate of voltage decay, or power flow levels.	EOP-003-2, R4 maps to PRC-010-1, R1. Applicability is changed to the PC or TP because the PC or TP is responsible for the program design. EOP-003-2, R4 is inherently embedded in PRC-010-1, R1, part 1.1. The specific items noted are described in PRC-010-1's Guidelines and Technical Basis.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall demonstrate its effectiveness prior to implementing the program. This demonstration shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to the UVLS Program's design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R7. The Transmission Operator shall coordinate automatic undervoltage load shedding throughout their areas with tripping of shunt capacitors, and other automatic actions that will occur under abnormal voltage, or power flow conditions.	EOP-003-2, R7 maps to PRC-010-1, R1. Applicability is changed to the PC or TP because the PC or TP is responsible for the program design. EOP-003-2, R7 is inherently embedded in PRC-010-1, R1, part 1.2. The specific items noted are described in PRC-010-1's Guidelines and Technical Basis.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall demonstrate its effectiveness prior to implementing the program. This demonstration shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to the UVLS Program's design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs.

Project 2008-02 Undervoltage Load Shedding (PRC-010-1)

VRF and VSL Justifications

This document provides the Undervoltage Load Shedding Standard Drafting Team's (drafting team's) justification for assignment of violation risk factors (VRFs) and violation severity levels (VSLs) for each requirement in PRC-010-1 – Undervoltage Load Shedding.

Each primary requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violations of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

The drafting team applied the following NERC criteria and FERC Guidelines when proposing VRFs and VSLs for the requirements under this project:

NERC Criteria - Violation Risk Factors

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; place the Bulk Electric System at an unacceptable risk of instability, separation, or Cascading failures; or hinder restoration to a normal condition.

Medium Risk Requirement

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 is administrative in nature and 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; or, a requirement that is administrative in nature and 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.

FERC Violation Risk Factor Guidelines

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report

The Commission seeks to ensure that Violation Risk Factors assigned to requirements of reliability standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard

The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards

The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level

Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation

Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such requirements must not be watered down to reflect the lower risk level associated with the less important objective of the reliability standard.

The following discussion addresses how the drafting team considered FERC's VRF Guidelines 2 through 5. The team did not address Guideline 1 directly because of an apparent conflict between Guidelines 1 and 4. Whereas Guideline 1 identifies a list of topics that encompass nearly all topics within NERC's Reliability Standards and implies that these requirements should be assigned a "High" VRF, Guideline 4 directs assignment of VRFs based on the impact of a specific requirement to the reliability of the system. The drafting team believes that Guideline 4 is reflective of the intent of VRFs in the first instance and, therefore, concentrated its approach on the reliability impact of the requirements.

PRC-010-1 – Undervoltage Load Shedding is a revision of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, with the stated purpose: *To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs.* FERC Order No. 693 requested that PRC-010-0 be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency loading shedding (UFLS) and undervoltage load shedding (UVLS) programs. PRC-010-1 addresses this directive in addition to consolidating and revising PRC-010-0 with the three (3) other existing UVLS standards: PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

PRC-010-1 has eight (8) requirements that incorporate and enhance the intent of the requirements of PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The revised standard requires that entities developing an Undervoltage Load Shedding Program demonstrate the program's effectiveness prior to implementation. Applicable entities are then required to adhere to the Undervoltage Load Shedding Program specifications and implementation schedule. The standard also requires an assessment of the program at least once every 60 months (or sooner if needed) and an assessment to evaluate program performance within 12 months of an applicable event. If program deficiencies are identified as a result of any of these assessments, entities are required to develop a Corrective Action Plan within three (3) months. In addition, there are requirements to update, provide data for, and share an Undervoltage Load Shedding database containing information necessary to model the program for use in event analyses and assessments.

The requirements of PRC-010-1 do not map, one-to-one, with the requirements of the legacy standards. The new requirements comingle various reliability attributes of the legacy standards with new reliability objectives, thus a requirement-to-requirement comparison of VRFs is not possible. In developing the new

VRFs for the requirements of PRC-010-1, the drafting team carefully considered the NERC criteria for developing VRFs, as well as the FERC VRF guidelines. The VRFs of FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding influenced (citing FERC VRF Guideline 3) the drafting team's VRF decisions, as the drafting team used PRC-006-1 as a model with respect to PRC-010-1's language and construct.

NERC Criteria - Violation Severity Levels

VSLs define the degree to which compliance with a requirement was not achieved. Each requirement must have at least one VSL. While it is preferable to have four VSLs for each requirement, some requirements do not have multiple "degrees" of noncompliant performance, and may have only one, two, or three VSLs.

VSLs should be based on the guidelines shown in the table below:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance. The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC Order on Violation Severity Levels

In its June 19, 2008 Order on Violation Severity Levels, FERC indicated it would use the following four guidelines for determining whether to approve VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior Levels of Non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when Levels of Non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

Guideline 2a: A violation of a "binary" type requirement must be a "Severe" VSL.

Guideline 2b: Do not use ambiguous terms such as “minor” and “significant” to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

. . . unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties on a per violation per day basis is the “default” for penalty calculations.

VRF and VSL Justifications – PRC-010-1, R1	
Proposed VRF	High
NERC VRF Discussion	This is a planning requirement that meets the NERC criterion for a High VRF. Failure to ensure the effectiveness of an Undervoltage Load Shedding Program could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has Parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is similar to EOP-003-2, Requirements R3 and R7, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This is a planning requirement that meets the NERC criterion for a High VRF. Failure to ensure the effectiveness of an Undervoltage Load Shedding Program as specified in Requirement R1 could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of High is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity that developed the UVLS Program failed to demonstrate the program's effectiveness prior to implementation in accordance with Requirement R1, including the items specified in Parts 1.1 and 1.2.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two Parts.

VRF and VSL Justifications – PRC-010-1, R1	
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** This is a new requirement; therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** The proposed VSL for this binary requirement is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R2	
Proposed VRF	High
NERC VRF Discussion	This is a planning requirement that meets the NERC criterion for a High VRF. Failure to adhere to the Undervoltage Load Shedding Program specifications and implementation schedule could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has no Parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is consistent with PRC-006-1, Requirement R9 and EOP-003-2, Requirement R5, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This is a planning requirement that meets the NERC criterion for a High VRF. Failure to adhere to the Undervoltage Load Shedding Program specifications and implementation schedule could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of High is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The responsible entity failed to adhere to the UVLS Program implementation schedule in accordance with Requirement R2.
Proposed Severe VSL	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—the VSLs cover aspects of the requirement that are equal in importance.

VRF and VSL Justifications – PRC-010-1, R2	
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** This is a new requirement; therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R3	
Proposed VRF	Medium
NERC VRF Discussion	This is a planning requirement that meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of each existing Undervoltage Load Shedding Program in its area at least once every 60 calendar months or sooner if material changes are made to system topology or operating conditions, could, under anticipated Emergency, abnormal, or restorative conditions, directly and adversely 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 the requirement is unlikely to lead to Bulk Electric System instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has Parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is consistent with PRC-010-0, Requirement R1, which has an approved VRF of Medium.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This is a planning requirement that meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of each existing Undervoltage Load Shedding Program in its area at least once every 60 calendar months or sooner if material changes are made to system topology or operating conditions, could, under anticipated Emergency, abnormal, or restorative conditions, directly and adversely 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 the requirement is unlikely to lead to Bulk Electric System instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.

VRF and VSL Justifications – PRC-010-1, R3	
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in Parts 3.1 and 3.2.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—there is a binary aspect for failure; the VSLs address the degrees of compliance with respect to equal importance of the two Parts.
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** The VSL is consistent in nature with the current VSL associated with the existing requirement being replaced (PRC-010-0, Requirement R1) and therefore does not lower the current level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** The proposed VSL for this binary requirement is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R4	
Proposed VRF	Medium
NERC VRF Discussion	This requirement meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the Undervoltage Load Shedding Program resolved the undervoltage issues associated with a qualifying event in a timely manner 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 the requirement is unlikely to lead to Bulk Electric System instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has no Parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is similar to PRC-022-1, Requirement 1 and PRC-006-1, Requirement R11, which have approved VRFs of Medium.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This requirement meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the Undervoltage Load Shedding Program resolved the undervoltage issues associated with a qualifying event in a timely manner 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 the requirement is unlikely to lead to Bulk Electric System instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.
Proposed Moderate VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.

VRF and VSL Justifications – PRC-010-1, R4	
Proposed High VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.
Proposed Severe VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—there is an incremental aspect to the VSL for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** The VSLs' associated requirement is different in construct from the existing requirement being replaced (PRC-022-1, Requirement R1) and, therefore, the VSLs cannot be compared. The VSLs for this requirement meet or exceed the current level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R5	
Proposed VRF	Medium
NERC VRF Discussion	This requirement meets NERC's criterion for a Medium VRF. Failure to develop a Corrective Action Plan to address the deficiencies identified as a result of an Undervoltage Load Shedding Program assessment in a timely manner 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 the requirement is unlikely to lead to Bulk Electric System instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has no Parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is similar to PRC-006-1, Requirement R12, which has an approve VRF of Medium.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This requirement meets NERC's criterion for a Medium VRF. Failure to develop a Corrective Action Plan to address the deficiencies identified as a result of an Undervoltage Load Shedding Program assessment in a timely manner 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 the requirement is unlikely to lead to Bulk Electric System instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity developed a CAP in accordance with Requirement R5, but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity developed a CAP in accordance with Requirement R5, but was late by more than 15 calendar days but less than or equal to 30 calendar days.

VRF and VSL Justifications – PRC-010-1, R5	
Proposed High VSL	The applicable entity developed a CAP in accordance with Requirement R5, but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity developed a CAP in accordance with Requirement R5, but was late by more than 45 calendar days. OR The applicable entity failed to develop a CAP in accordance with Requirement R5.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—there is an incremental aspect to the VSL for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** The VSLs' associated requirement is different in construct from the existing requirement being replaced (PRC-022-1, Requirement R1.5) and, therefore, the VSLs cannot be compared. The VSLs for this requirement meet or exceed the current level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R6	
Proposed VRF	Lower
NERC VRF Discussion	This is an administrative planning requirement that meets NERC's criterion for a Lower VRF. Failure to provide data according to the specified format and schedule to support maintenance of each Undervoltage Load Shedding Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, 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. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has no Parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is consistent with PRC-006-1, Requirement R8, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This is an administrative planning requirement that meets NERC's criterion for a Lower VRF. Failure to provide data according to the specified format and schedule to support maintenance of each Undervoltage Load Shedding Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, 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. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.

VRF and VSL Justifications – PRC-010-1, R6	
Proposed Lower VSL	The applicable entity provided data in accordance with Requirement R6, but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R6, but the data was not according to the specified format.
Proposed Moderate VSL	The applicable entity provided data in accordance with Requirement R6, but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.
Proposed High VSL	The applicable entity provided data in accordance with Requirement R6, but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.
Proposed Severe VSL	The applicable entity provided data in accordance with Requirement R6, but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R6.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—the VSLs cover aspects of the requirement that are not equal in importance; there is an incremental aspect to the VSL for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** The VSLs' associated requirement is different in construct from the existing requirement being replaced (PRC-021-1, Requirement R1) and, therefore, the VSLs cannot be compared. The VSLs for this requirement meet or exceed the current level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1, R6	
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R7	
Proposed VRF	Lower
NERC VRF Discussion	This is an administrative planning requirement that meets NERC's criterion for a Lower VRF. Failure to update an Undervoltage Load Shedding Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, 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. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has no Parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is consistent with PRC-006-1, Requirement R6, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This is an administrative planning requirement that meets NERC's criterion for a Lower VRF. Failure to update an Undervoltage Load Shedding Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, 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. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity updated the database in accordance with Requirement R7, but was late by less than or equal to 30 calendar days.
Proposed Moderate VSL	The applicable entity updated the database in accordance with Requirement R7, but was late by more than 30 calendar days but less than or equal to 60 calendar days.
Proposed High VSL	The applicable entity updated the database in accordance with Requirement R7, but was late by more than 60 calendar days but less than or equal to 90 calendar days.

VRF and VSL Justifications – PRC-010-1, R7	
Proposed Severe VSL	The applicable entity updated the database in accordance with Requirement R7, but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R7.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines— there is an incremental aspect to the VSL for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** The existing requirement being replaced (PRC-020-1, Requirement R1) is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1, R8	
Proposed VRF	Lower
NERC VRF Discussion	This is an administrative planning requirement that meets NERC's criterion for a Lower VRF. Failure to provide an Undervoltage Load Shedding Program database within a timely manner of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, 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. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1- Consistency w/ Blackout Report:** N/A
FERC VRF G2 Discussion	**Guideline 2- Consistency within a Reliability Standard:** The requirement has no Parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3- Consistency among Reliability Standards:** This requirement is consistent with PRC-006-1, Requirement R7, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4- Consistency with NERC Definitions of VRFs:** This is an administrative planning requirement that meets NERC's criterion for a Lower VRF. Failure to provide an Undervoltage Load Shedding Program database within a timely manner of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, 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. The applicable entities are always responsible for maintaining the reliability of the Bulk Electric System regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5- Treatment of Requirements that Co-mingle More than One Obligation:** This requirement does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by more than 15 calendar days but less than or equal to 30 calendar days.

VRF and VSL Justifications – PRC-010-1, R8	
Proposed High VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8, but was late by more than 60 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.
NERC VSL Guidelines Discussion	Meets NERC's VSL Guidelines—there is an incremental aspect to the VSL for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1- Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance:** The existing requirement being replaced (PRC-020-1, Requirement R2) is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2- Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a- The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent:** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3- Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement:** The proposed VSL uses similar terminology to that used in the associated requirement, and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4- Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations:** The VSL is based on a single violation and not cumulative violations.

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Project 2008-02 Undervoltage Load Shedding

Recommended Coordination Plan | March 14, 2014

Background

Project 2008-02 Undervoltage Load Shedding ("UVLS Project") proposes to consolidate and retire PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 to create PRC-010-1 – Undervoltage Load Shedding. During development, the drafting team identified the following necessary corresponding changes to meet the design of PRC-010-1:

1) Modify PRC-004-3 – Protection System Misoperation Identification and Correction, which excludes UVLS, to include certain types of UVLS programs as part of its applicable facilities.

2) Retire three requirements in EOP-003-2 – Load Shedding Plans whose required performance is reflected in proposed PRC-010-1.

3) Modify the current NERC Glossary definition of the term Special Protection System (SPS), which excludes UVLS, to include a subset of UVLS programs that are more appropriately categorized as SPSs and covered by SPS-related standards.

In order to make the necessary changes, the UVLS Project needs to coordinate with ongoing development work in three active NERC standard development projects as follows:

- Project 2010-05.1 Protection Systems: Phase 1 (Misoperations) ("Misoperations Project")
- Project 2009-03 Emergency Operations ("EOP Project")
- Project 2010-05.2 Protection Systems: Phase 2 (Special Protection Systems) ("SPS Project")

Current Recommended Plan

As a result, NERC has identified a preferred project plan to coordinate the above-mentioned projects to properly align legacy standard retirements and revised standard implementations due to the differences in each project's timing. In short, the revised SPS definition, the UVLS Project, and the EOP Project will be presented simultaneously to industry, the NERC Board of Trustees, and applicable regulatory authorities. An illustrative diagram of this coordination appears on the next page. This plan is subject to change as necessary.

1) The UVLS Project will address the conforming changes needed to PRC-004 after PRC-004-3 is complete. How and when this will occur depends on when PRC-004-3 obtains approval from the ballot body and is adopted by the NERC Board of Trustees.

2) The EOP and UVLS Projects will progress simultaneously and coordinate necessary changes.

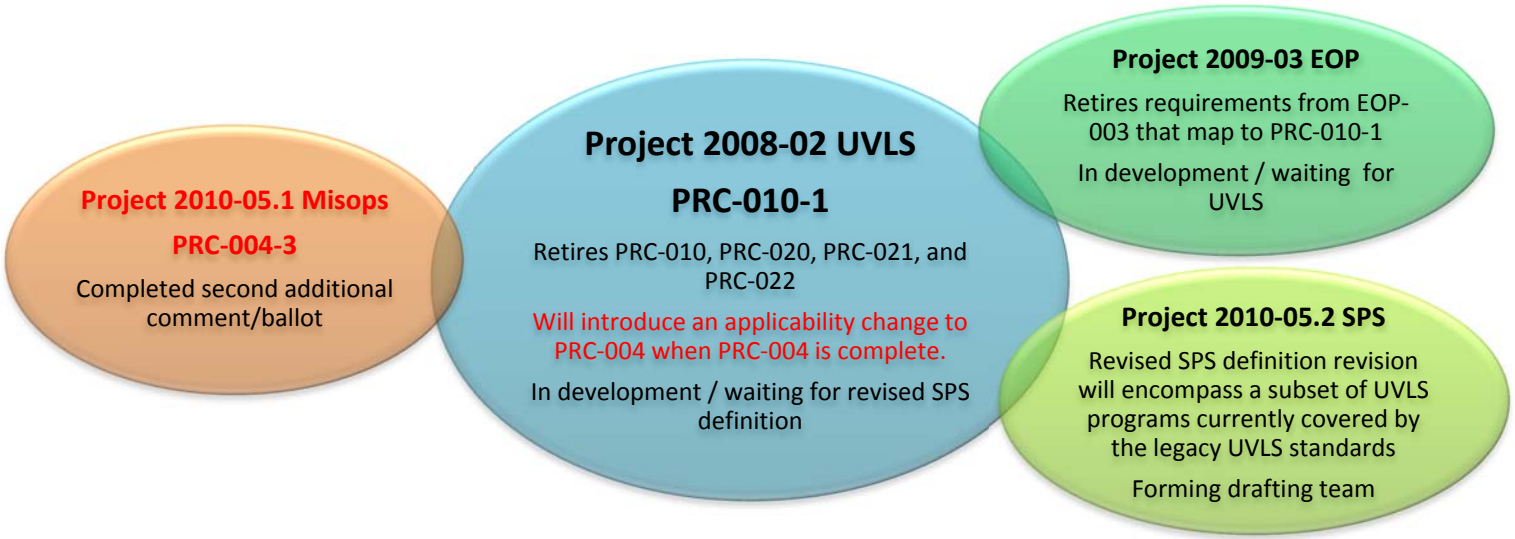
3) The SPS Project is proposing to revise the definition of SPS in advance of revising the SPS standards. The UVLS Project will progress simultaneously with the SPS definition revision in order to properly transfer certain aspects of the legacy UVLS standards into coverage under the SPS standards.

Impacts

As a result of the necessary coordination above, the UVLS Project and the EOP Project are now timed by the schedule for the SPS Project, which is targeting the approval of the revised SPS definition at the February 2015 NERC Board of Trustees meeting.

Additional Considerations

Of note, Project 2007-17.3 Protection System Maintenance and Testing: Phase 3 (Sudden Pressure Relays) is beginning development on version 4 of PRC-005, which may consider use of a new defined term introduced by the UVLS Project. Therefore, this project may also coordinate with the UVLS Project as needed.



April 2014
First SPS SDT Meeting

June 2014
UVLS and EOP Standards and SPS Defintion First Ballot

February 2015
UVLS and EOP Standards and SPS Definiton to BOT

April 2015
UVLS and EOP Standards and SPS Definiton Petition Package to FERC

TBD
Revised SPS Standards to BOT

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

PRC-010-1 FAQ

In Response to Comments

Project 2008-02 Undervoltage Load Shedding

March 14, 2014

RELIABILITY | ACCOUNTABILITY




3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

Table of Contents

Introduction

The Project 2008-02 Undervoltage Load Shedding (UVLS) Standard Drafting Team (drafting team) thanks all commenters who submitted comments on the revised Standard Authorization Request (SAR). The revised SAR and accompanying drafted portions of a proposed PRC-010-1 were posted for a 30-day informal comment period from September 10, 2013 through October 9, 2013. Stakeholders were asked to provide feedback on the revised SAR and supporting draft standard through a special electronic comment form. There were 30 sets of responses, including comments from approximately 93 different people from approximately 57 companies representing 9 of the 10 Industry Segments as shown in the table on the following pages.

All comments submitted may be reviewed in their original format on the project page.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel your concern has not been addressed, you can contact the Standards Developer, Erika Chanzes, at 404-446-2583 or at erika.chanzes@nerc.net.

FAQ in Response to Comments

The drafting team appreciates industry comments on the revised SAR and proposed PRC-010-1 standard. The drafting team reviewed all comments carefully and made changes to the standard accordingly; however, the Standard Processes Manual (SPM) does not require the drafting team to respond to each comment during an informal comment period. Comments or suggested changes with which the drafting agreed are reflected in a subsequent informal comment period posting of a proposed PRC-010-1. To succinctly address key issues needing clarification with respect to drafting team approach and intent, common comment themes that required drafting team response are reflected on the following pages in the construct of a frequently-asked questions format (FAQ).

Purpose of Standard Revision

What is the basis for a revision of the existing UVLS standards?

The initial input into a revision of the existing UVLS standards is FERC Order No. 693, Paragraph 1509, which directed the ERO to develop a modification of PRC-010-0 that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs." In addition, the August 14 Blackout Report showed that proper coordination would have mitigated effects if UVLS was used as a tool.

Additional inputs included 1) recommendations from the NERC System Protection and Control Subcommittee (SPCS) in its December 2010 *Technical Review of UVLS-Related Standards* to combine the four existing UVLS standards, revise the applicability to entities responsible for UVLS program design, implementation, and coordination, specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, and differentiate post-event validation of UVLS program design from verifying correct operation of UVLS equipment; 2) the existing UVLS standards were not in the current results-based format; 3) the preceding revision of the underfrequency load shedding (UFLS) standards had similar types of requirements and had been completed under the construct of a consolidation; and 4) the Independent Expert Review Panel recommendations, which included an evaluation of the existing standards' applicability and level of specificity.

The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability. As part of the revision to address this, the drafting team also agreed that an evaluation and consolidation of the existing UVLS standards was necessary to meet current Reliability Standard development initiatives and to provide clear, comprehensive requirements to address the application and coordination of UVLS.

UVLS programs are not mandatory—is compliance for an optional tool necessary?

The drafting team asserts that a key takeaway from the August 14 Blackout Report is that coordination of UVLS with other protection systems could have mitigated the effects if UVLS was used as a tool. Although the use of UVLS is not mandatory, when one is installed, the program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term UVLS Program, which limits the standard's applicability to only those undervoltage-based load shedding programs whose performance have an impact on system reliability.

Coordination with Project 2009-03 Emergency Operations

EOP-003-2 has potential redundant requirements with the proposed PRC-010-1—how is this being addressed?

As part of its five-year review, Project 2009-03 Emergency Operations (EOP) identified EOP-003-2, Requirements R2, R4, and R7 as being more properly covered by Project 2008-02 UVLS. Now that both projects are in formal development, they are strategically coordinating to move in lockstep from a timing perspective to address these requirements. Project 2009-03 EOP, which is proposing to revise and consolidate EOP-001-2.1b, EOP-002-3, and EOP-003-2 to create EOP-011-1, will retire the noted EOP-003-2 requirements (among other revisions), and the Project 2008-02 UVLS Mapping Document will show how PRC-010-1 encompasses the retired content accordingly. Slated to have aligning effective dates, both EOP-011-1 and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition. Please see the posted Project 2008-02 UVLS Project Coordination Plan for more information.

"UVLS Program" Definition

Why is the introduction of the new NERC Glossary term "UVLS Program" necessary?

PRC-010-1 introduces a new NERC Glossary term, UVLS Program, to clearly establish which UVLS programs PRC-010-1 will apply to: automatic load shedding programs consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions.

It is also noted in the definition that this term excludes centrally-controlled undervoltage-based load shedding. As part of the development to clearly establish PRC-010-1's applicability, the drafting team found it is necessary to establish a bright line with respect to the characteristics of centrally-controlled undervoltage-based load shedding with regard to its reliability requirement-related needs. Because the reliable performance of centrally-controlled undervoltage-based load shedding could be affected by a single component failure, the drafting team maintains that this type of load shedding is consistent with the nature of Special Protection Systems (SPSs) and should be covered by SPS-related Reliability Standards.

For further explanation, please see the rationale box for the UVLS Program definition on page 3 of the PRC-010-1 draft standard document and the portion of the Guidelines and Technical Basis that addresses the definition within the standard document on pages 16–17.

Where will centrally-controlled undervoltage-based load shedding be covered?

As explained immediately above, the requirements of PRC-010-1 are applicable to the proposed new NERC Glossary term "UVLS Program," which excludes centrally-controlled undervoltage-based load shedding because it is consistent in nature with SPSs. The current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Protection Systems: Phase 2 (Special Protection Systems), which is also currently under formal development, will revise the NERC Glossary definition of "Special Protection System" to exclude UVLS Programs (among other planned revisions).

As a result, the existing SPS-related standards (PRC-012 through PRC-017) will be applicable to centrally-controlled undervoltage-based load shedding upon the effective date of the revised definition of "Special Protection System." Similar to the coordination effort with Project 2009-03 EOP explained above, Project 2008-02 UVLS and Project 2010-05.2 SPS are working together in lockstep from a timing perspective to ensure that the revised SPS-definition and retirement of legacy UVLS standards align, and that both the proposed revised SPS definition and PRC-010-1 are posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition.

If the definition excludes certain types of UVLS, does this preclude an "integrated" approach (FERC Order No. 693, Paragraph 1509)?

The defined term UVLS Program clarifies which UVLS systems are subject to the requirements in PRC-010-1. The resulting exclusions from PRC-010-1 do not preclude an "integrated" approach because the standard requires that an entity coordinate with all other protection and control systems, which include other types of UVLS (i.e., locally-applied UVLS relays and centrally-controlled undervoltage-based load shedding).

Applicability

What is meant by the phrase "Planning Coordinator or Transmission Planner"?

PRC-010-1 is applicable to both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs. The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

Why is the Transmission Operator not included?

While the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance that was necessary to capture within PRC-010-1. To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001.

What about UVLS programs owned by Transmission Owners and Distribution Providers that are not required by the planner?

Requirement R3 requires the Planning Coordinator or Transmission Planner to perform a comprehensive assessment to evaluate the effectiveness of each existing UVLS Program *in its area* at least once every 60 calendar months (or sooner). It is noted that this is regardless of whether the planner initially developed the program; the planner has ultimate responsibility for the effectiveness of all UVLS Programs residing within its area.

Clarifications on Requirements R1, R3, R4, and R5

How would the coordination referenced in Requirement R1, Part 1.2 be demonstrated?

Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to demonstrate the program's viability and effectiveness prior to implementation. This demonstration should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. The studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis. For further guidance on and examples of coordination considerations, please see the portion of the Guidelines and Technical Basis section that addresses Requirement R1 on pages 17–18 of the draft PRC-010-1 standard document.

Requirements R1, R3, and R4 seem to all require demonstrations of program effectiveness—how are they different?

Requirements R1, R3, and R4 do all require demonstrations of program effectiveness, but they are each at distinct points in time.

Requirement R1 requires demonstration of program effectiveness (by way of the qualifying sub requirements) at the onset of program development, or during the initial planning stage, prior to implementation. Requirement R3 requires the same objectives of a demonstration of effectiveness, but at the point of a mandatory periodic review (every 60 calendar months or sooner as required). Requirement R4 addresses a UVLS Program's performance after an event (applicable voltage excursion) to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event.

It is noted that, because of the separate objectives of each requirement, UVLS Program deficiencies found as a result of the assessments performed in Requirement R3 or R4 would not be violations of Requirement R1.

Requirement R4 would require the Transmission Planner and Planning Coordinator to review all voltage excursions—isn't this unduly burdensome?

While Requirement R4 essentially requires the Planning Coordinator or Transmission Planner to review all voltage excursions to see if they fall below the initializing set points of the UVLS Program, the drafting team contends that it will be clearly evident if voltage falls below the UVLS threshold because either a) UVLS devices will operate; or b) the system will experience the adverse conditions the UVLS Program was installed to mitigate.

In addition, the drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have access to the real-time voltage data to monitor the excursions since they are not operating entities. However, the drafting team also contends that there should be an established feedback notification line from the Transmission Operator or Distribution Provider with regard to real-time voltage data to monitor excursions.

PRC-022-1 required the analysis of UVLS Misoperations. How is this addressed in PRC-010-1?

One of the SPCS recommendations was to clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities addressed in PRC-010-1) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

Relative to a UVLS Program, PRC-010-1, Requirements R4 and R5 require event analysis and a Corrective Action Plan (CAP) to address any identified program deficiencies. The UVLS drafting team maintains that verifying correct operation of UVLS equipment should be addressed in PRC-004 and is coordinating an applicability change to this standard with respect to the development timeline of Project 2010-05.1 Protection Systems (Misoperations), which is in the later stages of development of PRC-004-3. Please see the posted PRC-010-1 Mapping Document and Project 2008-02 UVLS Project Coordination Plan for further information.

Concerns with Requirements R6, R7, and R8

Do Requirements R6, R7, and R8 overlap with the requirements of MOD-032-1?

While both MOD-032-1 and Requirements R6, R7, and R8 of PRC-010-1 address data requirements, MOD-032-1 establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas the PRC-010-1 requirements address the need to maintain and share data and databases for the purposes of studies for use in event analyses for UVLS Programs specifically. While Reliability Standards in general may have overlap in this manner, the activities in these requirements remain distinctly different.

Requirements R6, R7, and R8 appear to be administrative—doesn't this conflict with Paragraph 81 criteria?

Proper maintenance and timely sharing of UVLS Program data as required by Requirements R6, R7, and R8 is necessary to inform the Planning Coordinator or Transmission Planner's studies and analyses. While administrative tasks are required, the tasks have a core reliability-based need.

In addition, Requirements R6, R7, and R8 were written to emulate FERC-approved PRC-006-1 Automatic Underfrequency Load Shedding data requirements. While these analogous requirements in PRC-006-1 are listed as candidates for Paragraph 81, they are not yet approved as meeting the criteria; furthermore, the Independent Expert Review Panel has recommended that these Paragraph 81 candidates not be included for deletion, citing that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters".

Attachment A – Drafting Team Members

Table 1: Project 2008-02 UVLS Standard Drafting Team		
	Participant	**Entity**
Chair	Greg Vassallo	Bonneville Power Administration
Member	José Conto	Electric Reliability Council of Texas, Inc.
Member	Bill Harm	PJM Interconnection, LLC
Member	Sharma Kolluri	Entergy Corporation
Member	Charles-Eric Langlois	Hydro-Quebec TransEnergie
Member	Manish Patel	Southern Company Transmission
Member	Fabio Rodriguez	Duke Energy Florida
Member	Hari Singh	Xcel Energy, Inc.
Member	Matthew H. Tackett	MISO

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2008-02 Undervoltage Load Shedding
PRC-010-1

Informal Comment Period Now Open through April 16, 2014

Now Available

A 30-day informal comment period for the draft standard **PRC-010-1 – Undervoltage Load Shedding** is open through **8 p.m. Eastern on Wednesday, April 16, 2014.**

If you have questions please contact Erika Chanzes via email or by telephone at (404) 446-2583.

Background information for this project can be found on the project page.

Project 2009-03 Emergency Operations will also soon be posting a proposed EOP-011-1 (intended to consolidate and replace EOP-001-2.1b, EOP-002-3.1, and EOP-003-2) for a 30-day informal comment period. Stakeholders may wish to review both projects with respect to the transition of certain requirements from EOP-003-2 to PRC-010-1.

Instructions for Commenting

Please use the electronic form to submit comments on the revised definition. If you experience any difficulties in using the electronic form, please contact Wendy Muller. An off-line, unofficial copy of the comment form is posted on the project page.

For information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, or at 404-446-2560.

North American Electric Reliability Corporation
3353 Peachtree Rd, NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

Individual or group. (25 Responses)
Name (15 Responses)
Organization (15 Responses)
Group Name (10 Responses)
Lead Contact (10 Responses)
IF YOU WISH TO EXPRESS SUPPORT FOR ANOTHER ENTITY'S COMMENTS WITHOUT ENTERING ANY ADDITIONAL COMMENTS, YOU MAY DO SO HERE. (0 Responses)
Comments (25 Responses)
Question 1 (23 Responses)
Question 1 Comments (25 Responses)
Question 2 (24 Responses)
Question 2 Comments (25 Responses)
Question 3 (24 Responses)
Question 3 Comments (25 Responses)
Question 3 (25 Responses)
Question 4 Comments (25 Responses)
Question 3 (25 Responses)
Question 5 Comments (25 Responses)

Individual
William H. Chambliss
Virginia State Corporation Commission, member OC
No
The logic for excluding ALL centrally-controlled undervoltage load shedding appears weak. All such programs are excluded because some MAY either use voltage inputs from various locations or use inputs other than voltages in their logic. It seems more reasonable to exclude only those centrally controlled undervoltage shedding that POSITIVELY fits either of the above characteristics, rather than excluding all because some MAY fit either.
Yes
Yes
Yes
It is unclear who is included in the term "UVLS entity" in R2. This should be a defined term.
Yes
Although I believe certain wording changes could improve the standard, I generally support it.
Individual
Thomas Foltz

American Electric Power
No
The proposed definition for Undervoltage Load Shedding Program makes no distinction between UVLS devices implemented on Distribution feeder circuits and BES (100kV and above) circuits. The previous PRC-021-1 only applied to UVLS programs used “to mitigate the risk of voltage collapse or voltage instability in the *BES*” (emphasis added). Please clarify whether or not the proposed definition applies only to the BES.
Yes
Yes
Yes
The drafting team stated in the Mapping Document their intention for PRC-004-3 to address UVLS Program Misoperations. We believe that it is clearer and more concise that the requirement for UVLS Program Misoperations be contained together with other UVLS related requirements within PRC-010-1 rather than be split separately between PRC-004-3 and PRC-010-1. In addition, referencing our comments in question 1, the proposed requirements in PRC-004-3 only include BES Misoperations while the proposed PRC-010-1 standard makes no distinction between BES and non-BES devices. We believe that this discrepancy needs to be addressed and clarified.
No
Further clarification is needed before AEP can determine whether it can support the proposed standard.
Individual
Amy Casuscelli
Xcel Energy Inc.
Yes
Yes
No
In R5, it is unclear which assessment is being referenced – is it the one performed in R3, in R4, or both? Please consider making the reference more specific. Also in R5, it is unclear how “within three calendar months of identification (of deficiencies)” can be measured? It appears to require the TP/PC to record the date the deficiencies were identified during the performance of assessment -- if this is indeed the intent, recording this milestone date is not captured in R3 or R4. Suggest the milestone date be changed to completion of assessment date. We suggest the following changes in R5 to address both concerns: R5. Each Planning

Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment [performed in either R3 or R4] shall develop a Corrective Action Plan (CAP) to address the deficiencies within three calendar months of [completing the assessment].
No
Yes
Good improvements and clarifications in the standard, and most importantly in the defined term “UVLS Program” by making a clear distinction with respect to SPS.
Individual
Ayesha Sabouba
Hydro One
No
The “distributed” attribute needs clarification. Often in one geographic region there are multiple UVLS schemes that are totally independent from each other and individually respond to various contingencies. Although there is always a possibility that one severe contingency would trigger two or more of these schemes, this by itself should not make the collection of UVLS schemes a “distributed” UVLS Program. When multiple UVLS schemes are armed in one region, even if one of them fails to shed its load in response to a severe contingency, the others will respond and the failure of one UVLS scheme will impact only its “contained area”. Is the proposed standard requiring the assessment of the simultaneous failure of all independent UVLS schemes in the region, or failure of only one of those schemes, to determine if there is “Adverse Reliability Impact outside this contained area”?
Yes
Yes
Yes
Requirement R6 could be removed since in the new MOD-032 the PC is required to specify all data and models needed for assessment of reliability of the system and the affected entities are required to provide those data and models to the PC. These will cover the UVLS data as well.
No
More clarity is needed for deciding which UVLS schemes are “UVLS Program”. Please see the answer to Q1 above regarding the “distributed” attribute and deciding when there could be adverse reliability impact outside contained area for multiple (e.g., five or six) independent UVLS schemes in one part of the system. One suggestion is to remove the “distributed” attribute (and even the term “Program”) and instead make the requirements of this standard applicable to those UVLS schemes that individually or collectively are needed for compliance with the performance requirements of TPL-001-4. This would be consistent with what is

proposed for SPS definition (and Type). Note that Page 18 has reference to “(TPL category C Contingency)” which needs to be updated to the categories in TPL-001-4.
Individual
Michael Falvo
Independent Electricity System Operator
Yes
No
We agree with the entities presented in Section A 4.1, but do not agree with the exclusion of Transmission Operator. While Section 4.1.3 includes Transmission Owner as an Undervoltage load shedding (UVLS) entities, not all TOs are responsible for the operation or control of UVLS equipment. Where a TO delegates such responsibilities to the TOP, or where the TO and TOP are separate organizations, the TO will not have such responsibilities. We suggest to add TOP to the Applicability Section.
No
We generally agree with R1, R2 and R4, but do have the following concerns with Requirements R3 and R5. R3: The phrase “or operating conditions” is very vague. There are definitely “material changes” to the operating conditions yearly, monthly, weekly and even daily. At a minimum, the dispatch scenarios will be different every day, week, month and year. Do these changes constitute material changes to the operating conditions? If so, then the effectiveness of each existing UVLS Program needs to be assessed very frequently. If no, then what constitutes “material changes to the operating conditions”? We suggest to remove the phrase “or operating conditions”. A review of the UVLS program once every 60 months or as material changes are made to system topology will suffice. R5: It is unclear whether or not the identified deficiencies are the results of the evaluations made in R3 and R4. This needs to be clarified, or else there need to be triggering events clearly stated in R5. Further, R5 requires the development of a CAP in 3 months, but does not require the implementation of the CAP, and the time frame. Both need to be added.
Yes
We offer the following comments on Requirements R6, R7 and R8 for consideration: R6: We question the need for R6. Given that R2 requires the UVLS entity to adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner, without exception, wouldn’t the PC and TP already have the information on their respective data base? We suggest to remove R6. R7: For the same reason stated in the comment on R6, above, R7 is not required and should be removed. Even if this requirement is retained, the database update to support modeling needs only to be performed as the UVLS program is revised following the identification in R3, R4 and the implementation of the CAP in R5, not annually. R8: The UVLS program data base may be required by other entities that need to consider UVLS operations in a PC’s area, such as the TOPs that developed SOLs and RCs that develop IROLs. The impacts of UVLS operations and

their settings need to be considered and modeled in the SOL/ITOL development. Please expand this requirement to include “and those entities that have a reliability need for the database.”
No
To put us in favor of the standard, the comments/concerns expressed under Q3 and Q4, above, will need to be address. And where changes are not made to address these concerns, the rationale for not making changes should be provided. There are no specific questions on the Measures, Retention requirements, VRFs and VSLs so we have elected not to review them at this time to provide comments. Further, since we do not agree with a number of requirements, commenting on the compliance elements including VRFs and VSLs is perhaps premature at this time. We will provide comment when the revised draft standard is posted for formal commenting.
Group
Colorado Springs Utilities
Kaleb Brimhall
Yes
Yes
Yes
Is WECC looking to organize and coordinate UVLS Programs within the overall WECC region?
No
Yes
Group
MRO NERC Standards Review Forum
Joe DePoorter
Yes
Yes
Yes
Yes
Please consider these suggestions. Modify the standard title to qualify that the standard applies to “Automatic Undervoltage Load Shedding” similar to the title of the ‘Automatic

Underfrequency Load Shedding Standard (PRC-006-1). This change would readily indicate that the standard does not include manual undervoltage load shedding, which is presently covered by EOP-003-2 (Loading Shedding Plans) standard and will continue to be covered by the future revision of standard EOP-011-1 when the automatic UVLS program requirements are removed. Modify the Purpose to qualify that the standard applies to automatic UVLS Programs used to mitigate the risk of BES Adverse Reliability Impacts due to undervoltage conditions with wording like, ". . . reliable operation of automatic Undervoltage Load Shedding (UVLS) Programs that are used to mitigate the risk of BES Adverse Reliability Impacts due to undervoltage conditions". Move specific wording from the guidelines which aren't mandatory into the NERC standard itself to clarify that the standard by itself does not require a mandatory UVLS program, rather if an entity has UVLS systems, (i.e. groups of relays set to open for to maintain BES system voltages and not individual UVLS relays protecting individual transmission lines) that meet the NERC standard, those systems are in-scope.
No
The proposed standard is very good. However, making changes to the standard that address the comments made above in an acceptable manner would be needed to put us in favor of the planned revision to the existing standards.
Group
Arizona Public Service Company
Janet Smith
Yes
Yes
No
For a UVLS developed as a safety net, any event that would trigger the necessary voltage excursion to trigger the UVLS program would be very significant. The analysis of the event, including evaluation of UVLS would likely take a minimum of a year. Has the drafting team considered the process involved in analyzing an event such as the Northeast Blackout and how the analysis of a safety net (had one been employed) would have impacted the overall analysis timeframe? In addition, APS has concerns that any additional analysis needed to identify effectiveness improvements would likely take more than three months. APS would like clarification that the three month time period given only refers to the development of the Corrective Action Program (CAP) milestones, and not the development and actual completion of these milestones within that 3 month period.
Yes
No
APS would like to see more detail as to what is required to demonstrate effectiveness and coordination as it relates to UVLS safety nets developed to protect from unforeseen multiple

Contingencies. APS would also like to see consideration of the time lines suggested by the drafting team to analyze UVLS effectiveness and to develop corrective action plans after a voltage excursion again specifically as it relates to safety net UVLS program that would not initiate except during an extreme event.
Individual
Dan Inman
Minnkota Power Cooperative
Yes
Minnkota Power Cooperative believes the definition and the enforceable standard should match the intent expressed in the guidelines. The guidelines express a specific criteria for wide-area issues (“wide-area voltage collapse” and “wide-area voltage undervoltage problems”). MPC supports this wide area criteria and suggest applying the criteria outlined in guidance to the definition for UVLS Programs. Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, wide-area voltage collapse, or uncontrolled separation resulting from wide-area undervoltage conditions. Centrally-controlled undervoltage-based load shedding is not included.
Yes
Yes
Yes
Yes
Individual
Trevor Schultz
Idaho Power Company
No
I suggest adding the words “wide area” prior to the words “voltage collapse” in the UVLS Program definition. It seems the SDT’s intent is to exclude UVLS systems used to mitigate the risk of “local” voltage collapse, as illustrated by the “Radial BES Subsystem” example in the PRC-010-1 Application Guidelines – in fact, the phrase “wide area voltage collapse” is used in the verbiage of this example. As the UVLS definition currently reads, it could be interpreted to include UVLS schemes implemented with the purpose of preventing local "voltage collapse", such as the scheme described in the Application Guidelines example.
Yes

Yes
No
No
I would support the proposed standard once I am assured the definition of UVLS Program provides adequate clarity to understand which schemes apply to the standard.
Group
Northeast Power Coordinating Council
Guy Zito
No
The “distributed” attribute needs clarification. Often in one geographic region there are multiple UVLS schemes that are totally independent from each other and individually respond to various contingencies. Although there is always a possibility that one severe contingency would trigger two or more of these schemes, this by itself should not make the collection of UVLS schemes a “distributed” UVLS Program. When multiple UVLS schemes are armed in one region, even if one of them fails to shed its load in response to a severe contingency, the others will respond and the failure of one UVLS scheme will impact only its “contained area”. Is the proposed standard requiring the assessment of the simultaneous failure of all independent UVLS schemes in the region, or failure of only one of those schemes, to determine if there is “Adverse Reliability Impact outside this contained area”?
No
We agree with the entities presented in Section A 4.1, but do not agree with the exclusion of Transmission Operator. While Section 4.1.3 includes Transmission Owner as an Undervoltage load shedding (UVLS) entities, not all TOs are responsible for the operation or control of UVLS equipment. Where a TO delegates such responsibilities to the TOP, or where the TO and TOP are separate organizations, the TO will not have such responsibilities. Suggest adding TOP to the Applicability Section.
No
We agree with R1, and R4, but do have the following concerns with Requirements R3 and R5. In Requirement R3 the phrase “or operating conditions” is very vague. There are continuous and ongoing “material changes” to operating conditions. At a minimum, the dispatch scenarios will be different every day, week, month and year. Do these changes constitute material changes to the operating conditions? If so, then the effectiveness of each existing UVLS Program needs to be assessed very frequently. If no, then what constitutes “material changes to the operating conditions”? Suggest removing “or operating conditions”. A review of the UVLS program once every 60 months or as material changes are made to system topology is sufficient. In Requirement R5 it is unclear whether or not the identified deficiencies are the results of the evaluations made in R3 and R4. This needs to be clarified, or else there need to be triggering events clearly stated in R5. Further, R5 requires the

development of a CAP in 3 months, but does not require the implementation of the CAP, and the time frame. Both need to be added.
Yes
Requirement R6 could be removed. In the new MOD-032 the PC is required to specify all data and models needed for assessment of reliability of the system, and the affected entities are required to provide those data and models to the PC. This will cover the UVLS data as well. Also, given that Requirement R2 requires the UVLS entity to adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner, without exception, wouldn't the PC and TP already have the information on their respective data base? Regarding Requirement R7, for the same reason as stated above for Requirement R6, Requirement R7 is not required and should be removed. Even if this requirement is retained, the database update to support modeling needs only to be performed as the UVLS program is revised following the identification in R3, R4 and the implementation of the CAP in Requirement R5, not annually. For Requirement R8, the UVLS program data base may be required by other entities that need to consider UVLS operations in a PC's area, such as the TOPs that developed SOLs and RCs that develop IROLs. The impacts of UVLS operations and their settings need to be considered and modeled in the SOL/IROL development. Please expand this requirement to include "and those entities that have a reliability need for the database."
No
More clarity is needed for deciding which UVLS schemes are "UVLS Program". Please see the response to Q1 above regarding the "distributed" attribute and deciding when there could be adverse reliability impact outside contained area for multiple (e.g., five or six) independent UVLS schemes in one part of the system. One suggestion is to remove the "distributed" attribute (and even the term "Program") and instead make the requirements of this standard applicable to those UVLS schemes that individually or collectively are needed for compliance with the performance requirements of TPL-001-4. This would be consistent with what is proposed for SPS definition (and Type). Note that Page 18 makes reference to "(TPL category C Contingency)" which needs to be updated to the categories in TPL-001-4.
Group
Duke Energy
Colby Bellville
Yes
Yes
Yes
R1: No comment R3: Duke Energy requests clarification from the SDT on the intent of the "material change" aspect of the proposed requirement. Is it the SDT's intent to have the

individual entity set its own criteria as to what constitutes a “material change”? R4: No comment R5: No comment
Yes
R7: Duke Energy suggests that the SDT consider re-wording R7 to the following: “Each Planning Coordinator that has a UVLS program in its area shall update a database containing data necessary to model its UVLS program for use in event analyses and assessments of the UVLS program as needed, or at least once every calendar year.” The addition of the phrase “as needed”, provides for a Planning Coordinator to update a UVLS program when necessary to ensure for the most current model availability.
Yes
Duke Energy’s support for the proposed PRC-010-1 is contingent upon the absolute inclusion of Centrally-controlled undervoltage-based load shedding in the definition of Special Protection System (Project 2010-05.2 Protection Systems).
Individual
Anthony Jablonski
ReliabiltiyFirst
No
ReliabilityFirst provides the following comments for considerations: 1. Requirement R1 - ReliabilityFirst requests clarification on why Requirement R1 is applicable to both the Planning Coordinator and Transmission Planner? In the scenario where the Planning Coordinator has an UVLS program, it would be counterintuitive for a Transmission Planner within the Planning Coordinator’s area to have an UVLS program as well. ReliabilityFirst recommends structuring this standard in the same fashion as the NERC PRC-006-1 (UFLS) Standard and remove the Transmission Planner as an Applicable Entity within the standard. If the Planning Coordinator and Transmission Planner are included based on differences within Regional Entity footprints, ReliabilityFirst recommends including a Regional Variance for these specific instances. 2. Requirements R6 and R7 - If Requirements R1, R3, R4 and R5 continue to apply to the Transmission Planner (based on our previous comment), ReliabilityFirst requests clarification on why the UVLS Entities are not required to provide data to the Transmission Planners (R6) and why the Transmission Planners are not required to update the UVLS database (R7).
Yes
ReliabilityFirst provides the following comments for considerations: 1. Requirement R1, Part 1.2 - ReliabilityFirst believes the term “coordination” by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration: “The UVLS Program is [validated] through coordination [of Protection Systems] with generator voltage…” 2. Requirement R2 - Requirement R2 requires the UVLS entity to adhere to the Planning Coordinator and Transmission Planner implementation schedule though there is no corresponding requirement for the PC or TP to provide such a schedule. If the Planning

Coordinator or Transmission Planner never provides such a schedule, there is a potential for the UVLS entity to be non-compliant. Once again ReliabilityFirst recommends the following similar structure of the NERC PRC-006-1 Standard and include the addition of a new requirement in this standard, such as “Each Planning Coordinator or Transmission Planner shall notify the UVLS Entities of the UVLS Program specifications and implementation schedule.” 3. Requirement R3 - ReliabilityFirst recommends removing the term “comprehensive” since it adds little or no value to the requirement. The term is ambiguous and the meaning may have potential differing interpretations by the parties involved. 4. Requirement R3, Part 1.3 - ReliabilityFirst believes the term “coordination” by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration “The UVLS Program is [validated] through [protected device] coordination with generator voltage…”
No
ReliabilityFirst believes the comments submitted via the preceding questions need to be addressed before the standard is ready for approval.
Individual
Andrew Z. Pusztai
American Transmission Company, LLC
No
ATC asks the SDT please consider the following modification of the proposed UVLS Definition to qualify that these are programs that are developed by the Planning Coordinator or the Transmission Planner and not temporary schemes that are developed by the Transmission Operator: ATC recommends revising the definition as follows: “Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program developed by the Planning Coordinator or Transmission Planner consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Centrally controlled undervoltage based load shedding is not included.”
Yes
Yes
Yes
ATC asks that the SDT please consider the following recommendations: 1. Modify the PRC-010-1 standard title to qualify that the standard applies to “Automatic Undervoltage Load Shedding” similar to the title of the ‘Automatic Underfrequency Load Shedding Standard (PRC-006-1). This change would readily indicate that the standard does not include manual undervoltage load shedding, which is presently covered by EOP-003-2 (Loading Shedding Plans) standard and will continue to be covered by the future revision of standard (EOP-003-3) when the automatic UVLS program requirements are removed. 2. Modify the Purpose to

qualify that the standard – (1) applies to automatic UVLS Programs, (2) does not apply to the situation of when an automatic voltage load shedding scheme is developed and implemented by the Transmission Operator for Operations Planning Time Horizon, and (3) to limit the applicability to mitigating the risk of BES Adverse Reliability Impacts due to undervoltage conditions. Consider changing the wording of the Purpose as follows: “To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of automatic Undervoltage Load Shedding (UVLS) Programs that are used to meet the NERC Transmission Planning performance requirements and mitigate the risk of BES Adverse Reliability Impacts due to undervoltage conditions”.
Yes
The proposed standard is very good, however, addressing the comments made above are recommended for ATC to be in favor of the planned revision to the existing standards.
Individual
Gul Khan
Oncor Electric Delivery LLC
Yes
Yes
Yes
Yes
Yes
Individual
Catherine Wesley
PJM Interconnection
No
The drafting team did not address, in this posting, PJM’s comment regarding the term “localized” which is not a defined term. The term potentially could be interpreted differently by auditors and the applicable functional entities. The term needs to be defined clearly to eliminate ambiguity. Additionally, PJM did not find a reference or explanation for our recommendation posted in the Consideration of Comments that were developed for industry comments submitted in October, 2013. PJM would appreciate understanding the drafting team’s decision not to provided clarity for this term.
Yes

No
PJM supports the SRC's response to this question. We reiterate their comments as follows: • R1 is missing specific wording and needs to specify the requirement to implement the UVLS program. • R3 & R5 should be clarified with language so that they only apply to "operating conditions that impact the performance of UVLS". • R5 is unclear as to which "assessment" is referred to? The assessment per R3? For R4? Or for both? • R5 needs additional language in the requirement for the entity to not only develop but also to implement the CAP.
Yes
While PJM does support the standard, we included the following comment during the previous posting in October, 2013: The PJM Regional Transmission Expansion Plan designs the PJM RTO system to avoid the need for UVLS and therefore PJM does not have a UVLS program. The standard needs to address the situation when the TP/PC does not have a UVLS program but the UVLS entity has their own UVLS schemes. The concepts contained within PRC-010-0 R1 should be incorporated within the new standard to ensure that individual UVLS entity schemes that are developed outside or in lieu of a TP/PC program are coordinated with their TP/PC. PJM would appreciate the drafting team's response to our concern.
Yes
Group
Florida Power & Light
Mike O'Neil
Yes
Yes
No
The rationale for R1 states that lack of coordination for UVLS is a key risk to the reliability of the BES. This premise is not supported by the August 14 2003 blackout or other events. UVLS was cited as a possible measure that could have mitigated the event had there been UVLS relays near the portions of the grid that experienced voltage collapse. Coordination problems are not demonstrated by the Blackout because the UVLS relays did not exist. The requirement to "demonstrate coordination" is extremely poor practice in Reliability Standard as it is inherently subjective and misinterpreted by auditors. Low voltage problems due the severe multiple contingencies tend to be focused on a local area due to the impedance of the transmission system. The need for any coordination depends on the area affected by the event and is best left up to the Transmission Planner. Generator low voltage ride through on existing generators is generally a function of the auxiliary bus design, the auxiliary bus loading conditions and the characteristic of equipment such as pump motors. Low voltage ride through is not a relay setting that can be looked up and is extremely difficult to determine without performing a load threatening staged test. NERC should be trying to encourage the

installation of UFLS relays. Many UVLS relays are engineered and justified based on Category D Extreme Events for which there is no transmission performance requirement. When planning studies demonstrate a benefit to the application of UFLS relays, Transmission Planners have ample motivation to develop a reliable scheme not prone to undesired load shedding. Imposing requirements that are difficult to demonstrate to an auditor are an impediment to more widespread application of UVLS and may lead some Planners to remove UVLS from service if they perceive a compliance risk.
No
Yes
Group
ACES Standards Collaborators
Jason Marshall
No
The combination of the definition, rationale boxes and application guidelines provide excellent description, clarification and support for which types of UVLS relays the standard is applicable. However, we would like further clarification regarding the inconsistencies between UVLS Program definition and the application guidelines that could lead to varying compliance outcomes. For instance, the application guidelines are clear on page 18 that the UVLS Program would apply to wide area voltage collapse. Given that NERC has defined wide area to include the entire reliability coordinator area, one could infer that wide area voltage collapse would exceed the area beyond a single BA. However, the actual definition of UVLS Program only includes voltage collapse which could include a local, small area voltage collapse. The example provided on page 18 makes clear that this is not the drafting team intent. However, FERC does not approve application guidelines. The Commission only approves definitions and requirements with only the requirements becoming enforceable. Thus, this could lead to inconsistent compliance outcomes. We support that concept of UVLS Program applying to a wide area voltage collapse. To remedy this issue, we recommend modifying the UVLS Program definition to include “Wide Area” before voltage collapse which is a NERC defined term that includes the entire RC Area as well as the critical flow and status information from adjacent RC Areas as determined by detailed system studies to allow the calculation of IROLs.
No
We support the concept of the delineation that the drafting team has described in the rationale box for the PC and TP. Furthermore, we support that requirements R7 and R8 are only applicable to the PC since they will develop the models for all of the TPs in their area. However, we think implementation of other requirements such as R1 should also identify only one function because it leads to confusion. The rationale box explains that the expectation is that only one of the two entities needs to develop the UVLS program. As the requirements

are written, the practical compliance application does not support the concept. While we understand the rationale box supports that both entities do not have to perform the action, a compliance auditor will ask PCs and TPs if they have UVLS Programs in their areas and expect them to show that they have completed studies and assessments to demonstrate its effectiveness per R1. The requirement applies to both and the PC or TP will not be given a "compliance pass" because they said the other has responsibility. The drafting team should work with NERC compliance staff to craft the requirements and RSAW to reflect the concept expressed in the applicability section of the compliance report.
No
(1) We are generally supportive of the approaches taken, but we do have some concerns with a few specific requirements. Requirement R1, Part 1.2 and Requirement R3, Part 3.2 of the standard need to be clarified to state that the UVLS program should be integrated with generator voltage-ride through capabilities for generators that are expected to be in-service during the actuation of the UVLS relays. UVLS Programs may be installed in areas with limited generation capabilities which result in limited reactive support. Thus, the tripping of one or more these generators in a load pocket may be ultimately what results in the need for the UVLS Program. If the area has a single generator that provides the voltage support and its loss is what ultimately triggers UVLS actuation, then why would the UVLS Program need to be coordinated with generator voltage ride-through capabilities? Please modify Parts 1.2 and 3.2 to recognize that if a unit contingency is ultimately what triggers the UVLS scheme that the UVLS Program does not need to be coordinated with the generator voltage-ride through capabilities for this standard.
Yes
(1) There appears to be inconsistency in the stated coordination between this project and the Project 2010-05.2 Special Protection Systems. Page 6 of proposed PRC-010-1 states that the definition of SPS as written in Project 2010-05.2 Special Protection Systems (SPS) will be adjusted to include only centrally-controlled UVLS. However, the recently posted definition of SPS did not reflect this. In fact, the definition explicitly excluded UVLS in bullet a) of the definition. We do support the concept that centrally-controlled UVLS schemes should be covered under the SPS standards and believe further coordination is required between the two drafting teams. (2) Requirement R8 appears to meet Paragraph 81 criteria and should be removed because it is administrative in nature. More specifically, it meets criterion B4 – Reporting because it requires reporting to third parties and does not have a discernible impact on reliability. Consider if the requirement did not exist. Is it likely that the Planning Coordinator would not share their information with another Planning Coordinator? The answer is that the PC would share because Parts 1.2 and 3.2 already require that PCs to coordinate with other UVLS Programs, which creates an implied requirement to share. Furthermore, PCs are already used to sharing information and data such as planning models through regional model building processes so sharing additional pertinent information is not a significant challenge. (3) We are concerned that requirements R4 and R5 potentially overlap with PRC-004-2.1a and may be inconsistent. The definition of Protection System and maintenance tables in PRC-005-2 make clear that distributed UVLS systems are considered Protection Systems and, thus, subject to PRC-004-2.1a. PRC-004-2.1a requires that the TO and

DP evaluate their Protection Systems Misoperations including UVLS relays Misoperations and to develop Corrective Action Plans. This would require the evaluation of all UVLS operations to ensure they are either correct or a Misoperation. R4 and R5 of PRC-010-1 would appear to require a similar analysis and development of Corrective Action Plans with specific time lines. PRC-004-2.1a does not contain specific time lines so the inclusion of specific times in PRC-010-1 R4 and R5 could cause confusion and be viewed to be in conflict. We recommend removal of PRC-010-1 R4 and R5 since they are already covered under PRC-004-2.1a. Redundant requirements also meet Paragraph 81 criteria.
No
We support the concept of the standard but believe there are still a few outstanding issues described in our comments to other questions that are required before we can support the standard. Thanks for the opportunity to comment.
Individual
Bill Temple
Northeast Utilities
No
The definition is not clear enough to determine what is a “UVLS Program”. The “distributed” attribute needs clarification. Often in one geographic region there are multiple UVLS schemes that are totally independent from each other and individually respond to various contingencies. Although there is always a possibility that one severe contingency would trigger two or more of these schemes, this by itself should not make the collection of UVLS schemes a “distributed” UVLS Program. The definition would become more clear if the clarification on page 18 (second paragraph) of the standard (Application Guide) is applied to the definition. The suggested definition for the “Undervoltage Load Shedding Program (UVLS Program)” based on the clarification of page 18 of the standard (application guide section) should be: “An automatic load shedding scheme that is used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions, within and outside of the local contained area”.
No
Yes
No
No
More clarity is needed in deciding which UVLS schemes are “UVLS Program”. Please see the answer to Q1 above regarding the “distributed” attribute and deciding when there could be adverse reliability impact outside contained area for multiple (e.g., five or six) independent UVLS schemes in one part of the system. One suggestion is to remove the “distributed” attribute and instead make the requirements of this standard applicable to those UVLS

schemes that individually or collectively are needed to mitigate Adverse Reliability Impacts within and outside of the local contained area. (Refer to last paragraph of page 18 of the draft standard). Note that Page 18 has reference to “(TPL category C Contingency)” which needs to be updated to the categories in TPL-001-4. Applicability: There are numerous instances where the standard often refers to “either the Planning Coordinator or Transmission Planner” is responsible for a requirement (Requirements R1, R3, R4 and R5). To streamline the process and make the standard clearer as to who is responsible for what requirement there should be an additional requirement in the standard (most probably the first requirement) that should direct the Planning Coordinator and Transmission Planner to come to an agreement as to who should be responsible for which of these requirements, similarly to Requirement R7 of TPL-001-4. It is not apparent from the standard whether the standard applies to only the BES or both BES and non-BES parts of the system. The applicability section also refers to Distribution Providers which suggests that the standard also applies to the non-BES portions of the system. The portions of the power system that the standard applies to should be clearly defined.
Individual
John Pearson
ISO New England
No
The standard defines an Undervoltage Load Shedding Program (UVLS Program) as “An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Centrally-controlled undervoltage-based load shedding is not included. Comment: The term distributed needs additional clarification. Often in a geographic region there are multiple UVLS schemes that are totally independent of one another and respond individually to various contingencies. These schemes are local to the area. A program would consist of a coordinated group of relays designed to manage voltage issues over a wide area of the power system.
Yes
No
In Requirement R3 the phrase “or operating conditions” is very vague. There are continuous and ongoing “material changes” to operating conditions. At a minimum, the dispatch scenarios will be different every day, week, month and year. Do these changes constitute material changes to the operating conditions? If so, then the effectiveness of each existing UVLS Program needs to be assessed very frequently. If no, then what constitutes “material changes to the operating conditions”? Suggest removing “or operating conditions”. A review of the UVLS program once every 60 months or as material changes are made to system topology is sufficient. In Requirement R5 it is unclear whether or not the identified deficiencies are the results of the evaluations made in R3 and R4. This needs to be clarified, or else there need to be triggering events clearly stated in R5. Further, R5 requires the

development of a CAP in 3 months, but does not require the implementation of the CAP, and the time frame. Both need to be added.
Yes
Requirement R6 could be removed since in the new MOD-032 standard the Planning Coordinator is required to specify data and models needed for assessment of system reliability and affected entities are required to provide that data to the Planning Coordinator. The MOD-032 requirements can address UVLS data needs.
No
The definition of UVLS program needs to be improved so that it eliminates local programs from consideration. Note that Page 18 has a reference to “TPL category C Contingency” that needs to be updated to be consistent with categories in TPL-001-4.
Group
Texas Reliability Entity, Inc.
Derrick Davis
No
The scope of the UVLS program per the proposed definition seems to be solely toward voltage-related IROLs. We disagree with this approach and feel that the overarching need for any UVLS protection system is to meet the BES performance requirements as stated in the TPL standards and the UVLS definition should be stated on that basis (whether the ULVS systems is applied for a steady-state, post-contingency, stability, or transient condition) for those TPL cases where non-consequential load loss is allowed (i.e. P2, P4, P5, P6, and P7 contingencies). As such, the definition of the UVLS program should be stated in a manner that the UVLS program provides the required BES performance per the TPL.
No
We agree with the PC/TP clarifications. As a different matter, we would like more clarity about the UVLS entities who may not be owners of BES assets. UVLS systems (as well as UFLS systems) are typically provided on distribution feeders which are not BES elements. Since the BES definition does not recognize distribution assets as part of the BES, additional certainty that applicability to UVLS entities is not contingent on UVLS devices being defined as BES assets or attached directly to BES assets. It is a common misconception that Standards requirements only apply to entities that own or operate BES assets.
No
1)Should there be an overarching requirement for the Planning Coordinator to develop and document general criteria for all UVLS programs in the Planning Coordinator’s area, especially in the case were there may be region-specific requirements that must be met. It would then follow that program, specifications, and demonstrating of effectiveness developed under R1 and R2 must meet the general criteria. 2)We have existing UVLS systems that where multiple TOs and DPs in different TP areas own the UVLS relays. We are assuming in a case such as this that the PC would be responsible for the demonstration of effectiveness (R1) and the program specifications (R2), but it is not explicitly stated. 3)In R4, the one-year time frame for analyzing

the UVLS performance for an actual event is too long. We suggest following timelines similar to the NERC Events Analysis Process.
Yes
We would suggest rewording the Purpose section as follows: “To establish design, documentation and assessment requirements for automatic Undervoltage Load Shedding (UVLS) programs which support affect the reliability of the Bulk Electric System and are used to meet performance requirements in the Transmission Planning Standards”
No
Please reference comments and suggestions above.
Individual
Keith Morisette
Tacoma Power
No
Tacoma Power has the following comments: Why is the verbiage “…and controls…” included in the proposed definition of a UVLS Program? Consider replacing “…relays and controls…” with just “…relays…” In the proposed definition of a UVLS Program, consider replacing ‘used’ with ‘intended’ or otherwise more clearly exclude undervoltage relaying intended primarily or exclusively for equipment protection. In the proposed definition of a UVLS Program, consider changing “…voltage collapse…” to “…wide-area voltage collapse…” The latter description is used in the Application Guidelines.
No
Tacoma Power submits the following comments: Requirement R1, Part 1.2, and Requirement R3, Part 3.2, may be too vague. The Application Guidelines provides some clarity, but an example for each type of system/program listed in Requirement R1, Part 1.2, and Requirement R3, Part 3.2, would be helpful. In Requirement R3, it will be difficult to audit whether or not a Transmission Planner or Planning Coordinator conducted an assessment “sooner if material changes are made to system topology or operating conditions.” How is the determination made that changes are “material”? Even the Application Guidelines acknowledges “that the term material change is not transportable on a continent wide basis.” Furthermore, what is to keep a Transmission Planner or Planning Authority from waiting the whole 60 calendar months even “if material changes are made to system topology or operating conditions”? In requirement R4, the words “that resulted in a voltage excursion” should be removed from R4. Many substations do not have capabilities to continuously record voltage at a fast enough sample rate to determine if UVLS should have operated. Maximum scan time by a SCADA system as allowed by BAL-005-0.2b is every 6 seconds, but the typical time delay of UVLS is 3 to 10 seconds per https://www.wecc.biz/library/WECC%20Documents/Miscellaneous%20Operating%20and%20Planning%20Policies%20and%20Procedures/Undervoltage%20Load%20Shedding%20Guidelines.pdf. Thus, Planning Coordinators would not be able to prove an excursion did not occur.

We agree with FAQ document that there should be a feedback mechanism from the TOP & DP to the TP or PC, but disagree as to the timeframe and content of that feedback. The TOP or DP should notify the PC and/or TP after an event (i.e. lines tripping out) occurs for which the UVLS program was designed to operate and then provide any available SCADA data or events. We strongly disagree with the concept that a TO or DP should be required to provide data in real-time to a PC or TP. Requiring that the TP or PC analyze real-time data to verify that no individual UVLS relays failed to operate would be a huge burden with no corresponding reliability gain. As outlined in the rationale for the UVLS program definition, one advantage of a UVLS program is that any individual relay may fail to operate, but that single failure is unlikely to affect the reliable performance of the program. The outcome of this requirement should be analysis of known or easily knowable events, and should not require exhaustive documentation to prove events did not occur. As an alternative, the following language would also be acceptable: "Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in operation of the UVLS Program, perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event." Pursuant to the preceding paragraph, should the applicability be changed to include Transmission Operator, and should a requirement be added to require that Transmission Operators and Distribution Providers notify their Transmission Planner or Planning Coordinator of events that resulted in operation of the UVLS Program? In the Guidance document there are references to both capitalized UVLS Program and to lower case UVLS programs. Please update them all to upper case.
Yes
Tacoma Power submits the following comments: Requirement R2 would require that UVLS entities "adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner." Where is the Planning Coordinator or Transmission Planner required to communicate the UVLS Program specifications and implementation schedule to the UVLS entity(ies)? Is it implied by Requirement R1? In Measure M2, consider changing "…the feeders armed…" to "…the equipment armed…" Some entities may interpret 'feeders' as radial distribution circuits operated under 15kV. A UVLS Program should not be limited to application on circuits less than 15kV. Requirement R6 would require that a UVLS entity "provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator…" Where is the Planning Coordinator required to communicate the format and schedule to the UVLS entity(ies)? Is it implied by Requirement R7? Please consider graduated VSLs for Requirement R3 based upon how late the assessment was conducted. In the Severe VSL for Requirement R4, change "15 months" to "15 calendar months." In the Lower VSL for Requirement R6, how can the applicable entity provide "data in accordance with Requirement R6" but not "according to the specified format"? Is verbiage like the following intended? "The applicable entity provided data according to the schedule specified by its Planning Coordinator, but the data was not provided in the specified format." In the Severe VSL for Requirement R8, change "60 calendar days" to "45 calendar days" to be consistent with the High VSL.
No

Please see the included comments. Tacoma Power has submitted specific comments above.
Group
ISO RTO Council Standards Review Committee
Greg Campoli
Yes
No
We see R1 is missing specific wording and needs to specify the requirement to implement the UVLS program. R3 & R5 should be clarified with language so that they only apply to “operating conditions that impact the performance of UVLS”.
Yes
Is R6 needed at all if R1 already requires the data to be provided? This requirement can be duplicative from an implementation standpoint and instead can be covered by adding a requirement to maintain the database under R1 or R2. Under R7, updates should only be required contingent upon other changes required e.g. CAP, R3 topology, etc. 4.1.3 – a missing reference to “TOP” needs to be added.
No
The individual entities signed onto these SRC joint consensus comments are each NERC members and registered in the registered ballot body. This response does not represent any commitment of how each member will vote. However, if each of these comments are addressed sufficiently, we can support PRC-010-1.
Group
SPP Standards Review Group
Robert Rhodes
Yes
No
Whereas the Rationale Box does mention the responsibility of the Planning Coordinator or the Transmission Planner, whichever entity is basically responsible for the UVLS Program and clarification is provided to a certain extent in Section 4.1.3, the clarity that is needed isn’t in Sections 4.1.1 and 4.1.2. Rather than simply listing each entity which makes it appear that both are responsible, it may be necessary to include language similar to that found in Section 4.1.3 ‘established by the Transmission Planner or Planning Coordinator’ which would indicate an either/or responsibility. This would be helpful in indicating that the developer or owner of the program is the Applicable Entity, not both as it is currently written.
Yes

While we generally support R1, R3, R4 and R5 we recommend replacing the term ‘demonstrate’ in Requirement R1 with ‘document’. We don’t understand to whom we would demonstrate the effectiveness of our UVLS Program. We also suggest adding a couple of commas in R3 to clarify the timing of future assessments. We propose the following: ‘…at least once every 60-calendar months, or sooner, if material changes are made…’ Also, in R5 we suggest tying the assessment to Requirement R4 by making the following change ‘…identifies deficiencies in its UVLS Program during an assessment, as specified in Requirement R4, shall develop a Corrective Action Plan…’
Yes
What is the driver for the 6-year data retention associated with Requirement R4? We don’t see the need for this being any different than the other requirements and was hoping the SDT would share their thinking with us. Here are typo/grammatical suggestions: In the Standard: Hyphenate 60-calendar months and any other similar time period term. This applies to the standard as well as the FAQ document. Spell out Corrective Action Plan (CAP) in the Rationale Box for Requirement R5. In the Severe VSL for R4, ’15 months’ should be ’15-calendar months’. Something appears to have been left out of the Lower VSL for R6. We suggest inserting ‘provided’ between ‘not’ and ‘according’. Hyphenate ‘ride-through’ in the last line of the 1st paragraph under the Introduction to the Guidelines and Technical Basis Section of the standard. Hyphenate ‘continent-wide’ at the end of the 2nd line in the 3rd paragraph under the Guidelines for Requirement R3 Section of the Guidelines and Technical Basis Section of the standard. Replace ‘match’ with ‘duplicate’ in the last line of the 1st paragraph under the Guidelines for Requirements R6-R8 Section of the Guidelines and Technical Basis Section of the standard. Also, in the next to last line of the 5th paragraph in the same section, replace ‘provide’ with ‘provided’. In the FAQ Document: Insert ‘team’ between ‘drafting’ and ‘agreed’ in the 4th line of the paragraph under FAQ in Response to Comments. The final report for the August 14, 2003 Blackout is referred to in several locations in the document as the August 14 Blackout Report. Use the complete, correct title of the report. Hyphenate ‘sub-requirements’ in the 1st line of the 2nd paragraph under Requirements R1, R3 and R4 seem to all require demonstrations of program effectiveness – how are they different? question under the Clarifications on Requirements R1, R3, R4 and R5. Capitalize ‘Real-time’ in the 2nd paragraph under the Requirement R4 would require the Transmission Planner and Planning Coordinator to review all voltage excursions – isn’t this unduly burdensome? question under Clarifications on Requirements R1, R3, R4 and R5.
Yes
In general we tend to support the proposed standard but would like to see the SDT respond to our comments/suggestions above. We are much appreciative of the consolidation of the four legacy standards into the new proposed standard.
Individual
Richard Vine
California ISO
No

This definition is extremely difficult to understand, and the example posed in the Standard lacks clarity. Verbiage in the Standard indicates that a centralized UVLS would be considered an SPS. Yet there is also a citation that appears to exempt UVLS restricted to a single station. This raises the question, how many stations need to be involved, and/or how wide the impacted area? WECC has developed definitions for RAS/SPS impact by defining either the amount of generation and/or load that is impacted by the SPS. It would add a lot more clarity if NERC were to adopt clear bright lines as to how much load and/or generation needs to be impacted before an UVLS is subject to the Standard.
No
1. For R6 and R7, add "Transmission Planner and Transmission Operator" in addition to the Planning Coordinator, such that UVLS entities will be required to provide data to the PC, TP, and TOP. 2. For R8, require “Each Planning Coordinator or Transmission Planner” to provide their database, and add “Transmission Operator” as a recipient for the UVLS Program database. The result would be that R8 would read as follows: "Each Planning Coordinator or Transmission Planner that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators, Transmission Planners, and Transmission Operators within its Interconnection within 30 calendar days of a request."
No
As elaborated on in the next question (Question 4), we think the TOP should be an applicable entity, particularly for R4, R5, R6, R7 where the time horizon to address the requirement is specified to be the Operations Planning Horizon.
Yes
We think the TOP should be an applicable entity, particularly for R4, R5, R6, R7 where the time horizon to address the requirement is specified to be the Operations Planning Horizon. R4 through R8 state the Time Horizon as the Operations Planning Horizon, yet do not include the TOP, but instead are applicable to the PC or TP. The TOP should be an applicable entity, particularly for R4, R5, R6, R7. The supporting rational also references coordination with the TOP entities. The Planning Horizon is typically considered to start with year 1, and the Operations Planning Horizon within the first 12 calendar months.
No
Not as currently written. However, if comments are addressed sufficiently, we could support the PRC-010-1 UVLS standard.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Consideration of Comments

Project 2008-02 Undervoltage Load Shedding

The Project 2008-02 drafting team thanks all commenters who submitted comments on the draft standard **PRC-010-1 – Undervoltage Load Shedding**. The draft standard was posted for a 30-day informal comment period from March 17, 2014 through April 16, 2014. Stakeholders were asked to provide feedback on the draft standard through a special electronic comment form. There were 25 sets of responses, including comments from approximately 83 different people from approximately 60 companies representing 9 of the 10 Industry Segments as shown in the table on the following pages.

All comments submitted may be reviewed in their original format on the project page.

The drafting team reviewed all comments carefully and made changes to the standard accordingly; though the Standard Processes Manual (SPM) does not require the drafting team to respond to comments during an informal comment period, the drafting team has responded to each comment individually to ensure that every concern was given due attention and consideration.

If you feel your concern has not been addressed, you can contact the Standards Developer, Erika Chanzes, at 404-446-2583 or at erika.chanzes@nerc.net.

Index to Questions, Comments, and Responses

The Industry Segments are:

1 — Transmission Owners
2 — RTOs, ISOs
3 — Load-serving Entities
4 — Transmission-dependent Utilities
5 — Electric Generators
6 — Electricity Brokers, Aggregators, and Marketers
7 — Large Electricity End Users
8 — Small Electricity End Users
9 — Federal, State, Provincial Regulatory or other Government Entities
10 — Regional Reliability Organizations, Regional Entities

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
1.	Group	Joe DePoorter	MRO NERC Standards Review Forum	X	X	X	X	X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	Alice Ireland	Xcel Energy	MRO	1, 3, 5, 6
2.	Chuck Wicklund	Otter Tail Power	MRO	1, 3, 5
3.	Dan Inman	Minnkota Power Cooperative	MRO	1, 3, 5
4.	Dave Rudolph	Basin Electric Power Cooperative	MRO	1, 3, 5, 6
5.	Kayleigh Wilkerson	Lincoln Electric System	MRO	1, 3, 5, 6
6.	Jodi Jensen	Western Area Power Administration	MRO	1, 5
7.	Ken Goldsmith	Alliant Energy	MRO	4
8.	Mahmood Safi	Omaha Public Power District	MRO	1, 3, 5, 6
9.	Marie Knox	MISO	MRO	2
10.	Mike Brytowski	Great River Energy	MRO	1, 3, 5, 6

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10
11. Randi Nyholm	Minnesota Power	MRO	1, 5									
12. Scott Bos	Muscatine Power & Water	MRO	1, 3, 5, 6									
13. Scott Nickels	Rochester Public Utilities	MRO	4									
14. Terry Harbour	MidAmerican Energy	MRO	1, 3, 5, 6									
15. Tom Breene	Wisconsin Public Service	MRO	3, 4, 5, 6									
16. Terry Eddleman	Nebraska Public Power District	MRO	1, 3, 5									
2. Group	Guy Zito	Northeast Power Coordinating Council	X	X	X		X	X		X	X	X

	Additional Member	Additional Organization	Region	Segment Selection
1.	Alan Adamson	New York State Reliability Council, LLC	NPCC	10
2.	David Burke	Orange and Rockland Utilities Inc.	NPCC	3
3.	Greg Campoli	New York Independent System Operator	NPCC	2
4.	Sylvain Clermont	Hydro-Quebec TransEnergie	NPCC	1
5.	Chris de Graffenried	Consolidated Edison Co. of New York, Inc.	NPCC	1
6.	Gerry Dunbar	Northeast Power Coordinating Council	NPCC	10
7.	Mike Garton	Dominion Resources Services, Inc.	NPCC	5
8.	Matt Goldberg	ISO - New England	NPCC	2
9.	Michael Jones	National Grid	NPCC	1
10.	Mark Kenny	Northeazst Utilities	NPCC	1
11.	Christina Koncz	PSEG Power LLC	NPCC	5
12.	Helen Lainis	Independent Electricity System Operator	NPCC	2
13.	Michael Lombardi	Northeast Power Coordinating Council	NPCC	10
14.	Alan MacNaughton	New Brunswick Power Corporation	NPCC	9
15.	Bruce Metruck	New York Power Authority	NPCC	6
16.	Silvia Parada Mitchell	NextEra Energy, LLC	NPCC	5
17.	Lee Pedowicz	Northeast Power Coordinating Council	NPCC	10
18.	Robert Pellegrini	The United Illuminating Company	NPCC	1
19.	Si Truc Phan	Hydro-Quebec TransEnergie	NPCC	1
20.	David Ramkalawan	Ontario Power Generation, Inc.	NPCC	5
21.	Brian Robinson	Utility Services	NPCC	8
22.	Ayesha Sabouba	Hydro One Newtworks Inc.	NPCC	1
23.	Brian Shanahan	National Grid	NPCC	1

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
24. Wayne Sipperly			New York Power Authority	NPCC	5								
25. Ben Wu			Orange and Rockland Utilities Inc.	NPCC	1								
26. Peter Yost			Consolidated Edison Co. of New York, Inc.	NPCC	3								
3.	Group	Colby Bellville	Duke Energy	X		X		X	X				
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Doug Hils	Duke Energy	RFC	1									
2.	Lee Schuster	Duke Energy	FRCC	3									
3.	Dale Goodwine	Duke Energy	SERC	5									
4.	Greg Cecil	Duke Energy	RFC	6									
4.	Group	Jason Marshall	ACES Standards Collaborators	X					X				
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Al Tamimi	Sunflower Electric Power Corporation	SPP	1									
2.	Shari Heino	Brazos Electric Power Cooperative	ERCOT	1, 5									
3.	Bob Solomon	Hoosier Energy	RFC	1									
5.	Group	Greg Campoli	ISO RTO Council Standards Review Committee		X								
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Ben Li	IESO	NPCC	2									
2.	Charles Yeung	SPP	SPP	2									
3.	Cheryl Moseley	ERCOT	ERCOT	2									
4.	Tom Bowe	PJM	RFC	2									
6.	Group	Robert Rhodes	SPP Standards Review Group	X	X	X	X	X					
	Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1.	Jonathan Hayes	Southwest Power Pool	SPP	2									
2.	Shannon Mickens	Southwest Power Pool	SPP	2									
3.	James Nail	City of Independence, MO	SPP	3									
4.	Don Schmit	Nebraska Public Power District	MRO	1, 3, 5									
5.	J. Scott Williams	City Utillities of Springfield	SPP	1, 4									
7.	Individual	Kaleb Brimhall	Colorado Springs Utilities	X		X		X	X				
8.	Individual	Janet Smith	Arizona Public Service Company	X		X		X	X				

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
9.	Individual	Mike O'Neil	Florida Power & Light	X									
10.	Individual	Derrick Davis	Texas Reliability Entity, Inc.										X
11.	Individual	William H. Chambliss	Virginia State Corporation Commission, member OC										
12.	Individual	Thomas Foltz	American Electric Power	X		X		X	X				
13.	Individual	Amy Casuscelli	Xcel Energy Inc.	X		X		X	X				
14.	Individual	Ayesha Sabouba	Hydro One	X		X							
15.	Individual	Michael Falvo	Independent Electricity System Operator		X								
16.	Individual	Dan Inman	Minnkota Power Cooperative	X									
17.	Individual	Trevor Schultz	Idaho Power Company	X									
18.	Individual	Anthony Jablonski	ReliabiltiyFirst										X
19.	Individual	Andrew Z. Pusztai	American Transmission Company, LLC	X									
20.	Individual	Gul Khan	Oncor Electric Delivery LLC	X									
21.	Individual	Catherine Wesley	PJM Interconnection		X								
22.	Individual	Bill Temple	Northeast Utilities	X									
23.	Individual	John Pearson	ISO New England		X								
24.	Individual	Keith Morisette	Tacoma Power	X		X	X	X	X				
25.	Individual	Richard Vine	California ISO		X								

1. **The drafting team has revised the wording of the proposed defined term UVLS Program and added information to the rationale box and Guidelines and Technical Basis. Specifically, the team has clarified the attributes of a UVLS Program, including that the definition is independent of how the program is armed, and how the exclusion of centrally-controlled undervoltage-load shedding will be addressed. Does the definition now provide the needed clarity necessary to understand which types of UVLS are applicable to the standard? If no, please indicate in the comment section what is unclear and provide specific suggested changes.**

Summary Consideration: The drafting team thanks all commenters for their time and attention. Based on the feedback received, the drafting team has adjusted the definition to clarify that a UVLS Program must "mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES)."

The drafting team notes that it has given much thought and consideration to use of the term "wide-area" prior to "voltage collapse," as the team agrees that this is the most relevant term to qualify the type of impact a UVLS Program must mitigate. Accordingly, the term "wide area" is utilized in the Guidelines and Technical Basis to support the drafting team's intent. However, the drafting team also agrees that the meaning and measurement of this term varies greatly on a continent-wide basis and could potentially be interpreted differently by auditors and the applicable functional entities if included as part of the enforceable language. Therefore, with the above noted adjustment to the definition, the drafting team has also adjusted the accompanying Rationale box to clarify that the intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES.

In addition, the drafting team agrees that multiple independent relays do not constitute a program. As a point of the clarification, the phrase "consisting of distributed relays and controls" is meant to enhance the understanding of the type of program being defined. A UVLS Program must first and foremost be an automatic load shedding program that mitigates the specified conditions impacting the BES as stated in the definition. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose. As such, the standard is not applicable to/is not requiring the assessment of the simultaneous failure of independent schemes.

The drafting team has given every comment due consideration and has responded to each individually. Please see below for responses to specific concerns.

Organization	Yes or No	Question 1 Comment
American Transmission Company, LLC	No	ATC asks the SDT please consider the following modification of the proposed UVLS Definition to qualify that these are programs that are developed by the Planning Coordinator or the Transmission Planner and not temporary schemes that are developed by the Transmission Operator. ATC recommends revising the definition as follows: Undervoltage Load Shedding Program (UVLS Program): "An automatic load shedding program developed by the Planning Coordinator or Transmission Planner consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Centrally controlled undervoltage based load shedding is not included." **RESPONSE: The drafting team thanks you for your comment. Upon consideration, the drafting team maintains that the requested explicit qualification that UVLS Programs are developed by the Planning Coordinator or Transmission Planner and are not temporary schemes developed by the Transmission Operator is not necessary on the basis that the nature of a scheme developed by a Transmission Operator would not meet the attributes of the defined term.**
Idaho Power Company	No	I suggest adding the words "wide area" prior to the words "voltage collapse" in the UVLS Program definition. It seems the SDT's intent is to exclude UVLS systems used to mitigate the risk of "local" voltage collapse, as illustrated by the "Radial BES Subsystem" example in the PRC-010-1 Application Guidelines. In fact, the phrase "wide area voltage collapse" is used in the verbiage of this example. As the UVLS definition currently reads, it could be interpreted to include UVLS schemes implemented with the purpose of preventing local "voltage collapse", such as the scheme described in the Application Guidelines example. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that there has been much consideration given to using the term "wide area" in the definition itself. While the team agrees that this is the most relevant term to qualify the intent, the term "wide area" is considered ambiguous and not transportable on**

Organization	Yes or No	Question 1 Comment
		a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. As such, the intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this flexibility has been further clarified in the accompanying Rationale box.
Tacoma Power	No	Tacoma Power has the following comments: Why is the verbiage "...and controls..." included in the proposed definition of a UVLS Program? Consider replacing "...relays and controls..." with just "...relays..." **RESPONSE: The drafting team thanks you for your comment. The drafting team has maintained the inclusion of "controls," as the term refers to multifunctional microprocessor-based controllers armed for UVLS.** In the proposed definition of a UVLS Program, consider replacing 'used' with 'intended' or otherwise more clearly exclude undervoltage relaying intended primarily or exclusively for equipment protection. **RESPONSE: The drafting team thanks you for your comment. The drafting team has added the phrase "impacting the Bulk Electric System", which should help further clarify that the term excludes UVLS relays that are exclusively for equipment protection.** In the proposed definition of a UVLS Program, consider changing "...voltage collapse..." to "...wide-area voltage collapse..." The latter description is used in the Application Guidelines. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that there has been due consideration to using the term "wide area" in the definition itself. While the team agrees that this is the most relevant term to qualify the intent, the term "wide area" is considered ambiguous and not transportable on a**

Organization	Yes or No	Question 1 Comment
		continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. As such, the intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this flexibility has been further clarified in the accompanying Rationale box.
Northeast Power Coordinating Council	No	The "distributed" attribute needs clarification. Often in one geographic region there are multiple UVLS schemes that are totally independent from each other and individually respond to various contingencies. Although there is always a possibility that one severe contingency would trigger two or more of these schemes, this by itself should not make the collection of UVLS schemes a "distributed" UVLS Program. When multiple UVLS schemes are armed in one region, even if one of them fails to shed its load in response to a severe contingency, the others will respond and the failure of one UVLS scheme will impact only its "contained area". Is the proposed standard requiring the assessment of the simultaneous failure of all independent UVLS schemes in the region, or failure of only one of those schemes, to determine if there is "Adverse Reliability Impact outside this contained area"? **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that multiple independent relays do not constitute a program. The phrase "consisting of distributed relays and controls" is meant to enhance the understanding of the type of program being defined. A UVLS Program must first and foremost be an automatic load shedding program that mitigates the specified conditions impacting the BES as stated in the definition. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose. As such, the standard is not applicable to/is not requiring the assessment of the simultaneous failure of independent schemes.**

Organization	Yes or No	Question 1 Comment
Hydro One	No	The "distributed" attribute needs clarification. Often in one geographic region there are multiple UVLS schemes that are totally independent from each other and individually respond to various contingencies. Although there is always a possibility that one severe contingency would trigger two or more of these schemes, this by itself should not make the collection of UVLS schemes a "distributed" UVLS Program. When multiple UVLS schemes are armed in one region, even if one of them fails to shed its load in response to a severe contingency, the others will respond and the failure of one UVLS scheme will impact only its "contained area". Is the proposed standard requiring the assessment of the simultaneous failure of all independent UVLS schemes in the region, or failure of only one of those schemes, to determine if there is "Adverse Reliability Impact outside this contained area"? **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that multiple independent relays do not constitute a program. The phrase "consisting of distributed relays and controls" is meant to enhance the understanding of the type of program being defined. A UVLS Program must first and foremost be an automatic load shedding program that mitigates the specified conditions impacting the BES as stated in the definition. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose. As such, the standard is not applicable to/is not requiring the assessment of the simultaneous failure of independent schemes.**
ACES Standards Collaborators	No	The combination of the definition, rationale boxes and application guidelines provide excellent description, clarification and support for which types of UVLS relays the standard is applicable. However, we would like further clarification regarding the inconsistencies between UVLS Program definition and the application guidelines that could lead to varying compliance outcomes. For instance, the application guidelines are clear on page 18 that the UVLS Program would apply to wide area voltage collapse. Given that NERC has defined wide area to include the entire reliability coordinator area, one could infer that wide area voltage collapse would exceed the area beyond a single BA. However, the actual definition of UVLS Program only

Organization	Yes or No	Question 1 Comment
		includes voltage collapse which could include a local, small area voltage collapse. The example provided on page 18 makes clear that this is not the drafting team intent. However, FERC does not approve application guidelines. The Commission only approves definitions and requirements with only the requirements becoming enforceable. Thus, this could lead to inconsistent compliance outcomes. We support that concept of UVLS Program applying to a wide area voltage collapse. To remedy this issue, we recommend modifying the UVLS Program definition to include "Wide Area" before voltage collapse which is a NERC defined term that includes the entire RC Area as well as the critical flow and status information from adjacent RC Areas as determined by detailed system studies to allow the calculation of IROLs. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that there has been much consideration given to using the term "wide area" in the definition itself. While the team agrees that this is the most relevant term to qualify the intent, the term "wide area" is considered ambiguous and not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. Also, the drafting team asserts that the NERC Glossary defined term "Wide Area" is not applicable, as it is tied to a Reliability Coordinator Area, which is potentially very large. For instance, in WECC, this would equate to the entire Interconnection.** **The intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this flexibility has been further clarified in the accompanying Rationale box.**
Northeast Utilities	No	The definition is not clear enough to determine what is a "UVLS Program". The "distributed" attribute needs clarification. Often in one geographic region there are

Organization	Yes or No	Question 1 Comment
		multiple UVLS schemes that are totally independent from each other and individually respond to various contingencies. Although there is always a possibility that one severe contingency would trigger two or more of these schemes, this by itself should not make the collection of UVLS schemes a "distributed" UVLS Program. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that multiple independent relays do not constitute a program. The phrase "consisting of distributed relays and controls" is meant to enhance the understanding of the type of program being defined. A UVLS Program must first and foremost be an automatic load shedding program that mitigates the specified conditions impacting the BES as stated in the definition. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose. As such, the standard is not applicable to/is not requiring the assessment of the simultaneous failure of independent schemes.** The definition would become more clear if the clarification on page 18 (second paragraph) of the standard (Application Guide) is applied to the definition. The suggested definition for the "Undervoltage Load Shedding Program (UVLS Program)" based on the clarification of page 18 of the standard (application guide section) should be: "An automatic load shedding scheme that is used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions, within and outside of the local contained area". **RESPONSE: The drafting team thanks you for your suggestion. The drafting team notes that there has been much consideration given to using words such as "local" and "contained" to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to**

Organization	Yes or No	Question 1 Comment
		determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this flexibility has been further clarified in the accompanying Rationale box.
PJM Interconnection	No	The drafting team did not address, in this posting, PJM's comment regarding the term "localized" which is not a defined term. The term potentially could be interpreted differently by auditors and the applicable functional entities. The term needs to be defined clearly to eliminate ambiguity. Additionally, PJM did not find a reference or explanation for our recommendation posted in the Consideration of Comments that were developed for industry comments submitted in October, 2013. PJM would appreciate understanding the drafting team's decision not to provided clarity for this term. **RESPONSE: The drafting team thanks you for your comment. In response to your comment that was submitted in October 2013, the drafting team agreed that the term "localized" was ambiguous and could potentially be interpreted differently by auditors and the applicable functional entities. The drafting team points out that the term "localized" was removed and not reflected in this posting. The exclusion for which the term "localized" was used is now qualified with non-ambiguous language in the definition and supported by an example in the respective section in the Guidelines and Technical Basis.**
Virginia State Corporation Commission, member OC	No	The logic for excluding ALL centrally-controlled undervoltage load shedding appears weak. All such programs are excluded because some MAY either use voltage inputs from various locations or use inputs other than voltages in their logic. It seems more reasonable to exclude only those centrally controlled undervoltage shedding that POSITIVELY fits either of the above characteristics, rather than excluding all because some MAY fit either.

Organization	Yes or No	Question 1 Comment
		RESPONSE: The drafting team thanks you for your comment. The drafting team agrees with your concern with the language as written and reworked the language as follows to more accurately convey the intent (note that this now appears in the Guidelines and Technical Basis section): **"The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a RAS, wherein load shedding is the remedial action. Therefore, just like for a RAS, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding."**
American Electric Power	No	The proposed definition for Undervoltage Load Shedding Program makes no distinction between UVLS devices implemented on Distribution feeder circuits and BES (100kV and above) circuits. The previous PRC-021-1 only applied to UVLS programs used "to mitigate the risk of voltage collapse or voltage instability in the *BES*" (emphasis added). Please clarify whether or not the proposed definition applies only to the BES. **RESPONSE: The drafting team thanks you for your comment. The phrase "impacting the Bulk Electric System" has been added to the definition to further clarify the applicable UVLS systems. The drafting team also notes that, regardless of where the UVLS devices are located and where they trip, if a UVLS system is there to protect the BES, the program falls under the definition/is applicable to the standard.**
Texas Reliability Entity, Inc.	No	The scope of the UVLS program per the proposed definition seems to be solely toward voltage-related IROLs. We disagree with this approach and feel that the overarching need for any UVLS protection system is to meet the BES performance requirements as stated in the TPL standards and the UVLS definition should be stated on that basis (whether the ULVS systems is applied for a steady-state, post-

Organization	Yes or No	Question 1 Comment
		contingency, stability, or transient condition) for those TPL cases where non-consequential load loss is allowed (i.e. P2, P4, P5, P6, and P7 contingencies). As such, the definition of the UVLS program should be stated in a manner that the UVLS program provides the required BES performance per the TPL. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the definition is not specific to performance required per TPL Reliability Standards because a UVLS Program may be developed and implemented to serve as a safety net system protection measure against unforeseen extreme Contingencies. However, the phrase "impacting the Bulk Electric System" has been added to the definition to further clarify the applicable UVLS systems.**
ISO New England	No	The standard defines an Undervoltage Load Shedding Program (UVLS Program) as "An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of Cascading, voltage instability, voltage collapse, or uncontrolled separation resulting from undervoltage conditions. Centrally-controlled undervoltage-based load shedding is not included." Comment: The term distributed needs additional clarification. Often in a geographic region there are multiple UVLS schemes that are totally independent of one another and respond individually to various contingencies. These schemes are local to the area. A program would consist of a coordinated group of relays designed to manage voltage issues over a wide area of the power system. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that multiple independent relays do not constitute a program. The phrase "consisting of distributed relays and controls" is meant to enhance the understanding of the type of program being defined. A UVLS Program must first and foremost be an automatic load shedding program that mitigates the specified conditions impacting the BES as stated in the definition. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose.**

Organization	Yes or No	Question 1 Comment
California ISO	No	This definition is extremely difficult to understand, and the example posed in the Standard lacks clarity. Verbiage in the standard indicates that a centralized UVLS would be considered an SPS. Yet there is also a citation that appears to exempt UVLS restricted to a single station. This raises the question, how many stations need to be involved, and/or how wide the impacted area? WECC has developed definitions for RAS/SPS impact by defining either the amount of generation and/or load that is impacted by the SPS. It would add a lot more clarity if NERC were to adopt clear bright lines as to how much load and/or generation needs to be impacted before an UVLS is subject to the Standard. **RESPONSE: The drafting team thanks you for your comment. The drafting team maintains that there cannot be a firm number or established bright lines to qualify the impact since these measurements vary greatly on a continent-wide basis. Note that it is the drafting team's understanding that WECC has only established classifications for RAS/SPS impacts in terms of amount of generation/load, and not a firm definition.** **The intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this flexibility has been further clarified in the accompanying Rationale box.**
Minnkota Power Cooperative	Yes	Minnkota Power Cooperative believes the definition and the enforceable standard should match the intent expressed in the guidelines. The guidelines express a specific criteria for wide-area issues ("wide-area voltage collapse" and "wide-area voltage undervoltage problems"). MPC supports this wide area criteria and suggest applying the criteria outlined in guidance to the definition for UVLS Programs: "Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of distributed relays and controls used to mitigate the risk of

Organization	Yes or No	Question 1 Comment
		Cascading, voltage instability, wide-area voltage collapse, or uncontrolled separation resulting from wide-area undervoltage conditions. Centrally-controlled undervoltage-based load shedding is not included." **RESPONSE: The drafting team thanks you for your support. In relation to your comment, the drafting notes that there has been much consideration given to using the term "wide area" in the definition itself. While the team agrees that this is the most relevant term to qualify the intent, the term "wide area" is considered ambiguous and not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. As such, the intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this flexibility has been further clarified in the accompanying Rationale box.**
MRO NERC Standards Review Forum	Yes	**RESPONSE: The drafting team thanks you for your support.**
Duke Energy	Yes	**RESPONSE: The drafting team thanks you for your support.**
SPP Standards Review Group	Yes	**RESPONSE: The drafting team thanks you for your support.**
Colorado Springs Utilities	Yes	**RESPONSE: The drafting team thanks you for your support.**
Arizona Public Service Company	Yes	**RESPONSE: The drafting team thanks you for your support.**
Florida Power & Light	Yes	**RESPONSE: The drafting team thanks you for your support.**
Xcel Energy Inc.	Yes	**RESPONSE: The drafting team thanks you for your support.**

Organization	Yes or No	Question 1 Comment
Independent Electricity System Operator	Yes	**RESPONSE: The drafting team thanks you for your support.**
Oncor Electric Delivery LLC	Yes	**RESPONSE: The drafting team thanks you for your support.**

2. **The drafting team has added clarification of the meaning of the phrase "Planning Coordinator or Transmission Planner" in a rationale box supporting the Applicability section. In addition, Requirements R7 and R8 are now applicable to only the Planning Coordinator. In light of these clarifications and revisions, do you agree with the Applicability of proposed PRC-010-1? If no, please indicate your concerns in the comment section.**

Summary Consideration: The drafting team thanks all commenters for their time and attention. Based on the feedback received, the drafting team notes the following with respect to the functional entities to which PRC-010-1 is applicable:

The Transmission Planner is not an applicable entity with respect to maintaining and sharing a UVLS Program database (Requirements R6–R8) because a Planning Coordinator will always have data on all of the programs in its area regardless of whether or not it was the developer of the program. A Transmission Planner may also maintain data if it is the developer of the UVLS Program, but there is no requirement to do so as it would be duplicative to what the Planning Coordinator already does.

The Transmission Operator is not an applicable entity in the standard because the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is covered under current EOP-003-2, and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).

The drafting teams agrees that in addition to the clarity provided in the Rationale box accompanying the Applicability section with respect to the phrase "Planning Coordinator or Transmission Planner," the enforceable language of the requirements should also reflect how to determine which is the responsible entity. This has been addressed with adjustments to the language of some of the requirements and/or further explanation—please see the individual responses to those commenters who had the concern.

The drafting team has given every comment due consideration and has responded to each individually. Please see below for responses to specific concerns.

Organization	Yes or No	Question 2 Comment
California ISO	No	1. For R6 and R7, add "Transmission Planner and Transmission Operator" in addition to the Planning Coordinator, such that UVLS entities will be required to provide data to the PC, TP, and TOP. 2. For R8, require “Each Planning Coordinator or Transmission Planner” to provide their database, and add “Transmission Operator” as a recipient for the UVLS Program database. The result would be that R8 would read as follows: "Each Planning Coordinator or Transmission Planner that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators, Transmission Planners, and Transmission Operators within its Interconnection within 30 calendar days of a request." **RESPONSE: The drafting team thanks you for your comment. In response to the addition of the Transmission Planner to Requirements R6–R8, the drafting team notes that a Planning Coordinator will always have data on all of the programs in its area. A Transmission Planner may also maintain data, but there is no requirement to do so as it would be duplicative to what the Planning Coordinator already does.** **With regard to the addition of the Transmission Operator to Requirements R6 and R7, the drafting notes that the type of data being received and maintained is for the purpose of planning activities for UVLS Programs that would be developed by Planning Coordinators or Transmission Planners. Due to its defining attributes, a UVLS Program would not be developed by a Transmission Operator, and therefore the Transmission Operator should not be applicable to requirements regarding maintaining a database or receiving data from UVLS entities.** **The drafting team agrees that a Transmission Operator may have a reliability need for a Planning Coordinator’s UVLS Program database. The drafting team has therefore adjusted Requirement R8 to include “other functional entities with a reliability need” as recipients of the database upon request, and has specified in the accompanying Rationale box that an example of these functional entities are Transmission Operators that develop System Operating Limits.**

Organization	Yes or No	Question 2 Comment
ReliabiltiyFirst	No	ReliabilityFirst provides the following comments for considerations: 1. Requirement R1 - ReliabilityFirst requests clarification on why Requirement R1 is applicable to both the Planning Coordinator and Transmission Planner? In the scenario where the Planning Coordinator has an UVLS program, it would be counterintuitive for a Transmission Planner within the Planning Coordinator's area to have an UVLS program as well. ReliabilityFirst recommends structuring this standard in the same fashion as the NERC PRC-006-1 (UFLS) Standard and remove the Transmission Planner as an Applicable Entity within the standard. If the Planning Coordinator and Transmission Planner are included based on differences within Regional Entity footprints, ReliabilityFirst recommends including a Regional Variance for these specific instances. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that Requirement R1 is not applicable to both the Planning Coordinator and Transmission Planner—it is applicable to one or the other (see the Rationale box accompanying the Applicability section of the standard). In the case of Requirement R1, the language makes it clear that the responsibility is to the entity that developed the UVLS Program.** **The drafting team maintains that the flexibility of applicability to either the Planning Coordinator or Transmission Planner is necessary. Depending on agreements, memorandums of understanding, or tariffs, either entity may be responsible for designing and coordinating a UVLS Program.** 2. Requirements R6 and R7 - If Requirements R1, R3, R4 and R5 continue to apply to the Transmission Planner (based on our previous comment), ReliabilityFirst requests clarification on why the UVLS Entities are not required to provide data to the Transmission Planners (R6) and why the Transmission Planners are not required to update the UVLS database (R7). **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that a Planning Coordinator will always have data on all of the programs in its**

Organization	Yes or No	Question 2 Comment
		area regardless of whether or not it developed the program. A Transmission Planner may also maintain data, but there is no requirement to do so as it would be duplicative to what the Planning Coordinator already does.
Northeast Power Coordinating Council	No	We agree with the entities presented in Section A 4.1, but do not agree with the exclusion of Transmission Operator. While Section 4.1.3 includes Transmission Owner as an Undervoltage load shedding (UVLS) entities, not all TOs are responsible for the operation or control of UVLS equipment. Where a TO delegates such responsibilities to the TOP, or where the TO and TOP are separate organizations, the TO will not have such responsibilities. Suggest adding TOP to the Applicability Section. **RESPONSE: The drafting team thanks you for your comment. The drafting team asserts that the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party. It is also noted that this is consistent with the applicability of PRC-006-1 Automatic UFLS. If the comment above is including manual load shedding for which the Transmission Operator is responsible, manual load shedding is not in the purview of PRC-010-1, as it is covered under EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).**
Independent Electricity System Operator	No	We agree with the entities presented in Section A 4.1, but do not agree with the exclusion of Transmission Operator. While Section 4.1.3 includes Transmission Owner as an Undervoltage load shedding (UVLS) entities, not all TOs are responsible for the operation or control of UVLS equipment. Where a TO delegates such responsibilities to the TOP, or where the TO and TOP are separate organizations, the TO will not have such responsibilities. We suggest to add TOP to the Applicability Section. **RESPONSE: The drafting team thanks you for your comment. The drafting team asserts that the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still**

Organization	Yes or No	Question 2 Comment
		the accountable party. It is also noted that this is consistent with the applicability of PRC-006-1 Automatic UFLS. If the comment above is including manual load shedding for which the Transmission Operator is responsible, manual load shedding is not in the purview of PRC-010-1, as it is covered under EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).
Texas Reliability Entity, Inc.	No	We agree with the PC/TP clarifications. As a different matter, we would like more clarity about the UVLS entities who may not be owners of BES assets. UVLS systems (as well as UFLS systems) are typically provided on distribution feeders which are not BES elements. Since the BES definition does not recognize distribution assets as part of the BES, additional certainty that applicability to UVLS entities is not contingent on UVLS devices being defined as BES assets or attached directly to BES assets. It is a common misconception that Standards requirements only apply to entities that own or operate BES assets. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that the UVLS devices are not contingent on being defined as or attached to BES assets. The drafting team asserts that this is clear in the defined term to which the standard is applicable—a UVLS Program encompasses devices that protect the impact to the BES. This is inherently independent of whether or not the devices are BES Elements.**
ACES Standards Collaborators	No	We support the concept of the delineation that the drafting team has described in the rationale box for the PC and TP. Furthermore, we support that requirements R7 and R8 are only applicable to the PC since they will develop the models for all of the TPs in their area. However, we think implementation of other requirements such as R1 should also identify only one function because it leads to confusion. The rationale box explains that the expectation is that only one of the two entities needs to develop the UVLS program. As the requirements are written, the practical compliance application does not support the concept. While we understand the rationale box supports that both entities do not have to perform the action, a

Organization	Yes or No	Question 2 Comment
		compliance auditor will ask PCs and TPs if they have UVLS Programs in their areas and expect them to show that they have completed studies and assessments to demonstrate its effectiveness per R1. The requirement applies to both and the PC or TP will not be given a "compliance pass" because they said the other has responsibility. The drafting team should work with NERC compliance staff to craft the requirements and RSAW to reflect the concept expressed in the applicability section of the compliance report. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that, in addition to the clarity provided in the Rationale box accompanying the Applicability section, the enforceable language of the requirements should make the applicability clear. As such, the drafting team notes the following:** **Requirement R1 makes it clear that the responsibility is to the entity that is developing a UVLS Program:** **"Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ."** **Requirement R3 has been adjusted in response to this comment to make it clear that the responsibility is to the entity that has a UVLS Program:** **"Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of *its* UVLS Programs . . ."** **Requirement R4 has been adjusted in a similar fashion as Requirement R3:** **"Each Planning Coordinator or Transmission Planner shall . . . perform an assessment to evaluate whether *its* UVLS Program . . ."** **Requirement R5 is unchanged as it reflects language similar to that of Requirements R3 and R4 above:**

Organization	Yes or No	Question 2 Comment
		"Each Planning Coordinator or Transmission Planner that identifies deficiencies in *its* UVLS Program during an assessment performed in either Requirement R3 or R4 shall . . ."
SPP Standards Review Group	No	Whereas the Rationale Box does mention the responsibility of the Planning Coordinator or the Transmission Planner, whichever entity is basically responsible for the UVLS Program and clarification is provided to a certain extent in Section 4.1.3, the clarity that is needed isn't in Sections 4.1.1 and 4.1.2. Rather than simply listing each entity which makes it appear that both are responsible, it may be necessary to include language similar to that found in Section 4.1.3 'established by the Transmission Planner or Planning Coordinator' which would indicate an either/or responsibility. This would be helpful in indicating that the developer or owner of the program is the Applicable Entity, not both as it is currently written. **RESPONSE: The drafting team thanks you for your comment. The drafting team considered this suggestion. However, the team came to the conclusion that this would only move the same intention of the "or" from the requirements to the Applicability section, thus retaining the same approach without the benefit of increased clarity. Upon examination of the language in the requirements, the drafting team notes the following:** **Requirement R1 makes it clear that the responsibility is to the entity that is developing a UVLS Program:** **"Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ."** **Requirement R3 has been adjusted in response to this comment to make it clear that the responsibility is to the entity that has a UVLS Program:** **"Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of *its* UVLS Programs . . ."** **Requirement R4 has been adjusted in a similar fashion as Requirement R3:**

Organization	Yes or No	Question 2 Comment
		"Each Planning Coordinator or Transmission Planner shall . . . perform an assessment to evaluate whether *its* UVLS Program . . ." Requirement R5 is unchanged as it reflects language similar to that of Requirements R3 and R4 above: "Each Planning Coordinator or Transmission Planner that identifies deficiencies in *its* UVLS Program during an assessment performed in either Requirement R3 or R4 shall . . ."
Northeast Utilities	No	RESPONSE: There is no apparent comment in reference to the negative support and therefore no response is provided.
MRO NERC Standards Review Forum	Yes	RESPONSE: The drafting team thanks you for your support.
Duke Energy	Yes	RESPONSE: The drafting team thanks you for your support.
ISO RTO Council Standards Review Committee	Yes	RESPONSE: The drafting team thanks you for your support.
Colorado Springs Utilities	Yes	RESPONSE: The drafting team thanks you for your support.
Arizona Public Service Company	Yes	RESPONSE: The drafting team thanks you for your support.
Florida Power & Light	Yes	RESPONSE: The drafting team thanks you for your support.
Virginia State Corporation Commission, member OC	Yes	RESPONSE: The drafting team thanks you for your support.
American Electric Power	Yes	RESPONSE: The drafting team thanks you for your support.
Xcel Energy Inc.	Yes	RESPONSE: The drafting team thanks you for your support.

Organization	Yes or No	Question 2 Comment
Hydro One	Yes	RESPONSE: The drafting team thanks you for your support.
Minnkota Power Cooperative	Yes	RESPONSE: The drafting team thanks you for your support.
Idaho Power Company	Yes	RESPONSE: The drafting team thanks you for your support.
American Transmission Company, LLC	Yes	RESPONSE: The drafting team thanks you for your support.
Oncor Electric Delivery LLC	Yes	RESPONSE: The drafting team thanks you for your support.
PJM Interconnection	Yes	RESPONSE: The drafting team thanks you for your support.
ISO New England	Yes	RESPONSE: The drafting team thanks you for your support.

3. **Requirements R1, R3, R4, and R5 have been revised (along with added supporting rationale and information in the Guidelines and Technical Basis) to clarify the expectations of what should be demonstrated at distinct points in time relative to UVLS Program effectiveness to support reliability. Do you support the current approach to these requirements? If no, please indicate your concerns in the comment section and provide specific suggested changes.**

Summary Consideration: The drafting team thanks all commenters for their time and attention. Based on the feedback received, the drafting team notes the following with respect to Requirements R1–R5:

The drafting team has changed word "demonstrate" to "evaluate" in Requirement R1 to further convey the flexibility for an entity to make the proper determinations with respect to program effectiveness based on system characteristics.

The requirement to implement the UVLS Program is contained in Requirement R2. However, the requirement has been adjusted to be more explicit, and it has also been adjusted to explicitly require UVLS entities to implement the CAP from Requirement R5. Requirement R2 now reads as follows: "Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5."

The drafting team has removed the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3 since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.

For Requirement R5, it has been adjusted to be specific to the assessments performed in Requirements R3 and R4. As a point of clarification, the three-month time frame is only to develop the CAP and does not encompass the time UVLS entities have to implement the CAP. While the NERC Glossary definition of a "Corrective Action Plan" states that a CAP includes an associated timetable for implementation, Requirement R5 has added language to emphasize that there must be an implementation schedule (to which entities are required to adhere in Requirement R2). The resulting language of Requirement R5 is as follows: "Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of completing the assessment."

The drafting team has given every comment due consideration and has responded to each individually. Please see below for responses to specific concerns.

Organization	Yes or No	Question 3 Comment
ISO New England	No	In Requirement R3 the phrase “or operating conditions” is very vague. There are continuous and ongoing “material changes” to operating conditions. At a minimum, the dispatch scenarios will be different every day, week, month and year. Do these changes constitute material changes to the operating conditions? If so, then the effectiveness of each existing UVLS Program needs to be assessed very frequently. If no, then what constitutes “material changes to the operating conditions”? Suggest removing “or operating conditions”. A review of the UVLS program once every 60 months or as material changes are made to system topology is sufficient. **RESPONSE: The drafting team thanks you for your comment. In consideration of this comment and others relating to the phrase “or sooner if material changes are made to system topology or operating conditions” in Requirement R3, the drafting team has removed this phrase since a “material” change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.** In Requirement R5 it is unclear whether or not the identified deficiencies are the results of the evaluations made in R3 and R4. This needs to be clarified, or else there need to be triggering events clearly stated in R5. **RESPONSE: The drafting team thanks you for your comment. The drafting agrees with the concern and has adjusted Requirement R5 as follows:**

Organization	Yes or No	Question 3 Comment
		"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment *performed in either Requirement R3 or R4* shall . . ." Further, R5 requires the development of a CAP in 3 months, but does not require the implementation of the CAP, and the time frame. Both need to be added. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees with your concern that the implementation of the CAP needs to be explicitly required. As such, Requirement R2 has been adjusted as follows:** **"*Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule* determined by its Planning Coordinator or Transmission Planner *associated* with UVLS Program development per Requirement R1 or *with any Corrective Action Plans per Requirement R5.*"** **It is noted that the time frame to implement the CAP is as required by the Planning Coordinator or Transmission Planner in the development of the CAP. While the NERC Glossary definition of a "Corrective Action Plan" states that a CAP includes an associated timetable for implementation, the drafting team has added the following language to Requirement R5 to emphasize that there must be an implementation schedule:** **"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment . . . shall develop a Corrective Action Plan to address the deficiencies *and subsequently provide the Corrective Action Plan, including an implementation schedule*, to UVLS entities within three calendar months of completing the assessment.**
ACES Standards Collaborators	No	We are generally supportive of the approaches taken, but we do have some concerns with a few specific requirements. Requirement R1, Part 1.2 and Requirement R3, Part 3.2 of the standard need to be clarified to state that the UVLS program should be integrated with generator voltage-ride through capabilities for

Organization	Yes or No	Question 3 Comment
		generators that are expected to be in-service during the actuation of the UVLS relays. UVLS Programs may be installed in areas with limited generation capabilities, which result in limited reactive support. Thus, the tripping of one or more these generators in a load pocket may be ultimately what results in the need for the UVLS Program. If the area has a single generator that provides the voltage support and its loss is what ultimately triggers UVLS actuation, then why would the UVLS Program need to be coordinated with generator voltage ride-through capabilities? Please modify Parts 1.2 and 3.2 to recognize that if a unit contingency is ultimately what triggers the UVLS scheme that the UVLS Program does not need to be coordinated with the generator voltage-ride through capabilities for this standard. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that this is inherently captured in Requirements R1, part 1.2 and R3, part 3.2, which require that a Planning Coordinator or Transmission Planner show the coordination considerations in response to specific severe contingencies. These studies and analyses would conclude that a UVLS Program does not need to coordinate with an offline unit in this given scenario.**
Texas Reliability Entity, Inc.	No	Should there be an overarching requirement for the Planning Coordinator to develop and document general criteria for all UVLS programs in the Planning Coordinator's area, especially in the case where there may be region-specific requirements that must be met? It would then follow that program, specifications, and demonstrating of effectiveness developed under R1 and R2 must meet the general criteria. **RESPONSE: The drafting team thanks you for your comment and has considered this suggestion; however, the team believes that it is necessary to maintain flexibility for a program's specific considerations and characteristics since the need for and design of a UVLS Program is unique to each system preservation footprint.**

Organization	Yes or No	Question 3 Comment
		We have existing UVLS systems where multiple TOs and DPs in different TP areas own the UVLS relays. We are assuming in a case such as this that the PC would be responsible for the demonstration of effectiveness (R1) and the program specifications (R2), but it is not explicitly stated. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that, regardless of who will own the UVLS relays, Requirement R1 is applicable to the planning entity that develops the UVLS Program. This is reflected in the language as follows: "Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ." The requirement is not meant to dictate which entity this will be—it only recognizes that it will be either a Planning Coordinator or a Transmission Planner. Either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.** **Requirement R2 follows similar logic. The applicable UVLS entities will receive and subsequently implement the specifications from the planning entity that provides them. In Requirements R3, R4, and R5, the language specifies that the assessment actions are to be completed by the entity that has a UVLS Program (e.g., "shall perform a comprehensive assessment to evaluate the effectiveness of each of *its* UVLS Programs"). This may be a Planning Coordinator or Transmission Planner depending on the individual circumstance.** In R4, the one-year time frame for analyzing the UVLS performance for an actual event is too long. We suggest following timelines similar to the NERC Events Analysis Process. **RESPONSE: The drafting team thanks you for your comment. The drafting team recognizes that not all analyses will warrant a one-year time frame to complete. As there will be varying scenarios, the drafting team notes that this is the maximum allowable time frame to complete a given performance assessment.**

Organization	Yes or No	Question 3 Comment
California ISO	No	As elaborated on in the next question (Question 4), we think the TOP should be an applicable entity, particularly for R4, R5, R6, R7 where the time horizon to address the requirement is specified to be the Operations Planning Horizon. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that, while the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance that was necessary to capture within PRC-010-1 since the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party.** **To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is covered under EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).** **Finally, it is noted that a time horizon is assigned based on the time necessary to mitigate a violation of the requirement and is not a determining factor as to whom the requirement is applicable. Requirements R4–R6 must be completed under a one-year time frame and, therefore, all mitigations of violations would have to occur under respective commensurate time frames. Per the NERC Time Horizons, this would fall under the "Operations Planning" time frame, which is "operating and resource plans from day-ahead and including seasonal," or within 12 months. Therefore, the Operations Planning time horizon assigned to Requirements R4–R6 indicates that the applicable planning entity has within 12 months to mitigate a violation of the requirement.**
Arizona Public Service Company	No	For a UVLS developed as a safety net, any event that would trigger the necessary voltage excursion to trigger the UVLS program would be very significant. The

Organization	Yes or No	Question 3 Comment
		analysis of the event, including evaluation of UVLS would likely take a minimum of a year. Has the drafting team considered the process involved in analyzing an event such as the Northeast Blackout and how the analysis of a safety net (had one been employed) would have impacted the overall analysis timeframe? **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that the time frame to analyze an event such as the Northeast Blackout would be significant. However, the analysis of a catastrophic event like this would go beyond just that for a UVLS Program, and therefore this requirement's time frame would not be applicable to the overall analysis of the event.** In addition, APS has concerns that any additional analysis needed to identify effectiveness improvements would likely take more than three months. APS would like clarification that the three month time period given only refers to the development of the Corrective Action Program (CAP) milestones, and not the development and actual completion of these milestones within that 3 month period. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that Requirement R5's language is specific to only the development of the CAP. In addition, the accompanying Rationale box and Guidelines and Technical Basis specify that the three-month time frame is only to develop the CAP and does not encompass the time UVLS entities have to implement the CAP.**
Xcel Energy Inc.	No	In R5, it is unclear which assessment is being referenced - is it the one performed in R3, in R4, or both? Please consider making the reference more specific. Also in R5, it is unclear how "within three calendar months of identification (of deficiencies)" can be measured? It appears to require the TP/PC to record the date the deficiencies were identified during the performance of assessment -- if this is indeed the intent, recording this milestone date is not captured in R3 or R4. Suggest the milestone date be changed to completion of assessment date.

Organization	Yes or No	Question 3 Comment
		We suggest the following changes in R5 to address both concerns: "R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment [performed in either R3 or R4] shall develop a Corrective Action Plan (CAP) to address the deficiencies within three calendar months of [completing the assessment]." **RESPONSE: The drafting team thanks you for your comment. The drafting agrees with the concern and has adjusted Requirement R5 as follows:** **Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment *performed in either Requirement R3 or R4* shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of *completing the assessment.*** **"Each UVLS entity shall *adhere to the UVLS Program specifications and implementation schedule* determined by its Planning Coordinator or Transmission**
PJM Interconnection	No	PJM supports the SRC's response to this question. We reiterate their comments as follows: R1 is missing specific wording and needs to specify the requirement to implement the UVLS program. R5 needs additional language in the requirement for the entity to not only develop but also to implement the CAP. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that the requirement to implement the UVLS Program is contained in Requirement R2. However, the requirement has been adjusted to require this explicitly, and it has also been adjusted to include an explicit requirement for UVLS entities to implement the CAP from Requirement 5. Requirement R2 now reads as follows:**

Organization	Yes or No	Question 3 Comment
		Planner *associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5.*" R3 & R5 should be clarified with language so that they only apply to "operating conditions that impact the performance of UVLS". **RESPONSE: The drafting team thanks you for your comment. In consideration of this comment and others relating to the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3, the drafting team has removed this phrase since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.** **With respect to adding language to Requirement R5 so that a CAP is developed in application to program deficiencies that only impact the performance of the UVLS Program, the drafting team notes that the stated purpose of the assessments in Requirements R3 and R4 inherently relate to uncovering deficiencies that would only impact UVLS Program performance:** **Requirement R3: "that it resolves the undervoltage issues for which it was designed" and "is integrated through coordination"** **Requirement R4: "evaluate whether its UVLS Program resolved the undervoltage issues associated with the event."** R5 is unclear as to which "assessment" is referred to? The assessment per R3? For R4? Or for both?

Organization	Yes or No	Question 3 Comment
		RESPONSE: The drafting team thanks you for your comment. The drafting agrees with the concern and has adjusted Requirement R5 as follows: **Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment *performed in either Requirement R3 or R4* shall develop a Corrective Action Plan . . ."**
Florida Power & Light	No	The rationale for R1 states that lack of coordination for UVLS is a key risk to the reliability of the BES. This premise is not supported by the August 14 2003 blackout or other events. UVLS was cited as a possible measure that could have mitigated the event had there been UVLS relays near the portions of the grid that experienced voltage collapse. Coordination problems are not demonstrated by the Blackout because the UVLS relays did not exist. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees with your assessment of the August 14 Blackout Report conclusions and notes that the Rationale box for Requirement R1 only notes an agreement with the reliability purpose of the associated directive, which is to require an integrated and coordinated approach to all protection systems.** **The information provided in the accompanying FAQ document with respect to the basis of the revision of the UVLS standards document does reference the August 14 Blackout Report as an input, but it draws your same conclusion: "coordination of UVLS with other protection systems *could* have mitigated the effects *if* UVLS was used as a tool (*emphasis added*).** **In other words, in response to your concern, the drafting team notes that the requirement to coordinate UVLS Programs with other protection systems is not rooted in the premise that this was a contributing factor to the August 14 Blackout.** The requirement to "demonstrate coordination" is extremely poor practice in Reliability Standard as it is inherently subjective and misinterpreted by auditors. Low voltage problems due the severe multiple contingencies tend to be focused on a local area due to the impedance of the transmission system. The need for any

Organization	Yes or No	Question 3 Comment
		coordination depends on the area affected by the event and is best left up to the Transmission Planner. Generator low voltage ride through on existing generators is generally a function of the auxiliary bus design, the auxiliary bus loading conditions and the characteristic of equipment such as pump motors. Low voltage ride through is not a relay setting that can be looked up and is extremely difficult to determine without performing a load threatening staged test. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees and notes that the requirements as written do leave all coordination considerations up to the studies and analyses performed by the Planning Coordinator or Transmission Planner. The requirements are only requiring that these studies and analyses of coordination considerations be done. The drafting team notes that it has changed word "demonstrate" to "evaluate" in Requirement R1 to further convey the flexibility for an entity to make the proper determinations with respect to program effectiveness based on system characteristics.** NERC should be trying to encourage the installation of UFLS relays. Many UVLS relays are engineered and justified based on Category D Extreme Events for which there is no transmission performance requirement. When planning studies demonstrate a benefit to the application of UFLS relays, Transmission Planners have ample motivation to develop a reliable scheme not prone to undesired load shedding. Imposing requirements that are difficult to demonstrate to an auditor are an impediment to more widespread application of UVLS and may lead some Planners to remove UVLS from service if they perceive a compliance risk. **RESPONSE: The drafting team thanks you for your comment. The drafting team asserts that, if a Planning Coordinator or Transmission Planner determines that a UVLS Program is a necessary system protection measure, it needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term UVLS Program, which limits the standard's applicability to only those undervoltage-**

Organization	Yes or No	Question 3 Comment
		based load shedding programs whose performance have an impact on system reliability.
Northeast Power Coordinating Council	No	We agree with R1, and R4, but do have the following concerns with Requirements R3 and R5. In Requirement R3 the phrase "or operating conditions" is very vague. There are continuous and ongoing "material changes" to operating conditions. At a minimum, the dispatch scenarios will be different every day, week, month and year. Do these changes constitute material changes to the operating conditions? If so, then the effectiveness of each existing UVLS Program needs to be assessed very frequently. If no, then what constitutes "material changes to the operating conditions"? Suggest removing "or operating conditions". A review of the UVLS program once every 60 months or as material changes are made to system topology is sufficient. **RESPONSE: The drafting team thanks you for your comment. In consideration of this comment and others relating to the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3, the drafting team has removed this phrase since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.** In Requirement R5 it is unclear whether or not the identified deficiencies are the results of the evaluations made in R3 and R4. This needs to be clarified, or else there need to be triggering events clearly stated in R5. **RESPONSE: The drafting team thanks you for your comment. The drafting agrees with the concern and has adjusted Requirement R5 as follows:**

Organization	Yes or No	Question 3 Comment
		"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment *performed in either Requirement R3 or R4* shall . . ." Further, R5 requires the development of a CAP in 3 months, but does not require the implementation of the CAP, and the time frame. Both need to be added. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees with your concern that the implementation of the CAP needs to be explicitly required. As such, Requirement R2 has been adjusted as follows:** ***"Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule* determined by its Planning Coordinator or Transmission Planner *associated* with UVLS Program development per Requirement R1 or *with any Corrective Action Plans per Requirement R5."*** **It is noted that the time frame to implement the CAP is as required by the Planning Coordinator or Transmission Planner in the development of the CAP. While the NERC Glossary definition of a "Corrective Action Plan" includes an associated timetable for implementation as part of its defining elements, Requirement R5 has added the following language to emphasize that there must be an implementation schedule:** **"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment . . . shall develop a Corrective Action Plan to address the deficiencies *and subsequently provide the Corrective Action Plan, including an implementation schedule*, to UVLS entities within three calendar months of completing the assessment."**
Independent Electricity System Operator	No	We generally agree with R1, R2 and R4, but do have the following concerns with Requirements R3 and R5. R3: The phrase "or operating conditions" is very vague. There are definitely "material changes" to the operating conditions yearly, monthly, weekly and even daily. At a

Organization	Yes or No	Question 3 Comment
		minimum, the dispatch scenarios will be different every day, week, month and year. Do these changes constitute material changes to the operating conditions? If so, then the effectiveness of each existing UVLS Program needs to be assessed very frequently. If no, then what constitutes "material changes to the operating conditions"? We suggest to remove the phrase "or operating conditions". A review of the UVLS program once every 60 months or as material changes are made to system topology will suffice. **RESPONSE: The drafting team thanks you for your comment. In consideration of this comment and others relating to the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3, the drafting team has removed this phrase since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.** R5: It is unclear whether or not the identified deficiencies are the results of the evaluations made in R3 and R4. This needs to be clarified, or else there need to be triggering events clearly stated in R5. **RESPONSE: The drafting team thanks you for your comment. The drafting agrees with the concern and has adjusted Requirement R5 as follows:** **"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment *performed in either Requirement R3 or R4* shall . . ."** Further, R5 requires the development of a CAP in 3 months, but does not require the implementation of the CAP, and the time frame. Both need to be added.

Organization	Yes or No	Question 3 Comment
		RESPONSE: The drafting team thanks you for your comment. The drafting team agrees with your concern that the implementation of the CAP needs to be explicitly required. As such, Requirement R2 has been adjusted as follows: **"*Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule* determined by its Planning Coordinator or Transmission Planner *associated* with UVLS Program development per Requirement R1 or *with any Corrective Action Plans per Requirement R5.*"** **It is noted that the time frame to implement the CAP is as required by the Planning Coordinator or Transmission Planner in the development of the CAP. While the NERC Glossary definition of a "Corrective Action Plan" includes an associated timetable for implementation as part of its defining elements, Requirement R5 has added the following language to emphasize that there must be an implementation schedule:** **"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment . . . shall develop a Corrective Action Plan to address the deficiencies *and subsequently provide the Corrective Action Plan, including an implementation schedule*, to UVLS entities within three calendar months of completing the assessment."**
ISO RTO Council Standards Review Committee	No	We see R1 is missing specific wording and needs to specify the requirement to implement the UVLS program. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that the requirement to implement the UVLS Program is contained in Requirement R2. However, the requirement has been adjusted to be more explicit, and it has also been adjusted to explicitly include a requirement for UVLS entities to implement the CAP from Requirement 5. Requirement R2 now reads as follows:** **"Each UVLS entity shall *adhere to the UVLS Program specifications and implementation schedule* determined by its Planning Coordinator or Transmission**

Organization	Yes or No	Question 3 Comment
		Planner *associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5*." R3 & R5 should be clarified with language so that they only apply to "operating conditions that impact the performance of UVLS". **RESPONSE: The drafting team thanks you for your comment. In consideration of this comment and others relating to the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3, the drafting team has removed this phrase since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.** **With respect to adding language to Requirement R5 so that a CAP is developed in application to program deficiencies that only impact the performance of the UVLS Program, the drafting team notes that the stated purpose of the assessments in Requirements R3 and R4 inherently relate to uncovering deficiencies that would only impact UVLS Program performance:** **Requirement R3: "that it resolves the undervoltage issues for which it was designed" and "is integrated through coordination"** **Requirement R4: "evaluate whether its UVLS Program resolved the undervoltage issues associated with the event."**
Tacoma Power	No	Tacoma Power submits the following comments: Requirement R1, Part 1.2, and Requirement R3, Part 3.2, may be too vague. The Application Guidelines provides some clarity, but an example for each type of

Organization	Yes or No	Question 3 Comment
		system/program listed in Requirement R1, Part 1.2, and Requirement R3, Part 3.2, would be helpful. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that it has changed word "demonstrate" to "evaluate" in Requirement R1 to further convey the flexibility for an entity to make the proper determinations with respect to program effectiveness based on system characteristics. The drafting team has provided only the examples given in the Guidelines and Technical Basis to avoid being overly prescriptive.** In Requirement R3, it will be difficult to audit whether or not a Transmission Planner or Planning Coordinator conducted an assessment "sooner if material changes are made to system topology or operating conditions." How is the determination made that changes are "material"? Even the Application Guidelines acknowledges "that the term material change is not transportable on a continent wide basis." Furthermore, what is to keep a Transmission Planner or Planning Authority from waiting the whole 60 calendar months even "if material changes are made to system topology or operating conditions"? **RESPONSE: The drafting team thanks you for your comment. In consideration of this comment and others relating to the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3, the drafting team has removed this phrase since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program.**

Organization	Yes or No	Question 3 Comment
		In requirement R4, the words "that resulted in a voltage excursion" should be removed from R4. Many substations do not have capabilities to continuously record voltage at a fast enough sample rate to determine if UVLS should have operated. Maximum scan time by a SCADA system as allowed by BAL-005-0.2b is every 6 seconds, but the typical time delay of UVLS is 3 to 10 seconds. Thus, Planning Coordinators would not be able to prove an excursion did not occur. We agree with FAQ document that there should be a feedback mechanism from the TOP & DP to the TP or PC, but disagree as to the timeframe and content of that feedback. The TOP or DP should notify the PC and/or TP after an event (i.e. lines tripping out) occurs for which the UVLS program was designed to operate and then provide any available SCADA data or events. We strongly disagree with the concept that a TO or DP should be required to provide data in real-time to a PC or TP. Requiring that the TP or PC analyze real-time data to verify that no individual UVLS relays failed to operate would be a huge burden with no corresponding reliability gain. As outlined in the rationale for the UVLS program definition, one advantage of a UVLS program is that any individual relay may fail to operate, but that single failure is unlikely to affect the reliable performance of the program. The outcome of this requirement should be analysis of known or easily knowable events, and should not require exhaustive documentation to prove events did not occur. As an alternative, the following language would also be acceptable: "Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in operation of the UVLS Program, perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event." Pursuant to the preceding paragraph, should the applicability be changed to include Transmission Operator, and should a requirement be added to require that Transmission Operators and Distribution Providers notify their Transmission Planner or Planning Coordinator of events that resulted in operation of the UVLS Program? **RESPONSE: The drafting team thanks you for your comment. The drafting team understands your concern with the noted language in the FAQ and notes that it was not the drafting team's intention to convey that a Transmission Owner or**

Organization	Yes or No	Question 3 Comment
		Distribution Provider should provide data to the Planning Coordinator or Transmission Planner, or that the Planning Coordinator or Transmission Planner should analyze the data, in "real-time." The drafting team has revised the wording as follows: **"The drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have the ability to know when voltage excursions are occurring since they are not operating entities. However, a process for the Transmission Operator, Transmission Owner, or Distribution Provider to notify the Transmission Planner or Planning Coordinator of such voltage excursion events is consistent with standard utility practice."** In the Guidance document there are references to both capitalized UVLS Program and to lower case UVLS programs. Please update them all to upper case. **RESPONSE: The drafting team thanks you for your comment. These references have been addressed accordingly.**
Colorado Springs Utilities	Yes	Is WECC looking to organize and coordinate UVLS Programs within the overall WECC region? **RESPONSE: The drafting team thanks you for your support. In relation to your comment, the drafting team notes that it cannot speak for WECC.**
Duke Energy	Yes	R1: No comment **RESPONSE: The drafting team thanks you for your support.** R3: Duke Energy requests clarification from the SDT on the intent of the "material change" aspect of the proposed requirement. Is it the SDT's intent to have the individual entity set its own criteria as to what constitutes a "material change"? **RESPONSE: The drafting team thanks you for your support. In relation to your comment, yes, the intention is that the Planning Coordinator or Transmission**

Organization	Yes or No	Question 3 Comment
		Planner will determine if there are material changes to system topology or operating conditions that affect the performance of a UVLS Program. In consideration of this comment and others relating to the phrase "or sooner if material changes are made to system topology or operating conditions" in Requirement R3, the drafting team has removed this phrase since a "material" change cannot be qualified on a continent-wide basis and could therefore be interpreted differently by auditors and functional entities. Instead, the drafting team has provided guidance in the respective Rationale box and Guidelines and Technical Basis section to explain the original intent of the language, which is the recognition that a comprehensive assessment may be performed sooner than the end of the 60-month cycle if a Planning Coordinator or Transmission Planner determines there is a change to the system that would affect the performance of the UVLS Program. R4: No comment R5: No comment **RESPONSE: The drafting team thanks you for your support.**
SPP Standards Review Group	Yes	While we generally support R1, R3, R4 and R5 we recommend replacing the term 'demonstrate' in Requirement R1 with 'document'. We don't understand to whom we would demonstrate the effectiveness of our UVLS Program. **RESPONSE: The drafting team thanks you for your support. In relation to your comment, the drafting team notes that it has changed word "demonstrate" to "evaluate" in Requirement R1 to further convey the flexibility for an entity to make the proper determinations with respect to program effectiveness based on system characteristics and that the requirement is only requiring the studies and analyses that are a part of this evaluation.**

Organization	Yes or No	Question 3 Comment
		We also suggest adding a couple of commas in R3 to clarify the timing of future assessments. We propose the following: '...at least once every 60-calendar months, or sooner, if material changes are made...' Also, in R5 we suggest tying the assessment to Requirement R4 by making the following change '...identifies deficiencies in its UVLS Program during an assessment, as specified in Requirement R4, shall develop a Corrective Action Plan...' **RESPONSE: The drafting team thanks you for your comment. The drafting agrees with the concern and has adjusted Requirement R5 as follows:** **"Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment *performed in either Requirement R3 or R4* shall . . ."**
MRO NERC Standards Review Forum	Yes	**RESPONSE: The drafting team thanks you for your support.**
Virginia State Corporation Commission, member OC	Yes	**RESPONSE: The drafting team thanks you for your support.**
American Electric Power	Yes	**RESPONSE: The drafting team thanks you for your support.**
Hydro One	Yes	**RESPONSE: The drafting team thanks you for your support.**
Minnkota Power Cooperative	Yes	**RESPONSE: The drafting team thanks you for your support.**
Idaho Power Company	Yes	**RESPONSE: The drafting team thanks you for your support.**
American Transmission Company, LLC	Yes	**RESPONSE: The drafting team thanks you for your support.**
Oncor Electric Delivery LLC	Yes	**RESPONSE: The drafting team thanks you for your support.**

Organization	Yes or No	Question 3 Comment
Northeast Utilities	Yes	RESPONSE: The drafting team thanks you for your support.

4. **Do you have comments on other issues not addressed by the previous questions (e.g., the remaining requirements or the coordination that is occurring with other projects)? If so, please indicate your concerns in the comment section.**

Summary Consideration: The drafting team thanks all commenters for their time and attention. Based on the feedback received, the drafting team notes the following:

With respect to including the word "automatic" to the standard title and Purpose statement to qualify that the standard is applicable to automatic UVLS and not manual UVLS, the drafting team maintains that it is evident that the standard does not include manual load shedding since the standard is clearly applicable to the term UVLS Program, and the definition of the term UVLS Program states that it is an "automatic load shedding program." In addition, in response to the requested clarification to the Purpose statement to qualify that the standard is applicable to UVLS systems that mitigate impacts to the BES, the drafting team notes that it has added the phrase "impacting the Bulk Electric System" to the definition of the term UVLS Program, to which the standard is applicable, to provide the requested clarification.

For the comments that went back to Requirement R1 to note that it should be required for the Planning Coordinator or Transmission Planner to provide the UVLS Program specifications and implementation schedule to UVLS entities, the drafting team agrees that this should be explicitly stated and has adjusted Requirement R1 as follows: "Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities . . ."

In response to the comments that expressed concern over the coordination with PRC-004 and/or how Requirements R4 and R5 may be redundant with PRC-004, the drafting team notes that PRC-010-1 applies specifically to UVLS Program design, development, and assessment and not to the associated equipment as addressed by PRC-004. PRC-004-3, which is currently under development and nearing completion, does NOT include UVLS as part of its applicable facilities. As such, the UVLS drafting team is making the recommendation for PRC-004-3 to be revised (once complete) to include UVLS Programs that trip one or more BES Elements to address Misoperations of this equipment. The drafting team notes that this approach is consistent with the treatment of UFLS Misoperations: PRC-006-1 Automatic UFLS does not address UFLS equipment Misoperations to the necessary extent of PRC-004, and PRC-004-3 has subsequently included UFLS that trips one or more BES Elements under its applicable facilities.

Requirement R6 requires UVLS entities to provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. The drafting team does not agree that this requirement should be removed on the basis that it is covered by MOD-032-1, because MOD-032-1 only establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas PRC-010-1 Requirement R6 addresses the need to provide this information for the purpose of studies for use in event analyses for UVLS Programs specifically (i.e., MOD-032-1 does not specifically require UVLS Program data for this purpose).

In addition, in response to the comment that Requirements R6 and R7 are not needed because the Planning Coordinator would already have the data since it initially supplied the program specifications to the UVLS entities per Requirement R1, the drafting team notes that the information the UVLS entity would provide to the Planning Coordinator per Requirement R6 is what is actually installed per the design specifications.

With respect to the comments that indicated that Requirement R7, which requires Planning Coordinators to update their UVLS Program database annually, should only be updated per identifications from the assessments performed in Requirements R3 and R4, the drafting team notes that since the data being updated in Requirement R7 is not static in nature, the annual time frame allows the Planning Coordinator to periodically capture cumulative effects of small changes that would not warrant updates by themselves.

Lastly, in response to comments, the drafting team has adjusted Requirement R8 to include "other functional entities with a reliability need" as recipients of the database upon request, and has specified in the accompanying Rationale box that an example of these functional entities are Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits.

The drafting team has given every comment due consideration and has responded to each individually. Please see below for responses to specific concerns.

Organization	Yes or No	Question 4 Comment
Colorado Springs Utilities	No	RESPONSE: The drafting team thanks you for your support.
Florida Power & Light	No	RESPONSE: The drafting team thanks you for your support.
Xcel Energy Inc.	No	RESPONSE: The drafting team thanks you for your support.
Idaho Power Company	No	RESPONSE: The drafting team thanks you for your support.
Northeast Utilities	No	RESPONSE: The drafting team thanks you for your support.
ACES Standards Collaborators	Yes	(1) There appears to be inconsistency in the stated coordination between this project and the Project 2010-05.2 Special Protection Systems. Page 6 of proposed PRC-010-1 states that the definition of SPS as written in Project 2010-05.2 Special Protection

Organization	Yes or No	Question 4 Comment
		Systems (SPS) will be adjusted to include only centrally-controlled UVLS. However, the recently posted definition of SPS did not reflect this. In fact, the definition explicitly excluded UVLS in bullet a) of the definition. We do support the concept that centrally-controlled UVLS schemes should be covered under the SPS standards and believe further coordination is required between the two drafting teams. **RESPONSE: The drafting team thanks you for your support. As a point of clarification, the revised definition of the term SPS that was posted during the PRC-010-1 informal comment period was a suggested revision from an earlier report drafted by the NERC SAMS and SPCS. This was posted for comment by Project 2010-05.2 SPS to solicit feedback from industry as a starting point for the SPS drafting team. The drafting team is now making the change to include centrally controlled UVLS in their revision of the definition. Both projects are being coordinated for their first formal comment periods, during which the coordinating change to the definition of SPS will be reflected.** (2) Requirement R8 appears to meet Paragraph 81 criteria and should be removed because it is administrative in nature. More specifically, it meets criterion B4 - Reporting because it requires reporting to third parties and does not have a discernible impact on reliability. Consider if the requirement did not exist. Is it likely that the Planning Coordinator would not share their information with another Planning Coordinator? The answer is that the PC would share because Parts 1.2 and 3.2 already require that PCs to coordinate with other UVLS Programs, which creates an implied requirement to share. Furthermore, PCs are already used to sharing information and data such as planning models through regional model building processes so sharing additional pertinent information is not a significant challenge. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that Requirement R1, part 1.2 and Requirement R3, part 3.2 require you to use the data to coordinate, whereas Requirement R8 requires the data to be shared.** **It is also noted that Requirement R8 is consistent with Requirement R7 of FERC-approved PRC-006-1 Automatic UFLS. The drafting team does recognize that PRC-**

Organization	Yes or No	Question 4 Comment
		006-1 Requirement R7 is a candidate for Phase 2 of the Paragraph 81 project, but notes that the Independent Expert Review Panel recommendations disagreed with this, noting that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters." The drafting team agrees that if Requirement R7 from PRC-006-1 is officially retired under Paragraph 81 criteria, the analogous requirement in PRC-010-1 would be reconsidered at that time. (3) We are concerned that requirements R4 and R5 potentially overlap with PRC-004-2.1a and may be inconsistent. The definition of Protection System and maintenance tables in PRC-005-2 make clear that distributed UVLS systems are considered Protection Systems and, thus, subject to PRC-004-2.1a. PRC-004-2.1a requires that the TO and DP evaluate their Protection Systems Misoperations including UVLS relays Misoperations and to develop Corrective Action Plans. This would require the evaluation of all UVLS operations to ensure they are either correct or a Misoperation. R4 and R5 of PRC-010-1 would appear to require a similar analysis and development of Corrective Action Plans with specific time lines. PRC-004-2.1a does not contain specific time lines so the inclusion of specific times in PRC-010-1 R4 and R5 could cause confusion and be viewed to be in conflict. We recommend removal of PRC-010-1 R4 and R5 since they are already covered under PRC-004-2.1a. Redundant requirements also meet Paragraph 81 criteria. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that PRC-010-1 applies specifically to UVLS Program design, development, and assessment and not to the associated equipment. The objective of Requirement R4 is for the Planning Coordinator or Transmission Planner to evaluate the program design to ensure the program operated as intended during a qualifying event. While an equipment Misoperation may inherently be identified as part of this process and subsequently included as part of the CAP developed in Requirement 5, Requirement R4 does not require an evaluation of equipment Misoperations to the extent required by PRC-004, and it is not applicable to Transmission Owners and**

Organization	Yes or No	Question 4 Comment
		Distribution Providers. In other words, the two standards may identify the same issue, but they are each required for different purposes. **In addition, PRC-004-3, which is currently under development and nearing completion and will retire PRC-004-2.1a, does not include UVLS as part of its applicable facilities because UVLS Misoperations are currently addressed by PRC-022-1. Since the implementation of PRC-010-1 retires PRC-022-1, the UVLS drafting team has recommended that PRC-004-3 be adjusted to include UVLS Programs that trip one or more BES Elements as part of its applicable facilities. This is consistent with the treatment of UFLS in PRC-004-3.**
American Transmission Company, LLC	Yes	ATC asks that the SDT please consider the following recommendations: Modify the PRC-010-1 standard title to qualify that the standard applies to "Automatic Undervoltage Load Shedding" similar to the title of the 'Automatic Underfrequency Load Shedding Standard (PRC-006-1). This change would readily indicate that the standard does not include manual undervoltage load shedding, which is presently covered by EOP-003-2 (Loading Shedding Plans) standard and will continue to be covered by the future revision of standard (EOP-003-3) when the automatic UVLS program requirements are removed. **RESPONSE: The drafting team thanks you for your comment. The drafting team maintains that it is evident that the standard does not include manual load shedding since the standard is clearly applicable to the term UVLS Program, and the definition of the term UVLS Program states that it is an "automatic load shedding program."** Modify the Purpose to qualify that the standard - (1) applies to automatic UVLS Programs, (2) does not apply to the situation of when an automatic voltage load shedding scheme is developed and implemented by the Transmission Operator for Operations Planning Time Horizon, and (3) to limit the applicability to mitigating the risk of BES Adverse Reliability Impacts due to undervoltage conditions. Consider changing the wording of the Purpose as follows:

Organization	Yes or No	Question 4 Comment
		"To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of automatic Undervoltage Load Shedding (UVLS) Programs that are used to meet the NERC Transmission Planning performance requirements and mitigate the risk of BES Adverse Reliability Impacts due to undervoltage conditions". **RESPONSE: The drafting team thanks you for your comment. With respect to item (1), the drafting team notes that the phrase "automatic UVLS Program" would be redundant since the definition of the term UVLS Program, to which the standard is applicable, states that a UVLS Program is an "automatic load shedding program." In relation to item (2), the drafting team maintains that the qualification that the standard does not apply to schemes developed by the Transmission Operator is not necessary on the basis that the nature of a scheme developed by a Transmission Operator would not meet the attributes of the defined term to which the standard is applicable. In consideration of item (3), the drafting team has added the phrase "impacting the Bulk Electric System" to the definition of UVLS Program, to which the standard is applicable, to provide the requested clarification.**
ISO RTO Council Standards Review Committee	Yes	Is R6 needed at all if R1 already requires the data to be provided? This requirement can be duplicative from an implementation standpoint and instead can be covered by adding a requirement to maintain the database under R1 or R2. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the information provided to the UVLS entity in Requirement R1 are the design specifications initially developed by the Planning Coordinator or Transmission Planner. The information the UVLS entity would provide to the Planning Coordinator in Requirement R6 is what is actually installed after the design specifications are passed from the Planning Coordinator or Transmission Planner to the UVLS entity.** Under R7, updates should only be required contingent upon other changes required e.g. CAP, R3 topology, etc. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that since the data being updated in Requirement R7 is not static in nature, the**

Organization	Yes or No	Question 4 Comment
		annual time frame allows the Planning Coordinator to periodically capture cumulative effects of small changes that would not warrant updates by themselves. 4.1.3 - a missing reference to "TOP" needs to be added. **RESPONSE: The drafting team thanks you for your comment. The drafting team maintains that there is no identified performance requirements applicable to the Transmission Operator because the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party. It is also noted that this is consistent with the applicability of PRC-006-1 Automatic UFLS. If the comment above is taking into account manual load shedding for which the Transmission Operator is responsible, it is noted that manual load shedding is not in the purview of PRC-010-1, as it is covered under EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).**
Virginia State Corporation Commission, member OC	Yes	It is unclear who is included in the term "UVLS entity" in R2. This should be a defined term. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that item 4.1.3 of the standard's Applicability section identifies "UVLS entities" as "Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator."**
MRO NERC Standards Review Forum	Yes	Please consider these suggestions. Modify the standard title to qualify that the standard applies to "Automatic Undervoltage Load Shedding" similar to the title of the 'Automatic Underfrequency Load Shedding Standard (PRC-006-1). This change would readily indicate that the standard does not include manual undervoltage load shedding, which is presently covered by EOP-003-2 (Loading Shedding Plans) standard and will continue to be

Organization	Yes or No	Question 4 Comment
		covered by the future revision of standard EOP-011-1 when the automatic UVLS program requirements are removed. **RESPONSE: The drafting team thanks you for your comment. The drafting team maintains that it is evident that the standard does not include manual load shedding since the standard is clearly applicable to the term UVLS Program, and the definition of the term UVLS Program states that it is an "automatic load shedding program."** Modify the Purpose to qualify that the standard applies to automatic UVLS Programs used to mitigate the risk of BES Adverse Reliability Impacts due to undervoltage conditions with wording like, ". . . reliable operation of automatic Undervoltage Load Shedding (UVLS) Programs that are used to mitigate the risk of BES Adverse Reliability Impacts due to undervoltage conditions". **RESPONSE: The drafting team thanks you for your comment. The drafting team has added the phrase "impacting the Bulk Electric System" to the definition of the term UVLS Program, to which the standard is applicable, to provide the requested clarification.** Move specific wording from the guidelines which aren't mandatory into the NERC standard itself to clarify that the standard by itself does not require a mandatory UVLS program, rather if an entity has UVLS systems, (i.e. groups of relays set to open for to maintain BES system voltages and not individual UVLS relays protecting individual transmission lines) that meet the NERC standard, those systems are in-scope. **RESPONSE: The drafting team thanks you for your comment. The drafting team maintains that the standard's requirements clearly do not require a mandatory UVLS Program and therefore the location of the emphasis in the Guidelines and Technical Basis is sufficient.**
Duke Energy	Yes	R7: Duke Energy suggests that the SDT consider re-wording R7 to the following: "Each Planning Coordinator that has a UVLS program in its area shall update a database containing data necessary to model its UVLS program for use in event

Organization	Yes or No	Question 4 Comment
		analyses and assessments of the UVLS program as needed, or at least once every calendar year." The addition of the phrase "as needed" provides for a Planning Coordinator to update a UVLS program when necessary to ensure for the most current model availability. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the annual time frame allows the Planning Coordinator to periodically capture cumulative effects of small changes that would not warrant updates by themselves. The phrase "at least" accounts for the fact that the Planning Coordinator may update it sooner if determined necessary.**
ReliabiltiyFirst	Yes	ReliabilityFirst provides the following comments for considerations: Requirement R1, Part 1.2 - ReliabilityFirst believes the term "coordination" by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration: "The UVLS Program is [validated] through coordination [of Protection Systems] with generator voltage..." **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the wording used, "integrated through coordination", is to be consistent with the FERC order. The drafting team notes that the evaluation required by Requirement R1 as a whole requires the UVLS Program to be validated.** Requirement R2 - Requirement R2 requires the UVLS entity to adhere to the Planning Coordinator and Transmission Planner implementation schedule though there is no corresponding requirement for the PC or TP to provide such a schedule. If the Planning Coordinator or Transmission Planner never provides such a schedule, there is a potential for the UVLS entity to be non-compliant. Once again ReliabilityFirst recommends the following similar structure of the NERC PRC-006-1 Standard and include the addition of a new requirement in this standard, such as

Organization	Yes or No	Question 4 Comment
		"Each Planning Coordinator or Transmission Planner shall notify the UVLS Entities of the UVLS Program specifications and implementation schedule." **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees and has adjusted Requirement R1 as follows:** **"Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness *and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities . . ."*** Requirement R3 - ReliabilityFirst recommends removing the term "comprehensive" since it adds little or no value to the requirement. The term is ambiguous and the meaning may have potential differing interpretations by the parties involved. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the word "comprehensive" is to distinguish between the annual TPL standard assessment and an in-depth relay coordination study that may examine beyond criteria events. The drafting team notes that this intention is supported by in the respective Rationale box and Guidelines and Technical Basis.** Requirement R3, Part 3.2 - ReliabilityFirst believes the term "coordination" by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration "The UVLS Program is [validated] through [protected device] coordination with generator voltage..." **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the wording used, "integrated through coordination", is to be consistent with the FERC order. The drafting team notes that the evaluation required by Requirement R3 as a whole requires the UVLS Program to be validated.**
ISO New England	Yes	Requirement R6 could be removed since in the new MOD-032 standard the Planning Coordinator is required to specify data and models needed for assessment of system

Organization	Yes or No	Question 4 Comment
		reliability and affected entities are required to provide that data to the Planning Coordinator. The MOD-032 requirements can address UVLS data needs. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that MOD-032-1 only establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas PRC-010-1 Requirement R6 addresses the need to supply data for the purpose of studies for use in event analyses for UVLS Programs specifically (i.e., MOD-032 does not specifically require UVLS Program data for this purpose).** **In addition, the drafting team notes that the current UFLS and SPS-related standards also have an analogous requirement.**
Hydro One	Yes	Requirement R6 could be removed since in the new MOD-032 the PC is required to specify all data and models needed for assessment of reliability of the system and the affected entities are required to provide those data and models to the PC. These will cover the UVLS data as well. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that MOD-032-1 only establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas PRC-010-1 Requirement R6 addresses the need to supply data for the purpose of studies for use in event analyses for UVLS Programs specifically (i.e., MOD-032 does not specifically require UVLS Program data for this purpose).** **In addition, the drafting team notes that the current UFLS and SPS-related standards also have an analogous requirement.**
Northeast Power Coordinating Council	Yes	Requirement R6 could be removed. In the new MOD-032 the PC is required to specify all data and models needed for assessment of reliability of the system, and the affected entities are required to provide those data and models to the PC. This will cover the UVLS data as well.

Organization	Yes or No	Question 4 Comment
		RESPONSE: The drafting team thanks you for your comment. The drafting team notes that MOD-032-1 only establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas PRC-010-1 Requirement R6 addresses the need to supply data for the purpose of studies for use in event analyses for UVLS Programs specifically (i.e., MOD-032 does not specifically require UVLS Program data for this purpose). **In addition, the drafting team notes that the current UFLS and SPS-related standards also have an analogous requirement.** Also, given that Requirement R2 requires the UVLS entity to adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner, without exception, wouldn't the PC and TP already have the information on their respective data base? **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the information provided to the UVLS entity in Requirement R1 are the design specifications initially developed by the Planning Coordinator or Transmission Planner. The information the UVLS entity would provide to the Planning Coordinator in Requirement R6 is what is actually installed after the design specifications are passed from the Planning Coordinator or Transmission Planner to the UVLS entity.** **In addition, the drafting team notes that the current FERC-approved UFLS standard, PRC-006-1, has an analogous requirement.** Regarding Requirement R7, for the same reason as stated above for Requirement R6, Requirement R7 is not required and should be removed. Even if this requirement is retained, the database update to support modeling needs only to be performed as the UVLS program is revised following the identification in R3, R4 and the implementation of the CAP in Requirement R5, not annually. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that, as per above, the information the UVLS entity would provide to the Planning Coordinator in Requirement R6 is what is actually installed after the design**

Organization	Yes or No	Question 4 Comment
		specifications are passed from the Planning Coordinator or Transmission Planner to the UVLS entity. The Planning Coordinator should have this information specifically in its database and not just its initial design specifications. **With respect to the indication that the database update only needs to be performed as the UVLS Program is revised following identifications in Requirement R3 or R4, the drafting team notes that the data being updated in Requirement R7 is not static in nature—the annual time frame allows the Planning Coordinator to periodically capture cumulative effects of small changes that would not warrant updates by themselves.** **In addition, the drafting team notes that the current FERC-approved UFLS standard, PRC-006-1, has an analogous requirement.** For Requirement R8, the UVLS program data base may be required by other entities that need to consider UVLS operations in a PC's area, such as the TOPs that developed SOLs and RCs that develop IROLs. The impacts of UVLS operations and their settings need to be considered and modeled in the SOL/IROL development. Please expand this requirement to include "and those entities that have a reliability need for the database." **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees and has adjusted Requirement R8 to include "other functional entities with a reliability need" as recipients of the database upon request, and has specified in the accompanying Rationale box that examples of these functional entities are Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits.**
Tacoma Power	Yes	Tacoma Power submits the following comments: Requirement R2 would require that UVLS entities "adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner." Where is the Planning Coordinator or Transmission Planner

Organization	Yes or No	Question 4 Comment
		required to communicate the UVLS Program specifications and implementation schedule to the UVLS entity(ies)? Is it implied by Requirement R1? **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the requirement to provide the specifications and schedule to UVLS entities is implied, but the drafting team has adjusted Requirement R1 to explicitly state this as follows:** **"Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness *and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities . . .*"** In Measure M2, consider changing "...the feeders armed..." to "...the equipment armed..." Some entities may interpret 'feeders' as radial distribution circuits operated under 15kV. A UVLS Program should not be limited to application on circuits less than 15kV. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees with the suggestion and has adjusted Measure M2 as follows:** **"Acceptable evidence must include date-stamped documentation on the completion of actions and may include, but is not limited to, identifying *the equipment* armed with UVLS relays . . . "** Requirement R6 would require that a UVLS entity "provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator..." Where is the Planning Coordinator required to communicate the format and schedule to the UVLS entity(ies)? Is it implied by Requirement R7? **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that Requirement R7 addresses the likely situation in which a Planning Coordinator would request the information according to a certain format and schedule; however, requesting the information in this manner is not required. The drafting team also**

Organization	Yes or No	Question 4 Comment
		notes that this is consistent with Requirement R8 of FERC-approved PRC-006-1 Automatic UFLS. Please consider graduated VSLs for Requirement R3 based upon how late the assessment was conducted. **RESPONSE: The drafting team thanks you for your comment. Upon consideration, the drafting team maintains that the five-year time frame to complete the assessment in the requirement already provides the maximum allowable time.** In the Severe VSL for Requirement R4, change "15 months" to "15 calendar months." **RESPONSE: The drafting team thanks you for your comment and for catching this oversight. The drafting team has added the word "calendar" accordingly.** In the Lower VSL for Requirement R6, how can the applicable entity provide "data in accordance with Requirement R6" but not "according to the specified format"? Is verbiage like the following intended? "The applicable entity provided data according to the schedule specified by its Planning Coordinator, but the data was not provided in the specified format." **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that all the VSLs are constructed in a similar way, in which the intent is to convey that a given requirement was met in all respects ("in accordance with R…") with the exception of the verbiage that follows the "but".** In the Severe VSL for Requirement R8, change "60 calendar days" to "45 calendar days" to be consistent with the High VSL. **RESPONSE: The drafting team thanks you for your comment and for catching this oversight. The drafting team has changed "60 calendar days" to "45 calendar days" accordingly.**
American Electric Power	Yes	The drafting team stated in the Mapping Document their intention for PRC-004-3 to address UVLS Program Misoperations. We believe that it is clearer and more concise

Organization	Yes or No	Question 4 Comment
		that the requirement for UVLS Program Misoperations be contained together with other UVLS related requirements within PRC-010-1 rather than be split separately between PRC-004-3 and PRC-010-1. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that PRC-010-1 applies specifically to UVLS Program design, development, and assessment and not to the associated equipment as addressed by PRC-004-3. In addition, the drafting team notes that this approach is consistent with the treatment of UFLS Misoperations; PRC-006-1 Automatic UFLS does not address UFLS equipment Misoperations to the necessary extent of PRC-004, and PRC-004-3 has subsequently included UFLS under its applicable facilities.** In addition, referencing our comments in question 1, the proposed requirements in PRC-004-3 only include BES Misoperations while the proposed PRC-010-1 standard makes no distinction between BES and non-BES devices. We believe that this discrepancy needs to be addressed and clarified. **RESPONSE: The drafting team thanks you for your comment. The drafting team has added the phrase "impacting the Bulk Electric System" to the definition of the term UVLS Program, to which the standard is applicable, for further clarification. However, the drafting team also notes that, regardless of where the UVLS devices are located and where they trip, if a UVLS program is there to protect the BES, the program falls under the definition/is applicable to the standard.**
Independent Electricity System Operator	Yes	We offer the following comments on Requirements R6, R7 and R8 for consideration: R6: We question the need for R6. Given that R2 requires the UVLS entity to adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner, without exception, wouldn't the PC and TP already have the information on their respective data base? We suggest to remove R6. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the information provided to the UVLS entity in Requirement R1 are the design**

Organization	Yes or No	Question 4 Comment
		specifications initially developed by the Planning Coordinator or Transmission Planner. The information the UVLS entity would provide to the Planning Coordinator in Requirement R6 is what is actually installed after the design specifications are passed from the Planning Coordinator or Transmission Planner to the UVLS entity. R7: For the same reason stated in the comment on R6 above, R7 is not required and should be removed. Even if this requirement is retained, the database update to support modeling needs only to be performed as the UVLS program is revised following the identification in R3, R4 and the implementation of the CAP in R5, not annually. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that, as per above, the information the UVLS entity would provide to the Planning Coordinator in Requirement R6 is what is actually installed after the design specifications are passed from the Planning Coordinator or Transmission Planner to the UVLS entity. The Planning Coordinator should have this information specifically in its database and not just its initial design specifications.** **With respect to the indication that the database update needs to be performed only as the UVLS Program is revised following identifications in Requirement R3 or R4, the drafting team notes that the data being updated in Requirement R7 is not static in nature—the annual time frame allows the Planning Coordinator to periodically capture cumulative effects of small changes that would not warrant updates by themselves.** **In addition, the drafting team notes that the current FERC-approved UFLS standard, PRC-006-1, has an analogous requirement.** R8: The UVLS program data base may be required by other entities that need to consider UVLS operations in a PC's area, such as the TOPs that developed SOLs and RCs that develop IROLs. The impacts of UVLS operations and their settings need to be considered and modeled in the SOL/ITOL development. Please expand this

Organization	Yes or No	Question 4 Comment
		requirement to include "and those entities that have a reliability need for the database." **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees and has adjusted Requirement R8 to include "other functional entities with a reliability need" as recipients of the database upon request, and has specified in the accompanying Rationale box that examples of these functional entities are Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits.**
California ISO	Yes	We think the TOP should be an applicable entity, particularly for R4, R5, R6, R7 where the time horizon to address the requirement is specified to be the Operations Planning Horizon. R4 through R8 state the Time Horizon as the Operations Planning Horizon, yet do not include the TOP, but instead are applicable to the PC or TP. The TOP should be an applicable entity, particularly for R4, R5, R6, R7. The supporting rational also references coordination with the TOP entities. The Planning Horizon is typically considered to start with year 1, and the Operations Planning Horizon within the first 12 calendar months. **RESPONSE: The drafting team thanks you for your comment. The drafting notes that, while the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance that was necessary to capture within PRC-010-1 since the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party.** **To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is**

Organization	Yes or No	Question 4 Comment
		covered under EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations). **Finally, it is noted that a time horizon is assigned based on the time necessary to mitigate a violation of the requirement and is not a determining factor as to whom the requirement is applicable. Requirements R4–R6 must be completed under a one-year time frame and, therefore, all mitigations of violations would have to occur under respective commensurate time frames. Per the NERC Time Horizons, this would fall under the "Operations Planning" time frame, which is "operating and resource plans from day-ahead and including seasonal," or within 12 months. Therefore, the Operations Planning time horizon assigned to Requirements R4–R6 indicates that the applicable planning entity has within 12 months to mitigate a violation of the requirement.**
Texas Reliability Entity, Inc.	Yes	We would suggest rewording the Purpose section as follows: "To establish design, documentation and assessment requirements for automatic Undervoltage Load Shedding (UVLS) programs which support affect the reliability of the Bulk Electric System and are used to meet performance requirements in the Transmission Planning Standards" **RESPONSE: The drafting team thanks you for your comment. The drafting team notes the definition of the term UVLS Program, to which the standard is applicable, is not specific to performance required per TPL Reliability Standards because a UVLS Program may be developed and implemented to serve as a safety net system protection measure against unforeseen extreme Contingencies. However, the phrase "impacting the Bulk Electric System" has been added to the definition to further clarify the applicable UVLS systems.**
SPP Standards Review Group	Yes	What is the driver for the 6-year data retention associated with Requirement R4? We don't see the need for this being any different than the other requirements and was hoping the SDT would share their thinking with us.

Organization	Yes or No	Question 4 Comment
		RESPONSE: The drafting team thanks you for your comment. The drafting team agrees and has adjusted the Evidence Retention section accordingly to make the retention time frame for Requirement R4 equal to that of the other requirements. Here are typo/grammatical suggestions: Hyphenate 60-calendar months and any other similar time period term. This applies to the standard as well as the FAQ document. **RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the use of the hyphen is dependent on whether the phrase is being used as a qualifier. For instance, the hyphen would be used in the phrase "60-calendar-month time period" but not when simply referring to "60 calendar months." The drafting team notes that it has reviewed all references and made a few corrections to remain consistent with this approach.** Spell out Corrective Action Plan (CAP) in the Rationale Box for Requirement R5. **RESPONSE: The drafting team thanks you for your comment and agrees—the term has been spelled out in the Rationale box accordingly.** In the Severe VSL for R4, '15 months' should be '15-calendar months'. **RESPONSE: The drafting team thanks you for your comment and for catching this oversight. The drafting team has added the word "calendar" accordingly.** Something appears to have been left out of the Lower VSL for R6. We suggest inserting 'provided' between 'not' and 'according'. **RESPONSE: The drafting team thanks you for your comment and agrees—the word "provided" has been inserted accordingly.** Hyphenate 'ride-through' in the last line of the 1st paragraph under the Introduction to the Guidelines and Technical Basis Section of the standard. **RESPONSE: The drafting team thanks you for your comment and agrees—the hyphen has been added accordingly.**

Organization	Yes or No	Question 4 Comment
		Hyphenate 'continent-wide' at the end of the 2nd line in the 3rd paragraph under the Guidelines for Requirement R3 Section of the Guidelines and Technical Basis Section of the standard. **RESPONSE: The drafting team thanks you for your comment and agrees—the hyphen has been added accordingly.** Replace 'match' with 'duplicate' in the last line of the 1st paragraph under the Guidelines for Requirements R6-R8 Section of the Guidelines and Technical Basis Section of the standard. Also, in the next to last line of the 5th paragraph in the same section, replace 'provide' with 'provided'. **RESPONSE: The drafting team thanks you for your comment and agrees—the word "match" has been replaced with "duplicate" and the word "provide" had been replaced with "provided."** In the FAQ Document: Insert 'team' between 'drafting' and 'agreed' in the 4th line of the paragraph under FAQ in Response to Comments. The final report for the August 14, 2003 Blackout is referred to in several locations in the document as the August 14 Blackout Report. Use the complete, correct title of the report. Hyphenate 'sub-requirements' in the 1st line of the 2nd paragraph under Requirements R1, R3 and R4 seem to all require demonstrations of program effectiveness - how are they different question under the Clarifications on Requirements R1, R3, R4 and R5. Capitalize 'Real-time' in the 2nd paragraph under the Requirement R4 would require the Transmission Planner and Planning Coordinator to review all voltage excursions - isn't this unduly burdensome question under Clarifications on Requirements R1, R3, R4 and R5.

Organization	Yes or No	Question 4 Comment
		RESPONSE: The drafting team thanks you for your comment and agrees—the word "team" has been added and the reference to the August 14 Blackout report has been changed to the complete title. Of note, the word "sub requirements" has been changed to "parts" and the word "real-time" has been removed as result of a revision to the text.
PJM Interconnection	Yes	While PJM does support the standard, we included the following comment during the previous posting in October, 2013: The PJM Regional Transmission Expansion Plan designs the PJM RTO system to avoid the need for UVLS and therefore PJM does not have a UVLS program. The standard needs to address the situation when the TP/PC does not have a UVLS program but the UVLS entity has their own UVLS schemes. The concepts contained within PRC-010-0 R1 should be incorporated within the new standard to ensure that individual UVLS entity schemes that are developed outside or in lieu of a TP/PC program are coordinated with their TP/PC. PJM would appreciate the drafting team's response to our concern. **RESPONSE: The drafting team thanks you for your comment. The drafting team has considered this and maintains that addressing this situation is not necessary on the basis that the nature of a scheme developed by a UVLS entity and not by a Planning Coordinator or Transmission Planner would not meet the attributes of the defined term UVLS Program to which the standard is applicable.**
Arizona Public Service Company	Yes	**RESPONSE: The drafting team thanks you for your support.**
Minnkota Power Cooperative	Yes	**RESPONSE: The drafting team thanks you for your support.**
Oncor Electric Delivery LLC	Yes	**RESPONSE: The drafting team thanks you for your support.**

5. Do you support the proposed PRC-010-1? If no, please indicate what specifically would put you in favor of the standard.

Summary Consideration: Due to the varying nature of these comments, please see below for responses to specific concerns.

Organization	Yes or No	Question 5 Comment
Arizona Public Service Company	No	APS would like to see more detail as to what is required to demonstrate effectiveness and coordination as it relates to UVLS safety nets developed to protect from unforeseen multiple Contingencies. **RESPONSE: The drafting team thanks you for your comment. That drafting team notes that what you consider to coordinate with and subsequently how you evaluate effectiveness and coordination is dependent on the specific high-impact, low-probability contingencies you model as it relates to a safety net. As such, the team has changed the term "demonstrate" to "evaluate" to further convey the flexibility in making these individual determinations on how to model the system.** APS would also like to see consideration of the time lines suggested by the drafting team to analyze UVLS effectiveness and to develop corrective action plans after a voltage excursion again specifically as it relates to safety net UVLS program that would not initiate except during an extreme event. **RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that the time frame to analyze an extreme event would be significant. However, the analysis of a catastrophic event would go beyond just that for a UVLS Program, and therefore this requirement's time frame would not be applicable to the overall analysis of the event.**
American Electric Power	No	Further clarification is needed before AEP can determine whether it can support the proposed standard.

Organization	Yes or No	Question 5 Comment
		RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.
Idaho Power Company	No	I would support the proposed standard once I am assured the definition of UVLS Program provides adequate clarity to understand which schemes apply to the standard. **RESPONSE: The drafting team thanks you for your comment. Please see the drafting team's response to your comment under Question 1 accordingly.**
Hydro One	No	More clarity is needed for deciding which UVLS schemes are "UVLS Program". Please see the answer to Q1 above regarding the "distributed" attribute and deciding when there could be adverse reliability impact outside contained area for multiple (e.g., five or six) independent UVLS schemes in one part of the system. One suggestion is to remove the "distributed" attribute (and even the term "Program") and instead make the requirements of this standard applicable to those UVLS schemes that individually or collectively are needed for compliance with the performance requirements of TPL-001-4. This would be consistent with what is proposed for SPS definition (and Type). **RESPONSE: The drafting team thanks you for your comment. Please see the drafting team's response to your comment under Question 1 accordingly. The drafting team also notes that the definition is not specific to performance required per TPL Reliability Standards because a UVLS Program may be developed and implemented to serve as a safety net system protection measure against unforeseen extreme Contingencies.** Note that Page 18 has reference to "(TPL category C Contingency)" which needs to be updated to the categories in TPL-001-4. **RESPONSE: The drafting team thanks you for your comment and agrees; of note, the drafting team has revised this language slightly and, as a result, this reference has been removed.**

Organization	Yes or No	Question 5 Comment
Northeast Power Coordinating Council	No	More clarity is needed for deciding which UVLS schemes are "UVLS Program". Please see the response to Q1 above regarding the "distributed" attribute and deciding when there could be adverse reliability impact outside contained area for multiple (e.g., five or six) independent UVLS schemes in one part of the system. One suggestion is to remove the "distributed" attribute (and even the term "Program") and instead make the requirements of this standard applicable to those UVLS schemes that individually or collectively are needed for compliance with the performance requirements of TPL-001-4. This would be consistent with what is proposed for SPS definition (and Type). **RESPONSE: The drafting team thanks you for your comment. Please see the drafting team's response to your comment under Question 1 accordingly. The drafting team also notes that the definition is not specific to performance required per TPL Reliability Standards because a UVLS Program may be developed and implemented to serve as a safety net system protection measure against unforeseen extreme Contingencies.** Note that Page 18 makes reference to "(TPL category C Contingency)" which needs to be updated to the categories in TPL-001-4. **RESPONSE: The drafting team thanks you for your comment and agrees; of note, the drafting team has revised this language slightly and, as a result, this reference has been removed.**
Northeast Utilities	No	More clarity is needed in deciding which UVLS schemes are "UVLS Program". Please see the answer to Q1 above regarding the "distributed" attribute and deciding when there could be adverse reliability impact outside contained area for multiple (e.g., five or six) independent UVLS schemes in one part of the system. One suggestion is to remove the "distributed" attribute and instead make the requirements of this standard applicable to those UVLS schemes that individually or collectively are needed to mitigate Adverse Reliability Impacts within and outside of the local contained area. (Refer to last paragraph of page 18 of the draft standard).

Organization	Yes or No	Question 5 Comment
		RESPONSE: The drafting team thanks you for your comment. Please see the drafting team's response to your comment under Question 1 accordingly. Note that Page 18 has reference to "(TPL category C Contingency)" which needs to be updated to the categories in TPL-001-4. **RESPONSE: The drafting team thanks you for your comment and agrees; of note, the drafting team has revised this language slightly and, as a result, this reference has been removed.** Applicability: There are numerous instances where the standard often refers to "either the Planning Coordinator or Transmission Planner" is responsible for a requirement (Requirements R1, R3, R4 and R5). To streamline the process and make the standard clearer as to who is responsible for what requirement, there should be an additional requirement in the standard (most probably the first requirement) that should direct the Planning Coordinator and Transmission Planner to come to an agreement as to who should be responsible for which of these requirements, similarly to Requirement R7 of TPL-001-4. **RESPONSE: The drafting team thanks you for your comment. Please see the drafting team's summary response and individual responses to this concern under Question 2 accordingly.** It is not apparent from the standard whether the standard applies to only the BES or both BES and non-BES parts of the system. The applicability section also refers to Distribution Providers, which suggests that the standard also applies to the non-BES portions of the system. The portions of the power system that the standard applies to should be clearly defined. **RESPONSE: The drafting team thanks you for your comment. The drafting team has added the phrase "impacting the Bulk Electric System" to the definition of the term UVLS Program, to which the standard is applicable, for further clarification. However, the drafting team also notes that, regardless of where the UVLS devices**

Organization	Yes or No	Question 5 Comment
		are located and where they trip, if a UVLS program is there to protect the BES, the program falls under the definition/is applicable to the standard.
California ISO	No	Not as currently written. However, if comments are addressed sufficiently, we could support the PRC-010-1 UVLS standard. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
Texas Reliability Entity, Inc.	No	Please reference comments and suggestions above. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
Tacoma Power	No	Please see the included comments. Tacoma Power has submitted specific comments above. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
ReliabiltiyFirst	No	ReliabilityFirst believes the comments submitted via the preceding questions need to be addressed before the standard is ready for approval. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
ISO New England	No	The definition of UVLS program needs to be improved so that it eliminates local programs from consideration.

Organization	Yes or No	Question 5 Comment
		RESONSE: The drafting team thanks you for your comment. The drafting team has added the phrase "impacting the Bulk Electric System" to the definition of the term UVLS Program, to which the standard is applicable, for further clarification. Note that Page 18 has a reference to "TPL category C Contingency" that needs to be updated to be consistent with categories in TPL-001-4. **RESPONSE: The drafting team thanks you for your comment and agrees; of note, the drafting team has revised this language slightly and this reference has been removed.**
ISO RTO Council Standards Review Committee	No	The individual entities signed onto these SRC joint consensus comments are each NERC members and registered in the registered ballot body. This response does not represent any commitment of how each member will vote. However, if each of these comments are addressed sufficiently, we can support PRC-010-1. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
MRO NERC Standards Review Forum	No	The proposed standard is very good. However, making changes to the standard that address the comments made above in an acceptable manner would be needed to put us in favor of the planned revision to the existing standards. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
Independent Electricity System Operator	No	To put us in favor of the standard, the comments/concerns expressed under Q3 and Q4, above, will need to be address. And where changes are not made to address these concerns, the rationale for not making changes should be provided. There are no specific questions on the Measures, Retention requirements, VRFs and VSLs so we have elected not to review them at this time to provide comments. Further, since we

Organization	Yes or No	Question 5 Comment
		do not agree with a number of requirements, commenting on the compliance elements including VRFs and VSLs is perhaps premature at this time. We will provide comment when the revised draft standard is posted for formal commenting. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
ACES Standards Collaborators	No	We support the concept of the standard but believe there are still a few outstanding issues described in our comments to other questions that are required before we can support the standard. Thanks for the opportunity to comment. **RESPONSE: The drafting team thanks you for your comments. Please see the drafting team's responses to your specific concerns under each Question respectively.**
Virginia State Corporation Commission, member OC	Yes	Although I believe certain wording changes could improve the standard, I generally support it. **RESPONSE: The drafting team thanks you for your support and looks forward to your feedback in response to improvements made to the standard during the next posting.**
Duke Energy	Yes	Duke Energy's support for the proposed PRC-010-1 is contingent upon the absolute inclusion of Centrally-controlled undervoltage-based load shedding in the definition of Special Protection System (Project 2010-05.2 Protection Systems). **RESPONSE: The drafting team thanks you for your support and notes that the revised definition of SPS to include centrally controlled undervoltage-based load shedding (by excluding PRC-010-1's defined term "UVLS Program") will be posted concurrently with PRC-010-1's next posting.**

Organization	Yes or No	Question 5 Comment
Xcel Energy Inc.	Yes	Good improvements and clarifications in the standard, and most importantly in the defined term "UVLS Program" by making a clear distinction with respect to SPS. **RESPONSE: The drafting team thanks you for your support.**
SPP Standards Review Group	Yes	In general we tend to support the proposed standard but would like to see the SDT respond to our comments/suggestions above. We are much appreciative of the consolidation of the four legacy standards into the new proposed standard. **RESPONSE: The drafting team thanks you for your comments and support. Please see the drafting team's responses to your specific concerns under each Question respectively.**
American Transmission Company, LLC	Yes	The proposed standard is very good, however, addressing the comments made above are recommended for ATC to be in favor of the planned revision to the existing standards. **RESPONSE: The drafting team thanks you for your comments and support. Please see the drafting team's responses to your specific concerns under each Question respectively.**
Colorado Springs Utilities	Yes	**RESPONSE: The drafting team thanks you for your support.**
Florida Power & Light	Yes	**RESPONSE: The drafting team thanks you for your support.**
Minnkota Power Cooperative	Yes	**RESPONSE: The drafting team thanks you for your support.**
Oncor Electric Delivery LLC	Yes	**RESPONSE: The drafting team thanks you for your support.**
PJM Interconnection	Yes	**RESPONSE: The drafting team thanks you for your support.**

END OF REPORT

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. Standard Authorization Request (SAR) posted for comment on January 20, 2010.
2. Revised SAR with supporting draft standard language posted for informal comment on September 10, 2013.
3. Draft standard posted for informal comment on March 17, 2014.

Description of Current Draft

The Undervoltage Load Shedding Standard Drafting Team is posting Draft 1 of PRC-010-1 – Undervoltage Load Shedding for a 45-day formal comment period and parallel (concurrent) initial ballot during the last 10 days of the comment period.

Anticipated Actions	Anticipated Date
45-day Formal Comment Period with Parallel Initial Ballot	June 2014
Final Ballot	September 2014
BOT Adoption	November 2014

Effective Dates

The standard shall become effective on the first day of the first calendar quarter that is 12 months after the date that the standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is 12 months after the date the standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Version History

Version	Date	Action	Change Tracking
1.0	TBD	Completed revision, merging and updating PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.	

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of distributed relays and controls used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES). Centrally controlled undervoltage-based load shedding is not included.

Rationale for Definition: As part of the development of PRC-010-1, the drafting team found it necessary to introduce the term Undervoltage Load Shedding Program (UVLS Program) to establish the applicability of PRC-010-1. The following are critical defining elements of the proposed term:

1) The definition provides flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES. (See Guidelines and Technical Basis section for further discussion.)

2) Centrally controlled undervoltage-based load shedding is excluded because its design and characteristics are commensurate with a Special Protection Systems (SPS) or Remedial Action Scheme (RAS) (wherein load shedding is the remedial action). As such, centrally controlled undervoltage-based load shedding should be subject to SPS/RAS-related Reliability Standards. (See Guidelines and Technical Basis section for rationale.)

Consequently, the drafting team has recommended that Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) include centrally controlled undervoltage-based load shedding in the definition of a Special Protection System/Remedial Action Scheme.

3) The definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.

When this standard has received ballot approval, the text boxes will be moved to the Guidelines and Technical Basis section of the Standard.

A. Introduction

1. **Title: Undervoltage Load Shedding**

2. **Number: PRC-010-1**

3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).

Rationale for Applicability: This standard is applicable to Planning Coordinators and Transmission Planners that have or are developing a UVLS Program, and to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as UVLS entities for the purpose of this standard.

The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.

The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 Undervoltage load shedding (UVLS) entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

5. Background:

UVLS Programs must work correctly to properly protect system reliability. Evaluating program effectiveness and coordination, and ensuring accurate and timely program implementation, assessment, and data will improve UVLS Program performance.

PRC-010-1 – Undervoltage Load Shedding is a consolidation and revision of the following Reliability Standards:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

The UVLS Standard Drafting Team (or drafting team) developed the revised PRC-010-1 to meet the following objectives:

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS systems.
- Create a single results-based standard that addresses current reliability issues associated with UVLS.

As noted above, the drafting team found it is necessary to establish a bright line with respect to the characteristics of centrally controlled undervoltage-based load shedding with regard to its reliability requirement-related needs. Because the design and characteristics of a centrally controlled undervoltage-based load shedding system are commensurate with a Special Protection System (SPS) or Remedial Action Scheme (RAS), the drafting team maintains that this type of load shedding should be covered by SPS or RAS-related Reliability Standards.

Therefore, PRC-010-1 introduces a new NERC Glossary term, UVLS Program, to establish the applicability of PRC-010-1 to automatic load shedding programs consisting of distributed relays and controls used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES). It is noted that this term excludes centrally controlled undervoltage-based load shedding.

Subsequently, since the current NERC Glossary definition of Special Protection System excludes UVLS, concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) will adjust the definition to exclude only UVLS Programs as defined above and therefore include centrally controlled undervoltage-based load shedding. Of note, the drafting team for Project 2010-05.2 is proposing to change the term from Special Protection System to Remedial Action Scheme. Accordingly, PRC-010-1 uses the term Remedial Action Scheme instead of Special Protection System.

In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program, which is in NUC-001-2.1. Project 2012-13 – Nuclear Plant Interface Coordination has adjusted the language of this reference in proposed NUC-001-3 to eliminate any potential confusion of a lowercase usage of a defined term. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.

Requirements of the revised Reliability Standard PRC-010-1 meet the following objectives:

- Evaluate a UVLS Program's effectiveness prior to implementation, including the program's coordination with other protection systems and generator voltage ride-through capabilities.
- Adhere to UVLS Program specifications and implementation schedule.
- Perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies.
- Maintain and share UVLS Program data.

Also of note, Project 2009-03 – Emergency Operations is proposing EOP-011-1, which, as part of the overall revisions, retires specific requirements from EOP-003-2 – Load Shedding Plans to eliminate identified redundancy between PRC-010-1 and EOP-003-2. In addition, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Programs that are intended to trip one or more BES Elements. A change to make these types of UVLS Programs explicitly applicable to PRC-004 will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

B. Requirements and Measures

Rationale for R1: In Paragraph 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability, and that each Planning Coordinator or Transmission Planner that develops a UVLS Program should evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage conditions that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate items, the drafting team recognizes that the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

In addition, Requirement R1 also requires the Planning Coordinator or Transmission Planner to provide the UVLS Program's specifications and implementation schedule to applicable UVLS entities to implement the program. It is noted that studies to evaluate the effectiveness of the program should be completed prior to providing the specifications and schedule.

R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design.

1.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M1. Acceptable evidence may include, but is not limited to, date-stamped studies and analyses, reports, or other documentation detailing the effectiveness of the UVLS Program, and date-stamped communications showing that the UVLS Program specifications and implementation schedule were provided to UVLS entities.

Rationale for R2: UVLS entities must implement a UVLS Program or address any necessary corrective actions for a UVLS Program according to the specifications and schedule provided by the Planning Coordinator or Transmission Planner. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

M2. Acceptable evidence must include date-stamped documentation on the completion of actions and may include, but is not limited to, identifying the equipment armed with UVLS relays, the UVLS relay settings, associated Load summaries, work management program records, work orders, and maintenance records.

Rationale for R3: A periodic comprehensive assessment (detailed analysis) should be conducted to identify and catalogue the accumulated effects of minor changes to the system that have occurred since the last assessment was completed, and should include an evaluation of each UVLS Program to ensure the continued integration through coordination. This comprehensive assessment supplements the NERC Reliability Standard TPL-001-4 annual assessment requirement to evaluate the impact of protection systems.

Based on the drafting team's knowledge and experience, and in keeping with time frames contained in similar requirements from other PRC Reliability Standards, 60 calendar months was determined to be the maximum amount of time allowable between assessments. Assessments will be performed sooner than the end of the 60-calendar month period if the Planning Coordinator or Transmission Planner determines that there are material changes to system topology or operating conditions that affect the performance of a UVLS Program. Note that the 60-calendar-month time frame would reset after each assessment.

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. Each assessment shall include, but is not limited to, studies and analyses that evaluate whether: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M3. Acceptable evidence may include, but is not limited to, date-stamped reports or other documentation detailing the assessment of the UVLS Program.

Rationale for R4: A UVLS Program not functioning as expected during a voltage excursion event for which the UVLS Program was designed to operate presents a critical risk to system reliability. Therefore, a timely assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the applicable event is essential. The 12 calendar months (from the date of the event) provides adequate time to coordinate with other Planning Coordinators, Transmission Planners, Transmission Operators, and UVLS entities, simulate pre- and post-event conditions, and complete the performance assessment.

R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M4. Acceptable evidence may include, but is not limited to, date-stamped event data, event analysis reports, or other documentation detailing the assessment of the UVLS Program.

Rationale for R5: If program deficiencies are identified during an assessment of a UVLS Program performed in either Requirement R3 or R4, the Planning Coordinator or Transmission Planner must develop a Corrective Action Plan (CAP) to address the deficiencies. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and the time needed to consider potential solutions, coordinate resources, develop a CAP and implementation schedule, and provide the CAP and schedule to UVLS entities.

It is noted that the three-month time frame is only to develop the CAP and provide it to UVLS entities and does not encompass the time UVLS entities have to implement the CAP. Requirement R2 requires UVLS entities to execute the CAP according to the schedule provided by the Planning Coordinator or Transmission Planner.

R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities

within three calendar months of completing the assessment. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M5. Acceptable evidence must include a date-stamped Corrective Action Plan that addresses identified deficiencies and may also include date-stamped reports or other documentation supporting the Corrective Action Plan. Evidence should also include date-stamped communications showing that the Corrective Action Plan and an associated implementation schedule were provided to UVLS entities.

Rationale for R6: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R6 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year.

R6. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M6. Acceptable evidence may include, but is not limited to, date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated.

Rationale for R7: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R7 supports this reliability need by requiring the UVLS entity to provide UVLS Program data in accordance with specified parameters.

R7. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M7. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.

Rationale for R8: Requirement R8 supports the integrated and coordinated approach to UVLS programs directed by Paragraph 1509 of Order No. 693 by requiring that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time period. Requests for the database should also be fulfilled for those functional entities that have a reliability need for the data (such as the Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits).

R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M8. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating that the UVLS Program database was provided within 30 calendar days of receipt of a written request.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The Planning Coordinator, Transmission Planner, Distribution Provider, and Transmission Owner shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The applicable entity shall retain documentation as evidence since the last audit.

If an applicable entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

"Compliance Monitoring and Assessment Processes" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	High	N/A	N/A	N/A	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in parts 1.1 and 1.2.

R2	Long-term Planning	High	N/A	N/A	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
R3	Long-term Planning	Medium	N/A	N/A	N/A	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in parts 3.1 and 3.2.

R4	Operations Planning	Medium	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 calendar months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
R5	Operations Planning	Medium	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.

R6	Operations Planning	Lower	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 30 calendar days but less than or equal to 60 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.
R7	Operations Planning	Lower	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.

R8	Operations Planning	Lower	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

Introduction

PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in its legacy standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard also addresses a FERC directive from Order No. 693, Paragraph 1509. This paragraph directs NERC to develop a modification to PRC-010-0 that requires an integrated and coordinated approach to all protection systems, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Since FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding was developed under a similar construct of combining existing standards and addressing a FERC Order No. 693 directive, the drafting team looked to this standard as a guide. With the understanding that UVLS and UFLS systems have fundamental differences, the drafting team adopted PRC-006-1's industry-vetted reliability principles and language as applicable to UVLS Programs.

The drafting team's established purpose for PRC-010-1 is to clearly define the responsibilities of applicable entities to pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs. Since the need for and design of UVLS Programs is unique to each system preservation footprint, the intent of the standard is to provide a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. The drafting team emphasizes that PRC-010-1 does not require a mandatory UVLS Program, nor does this standard address the need to have a UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The drafting team provides the following discussion to support the approach to the standard. The information is meant to enhance the understanding of the reliability needs and deliverable expectations of each requirement, supported as necessary by technical principles and industry experience.

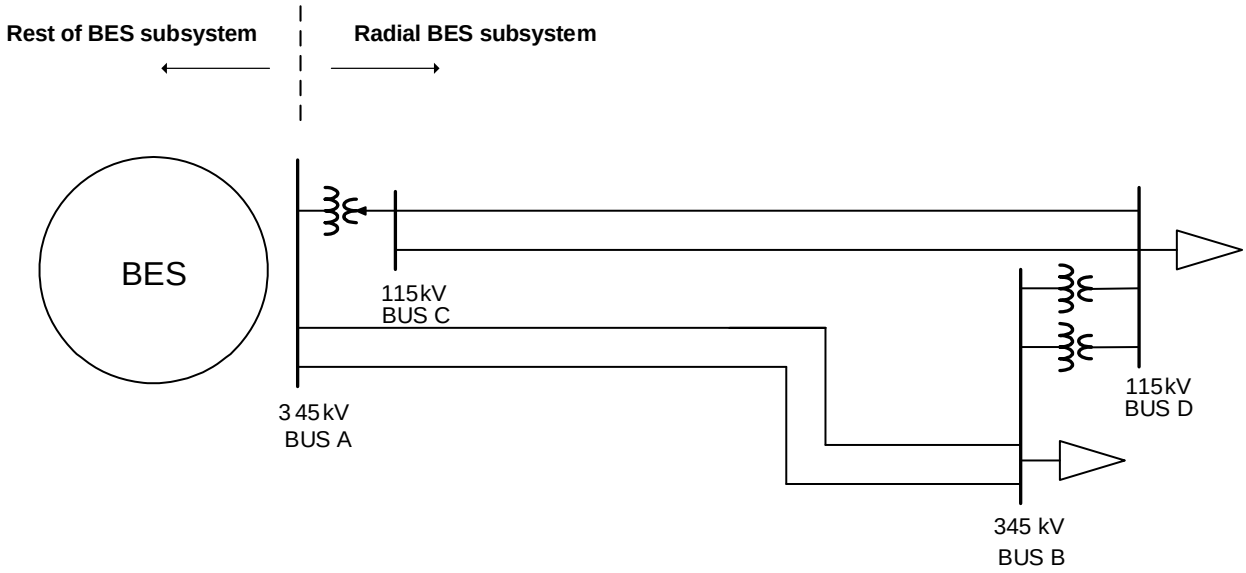
Guidelines for UVLS Program Definition

The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. As such, the failure of a single component is unlikely to affect the reliable operation of the program.

The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a RAS, wherein load shedding is the remedial action. Therefore, just like for a RAS, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding.

To ensure that the applicability of the standard is to only those undervoltage-based load shedding systems whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one more of the following: voltage instability, voltage collapse, or Cascading impacting the BES. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

Below is an example of a radial BES subsystem for which a UVLS system could be used as a solution to mitigate various issues following the loss of the 345 kV double circuit line between bus A and bus B. If the consequence of this Contingency is limited to undervoltage conditions, loss of load, or overloading of facilities within the contained area formed by buses A to D, a UVLS system (at buses B and D) used to mitigate this case would not fall under the definition of a UVLS Program. However, if this same UVLS system would be used to mitigate Adverse Reliability Impact outside this contained area, it would be classified as a wide-area undervoltage problem and would fall under the definition of UVLS Program.



High Level Requirement Overview

Requirement	Entity	Evaluate Program Effectiveness	Adhere to Program Specifications and Schedule	Perform Program Assessment (Periodic or Performance)	Develop a CAP to Address Program Deficiencies	Update and/or Share Program Data
R1	PC or TP	X				
R2	UVLS entity		X			
R3	PC or TP	X		X		
R4	PC or TP	X		X		
R5	PC or TP				X	
R6	PC					X
R7	UVLS entity					X
R8	PC					X

Guidelines for Requirement R1:

A UVLS Program may be developed and implemented to either serve as a safety net system protection measure against unforeseen extreme Contingencies or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under Transmission Planning (TPL) Reliability Standards. Regardless of the purpose, it is important that the UVLS Program being implemented is effective in terms that it mitigates undervoltage conditions leading to voltage instability, voltage collapse, or Cascading. Consideration should be given to voltage set points and time delays, rate of voltage decay or recovery, power flow levels, etc. when designing a UVLS Program.

For the UVLS Program to be effective in achieving its goal, it is also necessary that the UVLS Program is coordinated with generator voltage ride-through capabilities and other protection and control systems that may have an impact on the performance of the UVLS Program. Some of these protection and control systems may include, but are not limited to, transmission line protection, RAS, other undervoltage-based load shedding programs, auto-reclosing, and controls of shunt capacitors, reactors, and static Var systems (SVSs).

For example, if the purpose of a UVLS Program is to mitigate fault-induced delayed voltage recovery (FIDVR) events in a large load center that also includes local generation, it is important that such a UVLS Program is coordinated with local generators' voltage ride-through capabilities. Generators in the vicinity of a load center are critical to providing dynamic voltage support to the system during FIDVR events. To maximize the benefit of online generation, the best practice may be to shed load prior to generation trip. However, occasionally, it may be best to let generation trip prior to load shed. Therefore, the impact of generation tripping should be considered while designing a UVLS Program.

Another example that can be highlighted is the coordination of a UVLS Program with automatic shunt reactor tripping devices if there are any on the system. Most likely, any shunt reactors on the system will trip off automatically after some time delay during low voltage conditions. In such cases, shunt reactors should be tripped before the load is shed to preserve the system. This may require coordination of time delays associated with the UVLS Program with shunt reactor tripping devices.

Examples given above demonstrate that, for a UVLS Program to be effective, proper consideration should be given to coordination of a UVLS Program with generator ride-through capabilities and other protection and control systems.

Guidelines for Requirement R2:

Once a Planning Coordinator or Transmission Planner has identified a need for a UVLS Program, the Planning Coordinator or Transmission Planner will develop a program that includes specifications and an implementation schedule, which are then provided to UVLS entities per Requirement R1. Specifications may include voltage set points, time delays, amount of load to be shed, the location at which load needs to be shed, etc. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal. The UVLS entity must document that all necessary actions were completed to implement the UVLS Program.

Similarly, when a Corrective Action Plan (CAP) to address UVLS Program deficiencies is developed by the Planning Coordinator or Transmission Planner and provided to UVLS entities per Requirement R5, UVLS entities must comply with the CAP and its associated implementation schedule to ensure that the UVLS Program is effective. The UVLS entity is required to complete the actions specified in the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion.

Deferrals or other relevant changes to the UVLS Program specifications or CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence.

For example, documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency:

> CAP Example 1 - Corrective actions for a quick triggering problem; preemptive actions for similar installations:
>
> > Fault records showed that a group of UVLS relays did trigger at the right undervoltage level but with shorter delays that expected. On-site inspections were completed in three weeks, confirming that the delay

time programmed on the relays was 60 cycles instead of 90 cycles. A plan was scheduled for the next eight weeks to correct to a 90-cycle time delay setting of those UVLS relays identified to have shorter time delay settings.

Applicability to other UVLS relays: Based on our risk assessment, we scheduled to verify and adjust all remaining UVLS relays time delay settings within a one-year period.

CAP Example 2 - Corrective actions for a firmware problem; preemptive actions for similar installations:

Fault records were provided to the manufacturer on 6/4/2014. On 6/11/2014, the manufacturer responded that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. Version 3 firmware was installed on 6/12/2014.

Applicability to other UVLS relays: Based on our risk assessment, we plan to install firmware version 3 at all of our installations that are determined to be version 2. Proposed completion date is 12/31/2014.

The firmware replacements were completed on 12/4/2014.

Guidelines for Requirement R3:

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments (detailed analyses) are required to ensure its continued effectiveness. This assessment should be completed at least once every 60 calendar months to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed. However, at any point in time, a Planning Coordinator or Transmission Planner may also determine that a material change to system topology or operating conditions affects the performance of the UVLS Program and therefore necessitates the same comprehensive assessment. Regardless of the trigger, each assessment should include an evaluation of each UVLS Program to ensure the continued integration through coordination.

This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. The 60-month period is the same time frame used in TPL-001-4 and in PRC-006-1.

With respect to situations in which a material change to system and topology or operating conditions would necessitate a comprehensive assessment of the UVLS Program, it is understood that the term material change is not transportable on a continent-wide basis. This determination must be made by the Planning Coordinator or Transmission Planner and should

be accompanied by documentation to support the technical rationale for determining material changes.

As specified in Requirement R3, a comprehensive assessment must be performed at least once every 60 calendar months. If a Planning Coordinator or Transmission Planner conducts a comprehensive assessment sooner for the reasons discussed above, the 60-month time period would restart upon completion of this assessment.

Guidelines for Requirement R4:

The goal of the assessment required in Requirement R4 is to evaluate whether the UVLS Program resolved the undervoltage issues for an event that occurred on the system. It is expected that the assessment should include event data analysis, such as the relevant sequence of events leading to the undervoltage conditions (e.g., Contingencies, operation of protection systems, and RAS) and field measurements useful to analyzing the behavior of the system. A comprehensive description of the UVLS Program operation should be presented, including conditions of the trigger (e.g., voltage levels, time delays) and amount of load shed for each affected substation. Simulations of the event shall be performed to evaluate the level of performance of the program for the event of interest and to identify deficiencies to be included in a CAP per Requirement R5.

The studies and analyses showing the effectiveness of the UVLS Program can be similar to what is required in Requirements R1 and R3, but should include a clear link between the evaluation of effectiveness (in studies using simulations) and the analysis of the event (with measurements and event data) that actually occurred. For example, differences between the expected and actual system behavior for the event of interest should be discussed and modeling assumptions should be evaluated. Important discrepancies between the simulations and the actual event should be investigated.

Considering the importance of an event that involves the operation of a UVLS Program, the 12-calendar-month period provides adequate time to analyze the event and perform an assessment while identifying deficiencies within a reasonable time. This time period is also required in PRC-006-1.

Guidelines for Requirement R5:

Requirement R5 promotes the prudent correction of an identified problem during assessment evaluations of each UVLS Program. Per Requirements R3 and R4, an assessment of an active UVLS Program is triggered:

- After material changes are made to system topology or operating conditions. Since every UVLS is unique, the Planning Coordinator or Transmission Planner will decide the degree to which the change in topology or operating condition becomes a material change sufficient to trigger an assessment of the existing UVLS Program.

- Within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate.

- At least once every 60 months. The default time frame of 60 months or less between assessments has the intention to assure that the cumulative changes to the network and operating condition affecting the UVLS Program are evaluated.

A CAP is a list of actions and an associated timetable for implementation to remedy a specific problem. It is a proven tool for resolving operational problems. Per Requirement R5, the Planning Coordinator or Transmission Planner is required to develop a CAP and provide it to UVLS entities to accomplish the purpose of this requirement, which is to prevent future deficiencies in the UVLS Program, thereby minimizing risk to the system. Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found.

Based on industry experience and operational coordination timeframes, the drafting team believes that within three calendar months from the date an assessment is completed is a reasonable time frame for development of a CAP, including time to consider alternative solutions and coordination of resources. The "within three calendar months" time frame is solely to develop a CAP, including its implementation schedule, and provide it to UVLS entities. It does not include the time needed for its implementation by UVLS entities. This implementation time frame is dictated within the CAP's associated timetable for implementation, and the execution of the CAP according to its schedule is required in Requirement R2.

Guidelines for Requirements R6–R8

An accurate UVLS Program database is necessary for the Planning Coordinator or Transmission Planner to perform system reliability assessment studies and event analysis studies. Without accurate data, there is a possibility that annual reliability assessment studies that are performed by the Planning Coordinator can lead to erroneous results and therefore impact reliability. Also, without the accurate data, it is very difficult for the Planning Coordinator or Transmission Planner to duplicate a UVLS event and determine the root cause of the problem.

To support a UVLS Program database, it is necessary for each UVLS entity to provide accurate data to its Planning Coordinator. Each UVLS entity will provide the data according to the specified format and schedule provided by the Planning Coordinator. This is required in order for the Planning Coordinator to maintain and support a comprehensive UVLS Program database. By having a comprehensive database, the Planning Coordinator can embark on a reliability assessment or event analysis/benchmarking studies, identify the issues with the UVLS Program, and develop remedial action plans.

Items to be included in the UVLS Program database are as follows:

- Owner and operator of the UVLS Program
- Size and location of customer load, or percent of connected load, to be interrupted

- Corresponding voltage set points and clearing times
- Time delay from initiation to trip signal
- Breaker operating times
- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and RAS.

Additionally, the UVLS Program database should be updated annually (once every calendar year) by the Planning Coordinator. The intent here is for UVLS entities to review the data annually and provide changes to the Planning Coordinators so that Planning Coordinators can keep the databases current and accurate for performing event analysis and other assessments.

Finally, a Planning Coordinator is required to provide information to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of receipt of a written request. Thirty calendar days was selected as the time frame as it is considered to be reasonable and well-accepted by the industry. Also, this requirement of sharing the database with applicable functional entities supports the directive provided by FERC that requires an integrated and coordinated approach to UVLS programs (Paragraph 1509 of FERC Order No. 693).

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. Standard Authorization Request (SAR) posted for comment on January 20, 2010.
2. Revised SAR with supporting draft standard language posted for informal comment on September 10, 2013.
3. Draft standard posted for informal comment on March 17, 2014.

Description of Current Draft

~~This~~The Undervoltage Load Shedding Standard Drafting Team is posting ~~provides a complete draft standard and supporting documentation~~Draft 1 of PRC-010-1 – Undervoltage Load Shedding for ~~an additional 30~~a 45-day ~~in~~formal comment period ~~to elicit further feedback from industry~~and parallel (concurrent) initial ballot during the last 10 days of the comment period.

Anticipated Actions	Anticipated Date
45-day Formal Comment Period with Parallel Initial Ballot	June 2014
Final Ballot	September 2014
BOT Adoption	November 2014

Effective Dates

The standard shall become effective on the first day of the first calendar quarter that is 12 months after the date that the standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is 12 months after the date the standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Version History

Version	Date	Action	Change Tracking
1.0	TBD	Completed revision, merging and updating PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.	

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of distributed relays and controls used to mitigate ~~the risk of Cascading,~~undervoltage conditions leading to voltage instability, voltage collapse, or ~~uncontrolled separation resulting from undervoltage conditions.~~Cascading impacting the Bulk Electric System (BES). Centrally ~~-~~ controlled undervoltage-based load shedding is not included.

~~**Rationale for Definition:** As part of the development of PRC-010-1, the drafting team found it necessary to introduce the term Undervoltage Load Shedding Program (UVLS Program) to clearly establish PRC-010-1's applicability. The following discussion and characteristics were critical elements to the development of the proposed definition.~~

~~The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. Therefore, the failure of a single component is unlikely to affect the reliable performance of the program.~~

~~Centrally-controlled undervoltage-based load shedding is excluded, because the load shedding logic may utilize 1) voltage inputs from multiple locations; and/or 2) inputs other than voltages, such as generator reactive reserves, facility loadings, and equipment statuses. As such, its reliable performance could be affected by a single component failure, which is consistent with the nature of Special Protection Systems. Therefore, the drafting team has recommended that Project 2010-05.2 Protection System (Special Protection Systems) include centrally-controlled undervoltage-based load shedding in the definition of a Special Protection System.~~

~~The definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.~~

~~In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program in NUC-001-2.1. This standard is part of an open standard revision project, and the finalized definition of UVLS Program will be forwarded to that drafting team for consideration. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.~~

Rationale for Definition: As part of the development of PRC-010-1, the drafting team found it necessary to introduce the term Undervoltage Load Shedding Program (UVLS Program) to establish the applicability of PRC-010-1. The following are critical defining elements of the proposed term:

1) The definition provides flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES. (See Guidelines and Technical Basis section for further discussion.)

2) Centrally controlled undervoltage-based load shedding is excluded because its design and characteristics are commensurate with a Special Protection Systems (SPS) or Remedial Action Scheme (RAS) (wherein load shedding is the remedial action). As such, centrally controlled undervoltage-based load shedding should be subject to SPS/RAS-related Reliability Standards. (See Guidelines and Technical Basis section for rationale.)

Consequently, the drafting team has recommended that Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) include centrally controlled undervoltage-based load shedding in the definition of a Special Protection System/Remedial Action Scheme.

3) The definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.

When this standard has received ballot approval, the text boxes will be moved to the ~~Application~~ Guidelines ~~Section~~and Technical Basis section of the Standard.

A. Introduction

1. **Title: Undervoltage Load Shedding**

2. **Number: PRC-010-1**

3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).

Rationale for Applicability: This standard is applicable to Planning Coordinators and Transmission Planners that have or are developing a UVLS Program, and to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as UVLS entities for the purpose of this standard.

The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.

The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 Undervoltage load shedding (UVLS) entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

5. Background:

UVLS Programs must work correctly to properly protect system reliability. ~~Ensuring~~Evaluating program effectiveness and coordination, and ensuring accurate and timely program implementation, assessment, and data will improve UVLS Program performance.

PRC-010-1 – Undervoltage Load Shedding is a consolidation and revision of the following Reliability Standards:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

The UVLS Standard Drafting Team (or drafting team) developed the revised PRC-010-1 to meet the following objectives:

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally ~~-~~controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS systems.
- Create a single~~,~~ results-based standard that addresses current reliability issues associated with UVLS.

As noted above, the drafting team found it is necessary to establish a bright line with respect to the characteristics of centrally ~~-~~controlled undervoltage-based load shedding ~~in~~with regard to its reliability requirement-related needs. Because the ~~reliable performance~~design and characteristics of a centrally ~~-~~controlled undervoltage-based load shedding ~~could be affected by a single component failure,~~system are commensurate with a Special Protection System (SPS) or Remedial Action Scheme (RAS), the drafting team maintains that this type of load shedding ~~is consistent with the nature of Special Protection Systems (SPSs) and~~ should be covered by SPS or RAS-related Reliability Standards.

Therefore, PRC-010-1 introduces a new NERC Glossary term, UVLS Program, to ~~clearly~~ establish ~~PRC-010-1's~~the applicability of PRC-010-1 to automatic load shedding programs consisting of distributed relays and controls used to mitigate ~~the risk of Cascading,~~undervoltage conditions leading to voltage instability, voltage collapse, or

~~uncontrolled separation resulting from undervoltage conditions.~~Cascading impacting the Bulk Electric System (BES). It is noted that this term excludes centrally ~~-~~controlled undervoltage-based load shedding.

Subsequently, since the current NERC Glossary definition of Special Protection System excludes UVLS, concurrent Project 2010-05.2 – Special Protection Systems~~:~~ (Phase 2 ~~(Special~~of Protection Systems) will adjust the definition to exclude only UVLS Programs as defined above and therefore include centrally ~~-~~controlled undervoltage-based load shedding. Of note, the drafting team for Project 2010-05.2 is proposing to change the term from Special Protection System to Remedial Action Scheme. Accordingly, PRC-010-1 uses the term Remedial Action Scheme instead of Special Protection System.

In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program, which is in NUC-001-2.1. Project 2012-13 – Nuclear Plant Interface Coordination has adjusted the language of this reference in proposed NUC-001-3 to eliminate any potential confusion of a lowercase usage of a defined term. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.

Requirements of the revised Reliability Standard PRC-010-1 meet the following objectives:

- ~~Demonstrate~~Evaluate a UVLS Program's effectiveness prior to implementation, including the program's coordination with other protection systems and generator voltage ride-through capabilities.
- Adhere to UVLS Program specifications and implementation schedule.
- Perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies.
- Maintain and share UVLS Program data.

Also of note, Project 2009-03 – Emergency Operations is ~~retiring~~proposing EOP-011-1, which, as part of the overall revisions, retires specific requirements ~~and revising~~from EOP-003-2 – Load Shedding Plans to eliminate identified redundancy between PRC-010-1 and EOP-003-2. In addition, the UVLS drafting team's intention is for PRC-004 to address ~~appropriate~~Misoperations of UVLS Programs that are intended to trip one or more BES Elements. A change to make these types of UVLS ~~Program Misoperations (as previously addressed by PRC-022-1); the introduction of this revision~~Programs explicitly applicable to PRC-004 ~~is pending outcomes of~~ will be addressed once PRC-004-3~~, which is currently in final stages of development~~ – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems~~: Phase 1 (Misoperations~~).

B. Requirements and Measures

Rationale for R1: In Paragraph 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability, and that each Planning Coordinator or Transmission Planner that develops a UVLS Program should ~~demonstrate~~ evaluate the program's viability and effectiveness prior to implementation. This ~~demonstration~~ evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate items, the drafting team recognizes that the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

In addition, Requirement R1 also requires the Planning Coordinator or Transmission Planner to provide the UVLS Program's specifications and implementation schedule to applicable UVLS entities to implement the program. It is noted that studies to evaluate the effectiveness of the program should be completed prior to providing the specifications and schedule.

R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall ~~demonstrate~~evaluate its effectiveness ~~prior~~and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the ~~program. This demonstration~~UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show:
[Violation Risk Factor: High] [Time Horizon: Long-term Planning]

- **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to ~~the UVLS Program's~~its development and design.
- **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, ~~SPSs~~Remedial Action Schemes, and other undervoltage-based load shedding programs.

M1. Acceptable evidence may include, but is not limited to, date-stamped studies and analyses, ~~date-stamped~~ reports, or other documentation detailing the effectiveness of the UVLS Program~~.~~, and date-stamped communications showing that the UVLS Program specifications and implementation schedule were provided to UVLS entities.

Rationale for R2: UVLS entities must implement a UVLS Program or address any necessary corrective actions for a UVLS Program according to the specifications and schedule provided by the Planning Coordinator or Transmission Planner. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner~~.~~ associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

M2. Acceptable evidence must include date-stamped documentation on the completion of actions and may include, but is not limited to, ~~date-stamped documentation~~ identifying the ~~feeders~~equipment armed with UVLS relays, the UVLS relay settings, ~~and the~~ associated Load summaries, work management program records, work orders, and maintenance records.

Rationale for R3: A periodic comprehensive assessment (detailed analysis) should be conducted to ~~capture~~ identify and catalogue the accumulated effects of minor changes to the system that have occurred since the last assessment was completed, and should include an evaluation of each UVLS Program to ensure the continued integration through coordination. This comprehensive assessment supplements the NERC Reliability Standard TPL-001-4 annual assessment requirement to evaluate the impact of protection systems.

Based on the drafting team's knowledge and experience, and in keeping with time frames contained in similar requirements from other PRC Reliability Standards, 60 calendar months was determined to be the maximum amount of time allowable between assessments. Assessments will be performed sooner than the end of the 60-calendar month period if the Planning Coordinator or Transmission Planner determines that there are material changes to system topology or operating conditions that affect the performance of a UVLS Program. Note that the 60-calendar-month time frame would reset after each assessment.~~The drafting team asserts that there will be circumstances other than a periodic assessment, such as material changes to system topology or operating conditions, that could affect the performance of a UVLS Program and trigger assessments prior to the end of the 60-calendar month period. If so, the 60-calendar month time frame would reset after each assessment.~~

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each ~~existing~~of its UVLS ~~Program in its area~~Programs at least once every 60 calendar months~~ or sooner if material changes are made to system topology or operating conditions. The~~. Each assessment shall

include, but is not limited to, studies and analyses that evaluate whether: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, ~~SPSs~~Remedial Action Schemes, and other ~~UVLS~~undervoltage-based load shedding programs.

M3. Acceptable evidence may include, but is not limited to, date-stamped reports or other documentation detailing the assessment of the UVLS Program.

Rationale for R4: A UVLS Program not functioning as expected during a voltage excursion event for which the UVLS Program was designed to operate presents a critical risk to system reliability. Therefore, a timely assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the applicable event is essential. The 12 calendar months (from the date of the event) provides adequate time to coordinate with other Planning Coordinators and Transmission Planners, Transmission Operators, and UVLS entities, simulate pre- and post-event conditions, and complete the performance assessment.

R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which ~~the program~~its UVLS Program was designed to operate, perform an assessment to evaluate whether ~~the~~its UVLS Program resolved the undervoltage issues associated with the event. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M4. Acceptable evidence may include, but is not limited to, date-stamped event data, event analysis reports, or other documentation detailing the assessment of the UVLS Program.

Rationale for R5: If program deficiencies are identified during ~~any~~ an assessment of a UVLS Program performed in either Requirement R3 or R4, the Planning Coordinator or Transmission Planner must develop a Corrective Action Plan (CAP) ~~must be developed~~ to address the deficiencies. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and time needed to consider potential solutions, coordinate resources, and develop a CAP and implementation schedule, and provide the CAP and schedule to UVLS entities.

It is noted that the three-month time frame is only to develop the CAP and provide it to UVLS entities and does not encompass the time UVLS entities have to implement the CAP. Requirement R2 requires UVLS entities to execute the CAP according to the schedule provided by the Planning Coordinator or Transmission Planner.

R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan ~~(CAP)~~ to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of ~~identification~~completing the assessment. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M5. Acceptable evidence must include a ~~CAP~~date-stamped Corrective Action Plan that addresses identified deficiencies and may also include date-stamped reports or other documentation supporting the ~~CAP~~Corrective Action Plan. Evidence should also include date-stamped communications showing that the Corrective Action Plan and an associated implementation schedule were provided to UVLS entities.

Rationale for R6: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R6 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year.~~UVLS entity to provide UVLS Program data in accordance with specified parameters.~~

R6. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year. ~~Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of eacha UVLS Program database.~~ *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M6. Acceptable evidence may include, but is not limited to, date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated. ~~date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.~~

Rationale for R7: Having accurate and current data is required for the Planning Coordinator to perform studies and for use in event analyses. Requirement R7 supports this reliability need by requiring the UVLS entity to provide UVLS Program data in accordance with specified parameters. ~~Planning Coordinator to update its UVLS Program database at least once each calendar year.~~

R7. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. ~~Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year.~~ *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M7. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.~~date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated.~~

Rationale for R8: Requirement R8 supports the integrated and coordinated approach to UVLS programs directed by Paragraph 1509 of Order No. 693 by requiring that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time ~~frame of a request~~period. Requests for the database should also be fulfilled for those functional entities that have a reliability need for the data (such as the Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits).

R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M8. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating that the UVLS Program database was provided ~~as requested~~ within 30 calendar days of receipt of a written request.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

~~The applicable entity~~The Planning Coordinator, Transmission Planner, Distribution Provider, and Transmission Owner shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The applicable entity shall ~~keep data or evidence to show compliance with Requirements R1, R2, R3, R5, R6, R7, and R8~~retain documentation as evidence since the last audit.

- ~~The applicable entity shall keep data or evidence to show compliance with Requirement R4 for six calendar years.~~

If an applicable entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

"Compliance Monitoring and Assessment Processes" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	High	N/A	N/A	N/A	The applicable entity that developed the UVLS Program failed to ~~demonstrate~~evaluate the program's effectiveness ~~prior to~~ and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in ~~P~~parts 1.1 and 1.2.

R2	Long-term Planning	High	N/A	N/A	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the ~~UVLS Program~~ implementation schedule in accordance with Requirement R2.	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
R3	Long-term Planning	Medium	N/A	N/A	N/A	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in ~~P~~parts 3.1 and 3.2.

R4	Operations Planning	Medium	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 calendar months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.

R5	Operations Planning	Medium	The applicable entity developed a ~~CAP~~Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5~~,~~ but was late by less than or equal to 15 calendar days.	The applicable entity developed a ~~CAP~~Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5~~,~~ but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity developed a ~~CAP~~Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5~~,~~ but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity developed a ~~CAP~~Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5~~,~~ but was late by more than 45 calendar days. OR The responsible entity failed to develop a ~~CAP~~Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.

R6	Operations Planning	Lower	The applicable entity ~~provided data~~updated the database in accordance with Requirement R6~~,~~ but was late by less than or equal to 30 calendar days ~~per the specified schedule~~. ~~OR~~ ~~The applicable entity provided data in accordance with Requirement R6, but the data was not according to the specified format.~~	The applicable entity ~~provided data~~updated the database in accordance with Requirement R6~~,~~ but was late by more than 30 calendar days but less than or equal to 60 calendar days ~~per the specified schedule~~.	The applicable entity ~~provided data~~updated the database in accordance with Requirement R6~~,~~ but was late by more than 60 calendar days but less than or equal to 90 calendar days ~~per the specified schedule~~.	The applicable entity ~~provided data~~updated the database in accordance with Requirement R6~~,~~ but was late by more than 90 calendar days ~~per the specified schedule.~~. OR The applicable entity failed to ~~provide data~~update the database in accordance with Requirement R6.

R7	Operations Planning	Lower	The applicable entity ~~updated the database~~provided data in accordance with Requirement R7~~,~~ but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.	The applicable entity ~~updated the database~~provided data in accordance with Requirement R7~~,~~ but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.	The applicable entity ~~updated the database~~provided data in accordance with Requirement R7~~,~~ but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.	The applicable entity ~~updated the database~~provided data in accordance with Requirement R7~~,~~ but was late by more than 90 calendar days~~.~~ per the specified schedule. OR The applicable entity failed to ~~update the database~~provide data in accordance with Requirement R7.
R8	Operations Planning	Lower	The applicable entity provided its UVLS Program database in accordance with Requirement R8~~,~~ but was late by less than or equal to 15 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8~~,~~ but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8~~,~~ but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8~~,~~ but was late by more than ~~60~~45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

Introduction

PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in its legacy standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard also addresses a FERC directive from Order No. 693, Paragraph 1509. This paragraph directs NERC to develop a modification to PRC-010-0 that requires an integrated and coordinated approach to all protection systems, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Since FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding was developed under a similar construct of combining existing standards and addressing a FERC Order No. 693 directive, the drafting team looked to this standard as a guide. With the understanding that UVLS and UFLS ~~programs~~systems have fundamental differences, the drafting team adopted PRC-006-1's industry-vetted reliability principles and language as applicable to UVLS Programs.

The drafting team's established purpose for PRC-010-1 is to clearly define the responsibilities of applicable entities to pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs. Since the need for and design of UVLS Programs is unique to each system preservation footprint, the intent of the standard is to provide a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. The drafting team emphasizes that PRC-010-1 does not require a mandatory UVLS Program, nor does this standard address the need to have a UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The drafting team provides the following discussion to support the approach to the standard. The information is meant to enhance the understanding of the reliability needs and deliverable expectations of each requirement, supported as necessary by technical principles and industry experience.

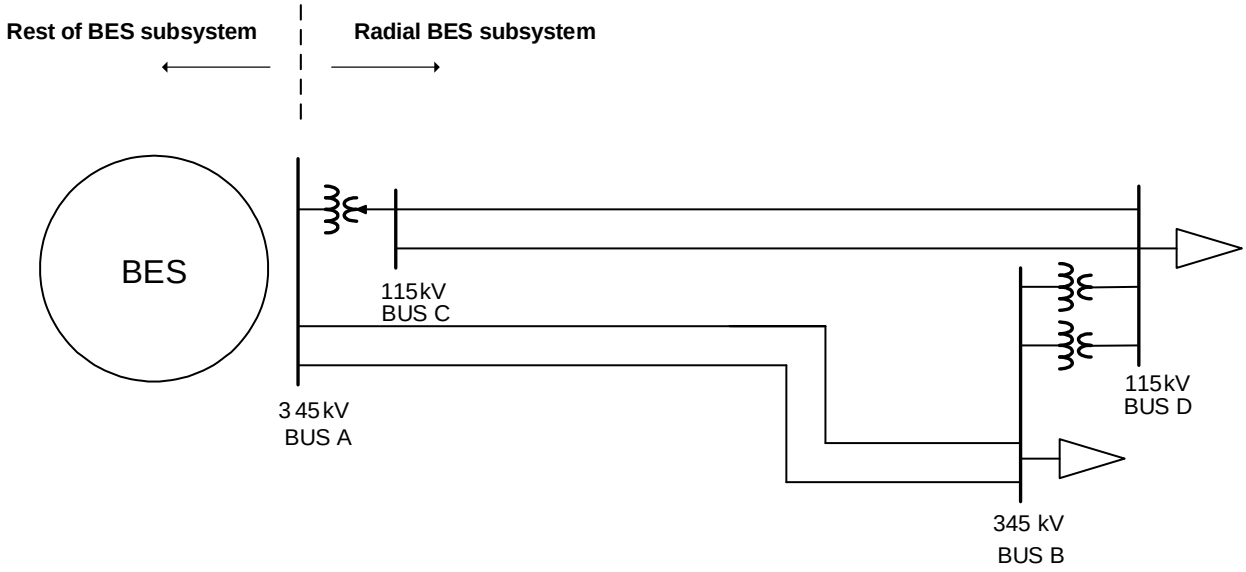
Guidelines for UVLS Program Definition

The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. As such, the failure of a single component is unlikely to affect the reliable operation of the program.

The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a RAS, wherein load shedding is the remedial action. Therefore, just like for a RAS, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding.

To ensure that the ~~UVLS Program standard's~~ applicability of the standard is to only those undervoltage-based load shedding ~~programs~~systems whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one more of the following: ~~Cascading,~~ voltage instability, ~~wide-area~~ voltage collapse, or ~~uncontrolled separation~~Cascading impacting the BES. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

Below is an example of a radial ~~Bulk Electric System (~~BES~~)~~ subsystem for which a UVLS system could be used as a solution to mitigate various issues following the loss of the 345 kV double circuit line between bus A and bus B~~ (TPL category C Contingency).~~. If the consequence of this Contingency is limited to undervoltage conditions, loss of load, or overloading of facilities within the contained area formed by buses A to D, a UVLS system (at buses B and D) used to mitigate this case would not fall under the definition of a UVLS Program. However, if this same UVLS system would be used to mitigate Adverse Reliability Impact outside this contained area, it would be classified as a wide-area undervoltage problem and would fall under the definition of UVLS Program.



High Level Requirement Overview

Requirement	Entity	~~Demonstrate~~Evaluate Program Effectiveness	Adhere to Program Specifications and Schedule	Perform Program Assessment (Periodic or Performance)	Develop a CAP to Address Program Deficiencies	Update and/or Share Program Data
R1	PC or TP	X				
R2	UVLS entity		X			
R3	PC or TP	X		X		
R4	PC or TP	X		X		
R5	PC or TP				X	
R6	~~UVLS entity~~PC					X
R7	~~PC~~UVLS entity					X
R8	PC					X

Guidelines for Requirement R1:

A UVLS Program may be developed and implemented to either serve as a safety net system protection measure against unforeseen extreme Contingencies or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under Transmission Planning (TPL) Reliability Standards. Regardless of the purpose, it is important that the UVLS Program being implemented is effective in terms that it mitigates ~~the risk of Cascading,~~undervoltage conditions leading to voltage instability, ~~wide area~~ voltage collapse, or ~~uncontrolled separation resulting from undervoltage conditions~~Cascading. Consideration should

be given to voltage set points and time delays, rate of voltage decay or recovery, power flow levels, etc. when designing a UVLS Program.

For the UVLS Program to be effective in achieving its goal, it is also necessary that the UVLS Program is coordinated with generator voltage ride-through capabilities and other protection and control systems that may have an impact on the performance of the UVLS Program. Some of these protection and control systems may include, but are not limited to, transmission line protection, ~~SPSs~~RAS, other undervoltage-based load shedding programs, auto-reclosing, and controls of shunt capacitors, reactors, and static Var systems (SVSs).

For example, if the purpose of a UVLS Program is to mitigate fault-induced delayed voltage recovery (FIDVR) events in a large load center that also includes local generation, it is important that such a UVLS Program is coordinated with local generators' voltage ride-through capabilities. Generators in the vicinity of a load center are critical to providing dynamic voltage support to the system during FIDVR events. To maximize the benefit of online generation, the best practice may be to shed load prior to generation trip. However, occasionally, it may be best to let generation trip prior to load shed. Therefore, the impact of generation tripping should be considered while designing a UVLS Program.

Another example that can be highlighted is the coordination of a UVLS Program with automatic shunt reactor tripping devices if there are any on the system. Most likely, any shunt reactors on the system will trip off automatically after some time delay during low voltage conditions. In such cases, shunt reactors should be tripped before the load is shed to preserve the system. This may require coordination of time delays associated with the UVLS Program with shunt reactor tripping devices.

Examples given above demonstrate that, for a UVLS Program to be effective, proper consideration should be given to coordination of a UVLS Program with generator ride-through capabilities and other protection and control systems.

Guidelines for Requirement R2:

Once a Planning Coordinator or Transmission Planner has identified a need for a UVLS Program, the Planning Coordinator or Transmission Planner will develop a program that includes specifications and an implementation schedule, which are then provided to UVLS entities~~.~~ per Requirement R1. Specifications may include voltage set points, time delays, amount of load to be shed, the location at which load needs to be shed, etc. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal. The UVLS entity must document that all necessary actions were completed to implement the UVLS Program.

Similarly, when a Corrective Action Plan (CAP) to address UVLS Program deficiencies is developed by the Planning Coordinator or Transmission Planner and provided to UVLS entities per Requirement R5, UVLS entities must comply with the CAP and its associated implementation schedule to ensure that the UVLS Program is effective. The UVLS entity is

required to complete the actions specified in the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion.

Deferrals or other relevant changes to the UVLS Program specifications or CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence.

For example, documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency:

CAP Example 1 - Corrective actions for a quick triggering problem; preemptive actions for similar installations:

Fault records showed that a group of UVLS relays did trigger at the right undervoltage level but with shorter delays that expected. On-site inspections were completed in three weeks, confirming that the delay time programmed on the relays was 60 cycles instead of 90 cycles. A plan was scheduled for the next eight weeks to correct to a 90-cycle time delay setting of those UVLS relays identified to have shorter time delay settings.

Applicability to other UVLS relays: Based on our risk assessment, we scheduled to verify and adjust all remaining UVLS relays time delay settings within a one-year period.

CAP Example 2 - Corrective actions for a firmware problem; preemptive actions for similar installations:

Fault records were provided to the manufacturer on 6/4/2014. On 6/11/2014, the manufacturer responded that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. Version 3 firmware was installed on 6/12/2014.

Applicability to other UVLS relays: Based on our risk assessment, we plan to install firmware version 3 at all of our installations that are determined to be version 2. Proposed completion date is 12/31/2014.

The firmware replacements were completed on 12/4/2014.

Guidelines for Requirement R3:

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments (detailed analyses) are required to ensure its continued effectiveness. This assessment should be completed at least once every 60 calendar months to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed. ~~There~~However, at any point in time, a Planning Coordinator or Transmission Planner may also ~~be~~determine that a material change~~s~~ to system topology or operating conditions ~~that would necessitate this~~affects the performance of the UVLS Program and therefore necessitates the same comprehensive assessment ~~at any point in time.~~. Regardless of the trigger, ~~the~~each assessment should include an evaluation of each UVLS Program to ensure the continued integration through coordination.

This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. The 60-month period is the same time frame used in TPL-001-4 and in PRC-006-1.

~~The~~ With respect to situations in which a material change ~~terminology is also used in~~ to system and topology or operating conditions would necessitate a comprehensive assessment of the ~~TPL-001-4 standard. The industry concluded~~UVLS Program, it is understood that the term material change is not transportable on a continent-wide basis. ~~Requirement R2, Part 6.2 of TPL-001-4 specifies that~~This determination must be made by the Planning Coordinator or Transmission Planner and should be accompanied by documentation to support the technical rationale for determining material changes ~~shall be included. Similar documentation should also support a UVLS Program assessment that is a result of a material change.~~.

As specified in Requirement R3, a comprehensive assessment must be performed at least once every 60 calendar months. If a Planning Coordinator or Transmission Planner conducts a comprehensive assessment ~~necessitated by a material change is conducted within~~sooner for the ~~60-month window~~reasons discussed above, the 60-month time period would restart upon completion of this assessment.

Guidelines for Requirement R4:

The goal of the assessment required in Requirement R4 is to evaluate whether the UVLS Program resolved the undervoltage issues for an event that occurred on the system. It is expected that the assessment should include event data analysis, such as the relevant sequence of events leading to the undervoltage conditions (e.g., Contingencies, operation of protection systems, and ~~SPSs~~RAS) and field measurements useful to analyzing the behavior of the system. A comprehensive description of the UVLS Program operation should be presented, including conditions of the trigger (e.g., voltage levels, time delays) and amount of load shed for each affected substation. Simulations of the event shall be performed to evaluate the level of performance of the program for the event of interest and to identify deficiencies to be included in a CAP per Requirement R5.

The studies and analyses showing the effectiveness of the UVLS Program can be similar to what is required in Requirements R1 and R3, but should include a clear link between the ~~demonstration~~evaluation of effectiveness (in studies using simulations) and the analysis of the event (with measurements and event data) that actually occurred. For example, differences between the expected and actual system behavior for the event of interest should be discussed and modeling assumptions should be evaluated. Important discrepancies between the simulations and the actual event should be investigated.

Considering the importance of an event that involves the operation of a UVLS Program, the 12-calendar-month period provides adequate time to analyze the event and perform an assessment while identifying deficiencies within a reasonable time. This time period is also required in PRC-006-1.

Guidelines for Requirement R5:

Requirement ~~5~~R5 promotes the prudent correction of an identified problem during assessment evaluations of each UVLS Program. ~~An~~Per Requirements R3 and R4, an assessment of an active UVLS Program is triggered:

- After material changes are made to system topology or operating conditions. Since every UVLS is unique, the Planning Coordinator or Transmission Planner will decide the degree to which the change in topology or operating condition becomes a material change sufficient to trigger an assessment of the existing UVLS Program.

- Within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate.

- At least once every 60 months. The default time frame of 60 months or less between assessments has the intention to assure that the cumulative changes to the network and operating condition affecting the UVLS Program are evaluated.

~~The 60-calendar month time frame would reset after each assessment.~~

A CAP is a list of actions and an associated timetable for implementation to remedy a specific problem. It is a proven tool for resolving operational problems. ~~The responsible entity~~Per Requirement R5, the Planning Coordinator or Transmission Planner is required to ~~implement and complete~~develop a CAP and provide it to UVLS entities to accomplish the purpose of this requirement, which is to prevent future deficiencies in the UVLS Program, thereby minimizing risk to the system. Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found~~The responsible entity is also required to complete the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion~~.

~~Deferrals or other relevant changes to the CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful CAP execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence. Documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency.~~

~~CAP examples:~~

~~CAP Example 1 – Corrective actions for a quick-triggering problem; preemptive actions for similar installations:~~

~~Fault records showed that a group of UVLS relays did trigger at the right undervoltage level but with shorter delays that expected. On-site inspections were completed in three weeks, confirming that the delay time programmed on the relays was 60 cycles instead of 90 cycles. A plan was scheduled for the next eight weeks to correct to a 90-cycle time delay setting of those UVLS relays identified to have shorter time delay settings.~~

~~Applicability to other UVLS relays: Based on our risk assessment, we scheduled to verify and adjust all remaining UVLS relays time delay settings within a one-year period.~~

~~CAP Example 2 – Corrective actions for a firmware problem; preemptive actions for similar installations:~~

~~Fault records were provided to the manufacturer on 6/4/2014. On 6/11/2014, the manufacturer responded that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. Version 3 firmware was installed on 6/12/2014.~~

~~Applicability to other UVLS relays: Based on our risk assessment, we plan to install firmware version 3 at all of our installations that are determined to be version 2. Proposed completion date is 12/31/2014.~~

~~The firmware replacements were completed on 12/4/2014.~~

Based on industry experience and operational coordination timeframes, the drafting team believes that within three calendar months from the date ~~the problem was identified~~an assessment is completed is a reasonable time frame for development of a CAP, including time to consider alternative solutions and coordination of resources. The “within three calendar months” time frame is solely to develop a CAP, including its implementation schedule, and ~~it~~provide it to UVLS entities. It does not include the time needed for its implementation~~.~~ by

UVLS entities. This implementation time frame is dictated within the CAP's associated timetable for implementation, and the execution of the CAP according to its schedule is required in Requirement R2.

~~Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found.~~

Guidelines for Requirements R6–R8

An accurate UVLS Program database is necessary for the Planning Coordinator or Transmission Planner to perform system reliability assessment studies and event analysis studies. Without accurate data, there is a possibility that annual reliability assessment studies that are performed by the Planning Coordinator can lead to erroneous results and therefore impact reliability. Also, without the accurate data, it is very difficult for the Planning Coordinator or Transmission Planner to ~~match~~duplicate a UVLS event and determine the root cause of the problem.

To support a UVLS Program database, it is necessary for each UVLS entity to provide accurate data to its Planning Coordinator. Each UVLS entity will provide the data according to the specified format and schedule provided by the Planning Coordinator. This is required in order for the Planning Coordinator to maintain and support a comprehensive UVLS Program database. By having a comprehensive database, the Planning Coordinator can embark on a reliability assessment or event analysis/benchmarking studies, identify the issues with the UVLS Program, and develop remedial action plans.

Items to be included in the UVLS Program database are as follows:

- Owner and operator of the UVLS Program
- Size and location of customer load, or percent of connected load, to be interrupted
- Corresponding voltage set points and ~~overall scheme~~ clearing times
- Time delay from initiation to trip signal
- Breaker operating times
- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and ~~SPSs~~RAS.

Additionally, the UVLS Program database should be updated annually (once every calendar year) by the Planning Coordinator. The intent here is for UVLS entities to review the data annually and provide changes to the Planning Coordinators so that Planning Coordinators can keep the databases current and accurate for performing event analysis and other assessments.

Finally, a Planning Coordinator is required to provide information to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of ~~a~~ receipt of a written request. ~~The 30~~Thirty calendar days was selected as ~~an acceptable~~the time frame as it is considered to be reasonable and well-accepted by the industry. Also, this requirement of sharing the database

with ~~other Planning Coordinators and Transmission Planners~~applicable functional entities supports the directive provided by FERC that requires an integrated and coordinated approach to UVLS programs (Paragraph 1509 of FERC Order No. 693).

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Implementation Plan

Project 2008-02: Underfrequency Load Shedding (UFLS)

Requested Approval

- PRC-006-2: Automatic Underfrequency Load Shedding

Requested Retirement

- PRC-006-1: Automatic Underfrequency Load Shedding

Prerequisite Approvals

- None

Revisions to Defined Terms in the NERC Glossary

- None

Applicable Entities

- Planning Coordinators
- UFLS entities shall mean all entities that are responsible for the ownership, operation, or control of UFLS equipment as required by the UFLS program established by the Planning Coordinators. Such entities may include one or more of the following:
    - Transmission Owners
    - Distribution Providers
- Transmission Owners that own Elements identified in the UFLS program established by the Planning Coordinators

Effective Date

This standard is effective on the first day of the first calendar quarter six months after the date that the standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter after the date the standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Retirement of Existing PRC-006-1

PRC-006-1 shall be retired at midnight of the day immediately prior to the Effective Date of PRC-006-2.

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Unofficial Comment Form

Project 2008-02 Undervoltage Load Shedding (PRC-010-1)

Please **DO NOT** use this form for submitting comments. Please use the electronic comment form to submit comments on the Project 2008-02 Undervoltage Load Shedding (UVLS) draft standard PRC-010-1. The electronic comment form must be completed by **Thursday, August 7, 2014**.

If you have questions, please contact Erika Chanzes via email or by telephone at 404-446-2583.

The project page may be accessed by clicking here.

Background Information

In January 2010, NERC posted the Project 2008-02 UVLS Standard Authorization Request (SAR) for public comment. The SAR cited NERC technical reports and assessments of UVLS programs and standards, along with the FERC Order No. 693 directive that approved PRC-010-0 but requested that it be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Work was deferred due to prioritization for the 2011–2013 Reliability Standards Development Plan (RSDP) and the effort was restarted as part of the 2013–2015 RSDP. The formal drafting team members were tasked with reevaluating and revising the SAR and subsequently proceeding with standard development. The team's objective is to ensure that Project 2008-02 addresses NERC's existing UVLS standards such that they are results-based, address the appropriate regulatory directives, coordinate with present reliability standard efforts (e.g., Paragraph 81, the Independent Expert Review Panel recommendations, and other active standard development projects), and consider current reliability issues associated with UVLS.

Based on these considerations, the drafting team posted a revised SAR and draft requirements for an informal comment period in September 2013, and then posted a complete standard and supporting documents for a second informal comment period in March 2014. The drafting team has considered the feedback from industry and made appropriate revisions.

This formal comment period seeks stakeholder feedback on the proposed draft standard PRC-010-1.

You do not have to answer all questions. Enter comments in simple text format. Bullets, numbers, and special formatting will not be retained.

Questions

1. The drafting team has proposed a new NERC Glossary term, "UVLS Program," and has included supporting information in an accompanying Rationale box and in the standard document's Guidelines and Technical Basis section. Does the defined term and supporting information provide the clarity necessary to understand which types of UVLS are applicable to the standard? If no, please indicate your concerns in the comment section and provide specific suggested changes.

☐ Yes
☐ No

Comments:

2. Do you have any concerns with the standard itself, including the Applicability section, Requirements, Measures, Violation Risk Factors (VRFs), and Violation Severity Levels (VSLs)? If yes, please indicate your concerns in the comment section and provide specific suggested changes.

☐ Yes
☐ No

Comments:

3. Do you have any concerns with items not addressed by the previous questions (e.g., the Implementation Plan or the coordination that is occurring with other projects)? If yes, please indicate your concerns in the comment section and provide specific suggested changes.

☐ Yes
☐ No

Comments:

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Standards Authorization Request Form

When completed, please email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved reliability standards. Please use this form to submit your request to propose a new or a revision to a NERC Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard:	Undervoltage Load Shedding (UVLS) Underfrequency Load Shedding (UFLS)		
Date Submitted:	Revised SAR posted for informal comment September 2013, March 2014 and May 23, 2014		
SAR Requester Information			
Name:	Undervoltage Load Shedding Standard Drafting Team (UVLSSDT) Underfrequency Load Shedding Standard Drafting Team (UFLS SDT)		
Organization:			
Telephone:	404-823-1132 404-446-2581	E-mail:	Erika.Chanzes@nerc.net Lacey.Ourso@nerc.net
SAR Type (Check as many as applicable)			
☐ New Standard ☒ Revision to existing Standard		☒ Withdrawal of existing Standard ☐ Urgent Action	

SAR Information
Industry Need (What is the industry problem this request is trying to solve?):
<u>Undervoltage Load Shedding</u> A need for clear and comprehensive requirements for the application and coordination of undervoltage loading shedding (UVLS) as an option to mitigate or address a number of different voltage control concerns, as evidenced by the following:

SAR Information

- **Of the events analyzed by NERC over the last 10 years, voltage issues have continued to contribute to disturbances.**

- **NERC SPCS Report to the Planning Committee: Technical Review of UVLS-Related Standards: PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 (December 2010):** *"Specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems."*

- **FERC Order No. 693, Paragraph 1509:** *"…the Commission directs the ERO to develop a modification to PRC-010-0 through the Reliability Standards development process that requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs."*

- **August 14 Blackout: Causes and Recommendations, Blackout Recommendation 21:** *"[NERC should] determine the goals and principles needed to establish an integrated approach to relay protection for generators and transmission lines and the use of under-frequency and under-voltage load shedding (UFLS and UVLS) programs. An integrated approach is needed to ensure that at the local and regional level these interactive components provide an appropriate balance of risks and benefits in terms of protecting specific assets and facilitating overall grid survival."*

Underfrequency Load Shedding

Address the outstanding FERC directive and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel).

Purpose or Goal (How does this request propose to address the problem described above?):

Undervoltage Load Shedding

1) Establish a results-based standard with requirements that ensure an integrated approach to the design, evaluation, and reliable operation of applicable UVLS programs.

SAR Information

2) Ensure coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Special Protection Systems (SPSs), and other UVLS programs.

Underfrequency Load Shedding

This SAR proposes to revise PRC-006-1 to address an outstanding FERC directive and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel). Specifically, the SDT should address the directive from FERC Order No. 763 Paragraph 48, which provides, in part, "Notwithstanding NERC's comments, the Commission is not persuaded that Requirement R9 requires corrective action in accordance with a schedule established by the planning coordinator. Based on its comments, however, NERC has expressed no opposition to such a requirement. We accept NERC's comments that Requirement R9 requires a schedule established by the planning coordinator, but NERC's reading of Requirement R9 should be made clear in the Requirement itself. Accordingly, we direct NERC to make that requirement explicit in future versions of the Reliability Standard."

Identify the objectives of the proposed standard's requirements (What specific reliability deliverables are required to achieve the goal?):

Undervoltage Load Shedding

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally-controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS programs.

SAR Information
• Create a single, results-based standard that addresses current reliability issues associated with UVLS programs. **Underfrequency Load Shedding** The objective is to revise PRC-006-1 to address the directive included in FERC Order No. 763 and to provide for clear, unambiguous design and documentation requirements for automatic underfrequency load shedding programs that arrest declining frequency and assist recovery of frequency following system events leading to frequency degradation.
Brief Description (Provide a paragraph that describes the scope of this standard action.)
Undervoltage Load Shedding PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1, and PRC-022-1 and be revised to PRC-010-1, which will provide specific requirements for the design, evaluation, and coordinated operation of the UVLS programs to which the standard is applicable. The revised standard will be accompanied by a recommendation to retire PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. **Underfrequency Load Shedding** PRC-006-1 should be revised to address the FERC directive included in FERC Order No. 763 and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel).
Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)
Undervoltage Load Shedding The four existing NERC UVLS standards will be consolidated to create one comprehensive standard, which will reduce the total number of standards and eliminate PRC-020-1 and PRC-021-1's applicability to and involvement of the RRO. PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1,

SAR Information

and PRC-022-1, and the existing requirements and measures will be revised to establish a results-based standard that clearly defines the responsibilities of applicable entities to:

- Pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS programs to which the standard is applicable.
- Ensure the coordination of these UVLS programs with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs.
- Perform periodic program assessment and performance analysis.
- Establish proper and meaningful database requirements for these UVLS programs.

The revised standard **WILL**:

- Establish continent-wide requirements applicable to entities responsible for the design and implementation of the UVLS programs to which the standard is applicable.
- Address requirements for these programs after the need for UVLS has been determined by the appropriate planning studies.
- Be developed with due consideration to any necessary coordinating changes with other standards or standards projects to meet its design.

The revised standard **WILL NOT**:

- Require a UVLS program.
- Apply to centrally-controlled undervoltage-based load shedding programs (see Related SARs section below).
- Apply to the Generator Owner or Generator Operator; Generator Owner data reporting necessary for UVLS coordination is addressed in PRC-024-1.
- Include the previously applicable Load-Serving Entity since this function does not own physical assets. If a Load-Serving Entity is also registered as a Distribution Provider, the entity will be included under that applicable function.
- Include the previously applicable Transmission Operator because the requirements are more accurately applicable to asset owners (Transmission Owner and Distribution Provider).

No market interface impacts are anticipated.

Underfrequency Load Shedding

The SDT shall revise PRC-006-1 to address the FERC directive included in FERC Order No. 763 and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel).

Reliability Functions	
The Standard will Apply to the Following Functions (Check each one that applies.)	
☐ Regional Reliability Organization	Conducts the regional activities related to planning and operations, and coordinates activities of Responsible Entities to secure the reliability of the Bulk Electric System within the region and adjacent regions.
☐ Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐ Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐ Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
☒ Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐ Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.
☒ Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐ Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒ Transmission Owner	Owns and maintains transmission facilities.
☐ Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☒ Distribution Provider	Delivers electrical energy to the End-use customer.
☐ Generator Owner	Owns and maintains generation facilities.
☐ Generator Operator	Operates generation unit(s) to provide real and reactive power.

Reliability Functions		
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles	
Applicable Reliability Principles (Check all that apply).	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☒	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
☒	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
☒	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☒	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles?	Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.	Yes
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	Yes

Reliability and Market Interface Principles	
4. A reliability 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

Related Standards	
Standard No.	Explanation
TPL-001-4	Development of PRC-010-1 is based on implementation of FERC-approved TPL-001-4.
EOP-003-2	Project 2009-03 Emergency Operations (proposed EOP-011-1) will retire EOP-003-2, and Requirements R2, R4, and R7 will be moved to Project 2008-02 UVLS (proposed PRC-010-1). The UVLSSDT will address these overlapping requirements as part of the revision and mapping process.
PRC-004-2.1a	The UVLSSDT will consider if PRC-004 is the more appropriate standard to address UVLS Misoperations and will coordinate with Project 2010-05.1 Protection Systems (Misoperations) (proposed PRC-004-3).
PRC-005-2 and other standards as identified	The UVLSSDT will evaluate the use of references to UVLS with respect to any proposed defined terms by PRC-010-1 and will coordinate with Project 2007-17.3 Protection System Maintenance and Testing (Sudden Pressure Relays) (proposed PRC-005-4) and other standards or standard development projects as necessary.

Related SARs	
Project	Explanation
Project 2010-05.2 Protection Systems (Special Protection Systems)	The UVLSSDT is recommending that Project 2010-05.2 Protection Systems (Special Protection Systems) adjust the definition of Special Protection System to include centrally-controlled undervoltage-based load shedding.

Regional Variances	
Region	Explanation
ERCOT	None
FRCC	None
MRO	None
NPCC	PRC-006-NPCC-1
RFC	None
SERC	PRC-006-SERC-02
SPP	None
WECC	None

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Standards Authorization Request Form

When completed, please email this form to:
sarcomm@nerc.com

NERC welcomes suggestions to improve the reliability of the bulk power system through improved reliability standards. Please use this form to submit your request to propose a new or a revision to a NERC Reliability Standard.

Request to propose a new or a revision to a Reliability Standard			
Title of Proposed Standard:	Undervoltage Load Shedding (UVLS) Underfrequency Load Shedding (UFLS)		
Date Submitted:	Revised SAR posted for informal comment September 2013, March 2014 and May 23, 2014		
SAR Requester Information			
Name:	Undervoltage Load Shedding Standard Drafting Team (UVLSSDT) Underfrequency Load Shedding Standard Drafting Team (UFLS SDT)		
Organization:			
Telephone:	404-823-1132 404-446-2581	E-mail:	Erika.Chanzes@nerc.net Lacey.Ourso@nerc.net
SAR Type (Check as many as applicable)			
☐ New Standard ☒ Revision to existing Standard		☒ Withdrawal of existing Standard ☐ Urgent Action	

SAR Information
Industry Need (What is the industry problem this request is trying to solve?):
Undervoltage Load Shedding A need for clear and comprehensive requirements for the application and coordination of undervoltage loading shedding (UVLS) as an option to mitigate or address a number of different voltage control concerns, as evidenced by the following:

SAR Information

- **Of the events analyzed by NERC over the last 10 years, voltage issues have continued to contribute to disturbances.**

- **NERC SPCS Report to the Planning Committee: Technical Review of UVLS-Related Standards: PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 (December 2010):** *"Specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems."*

- **FERC Order No. 693, Paragraph 1509:** *"…the Commission directs the ERO to develop a modification to PRC-010-0 through the Reliability Standards development process that requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs."*

- **August 14 Blackout: Causes and Recommendations, Blackout Recommendation 21:** *"[NERC should] determine the goals and principles needed to establish an integrated approach to relay protection for generators and transmission lines and the use of under-frequency and under-voltage load shedding (UFLS and UVLS) programs. An integrated approach is needed to ensure that at the local and regional level these interactive components provide an appropriate balance of risks and benefits in terms of protecting specific assets and facilitating overall grid survival."*

Underfrequency Load Shedding

Address the outstanding FERC directive and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel).

Purpose or Goal (How does this request propose to address the problem described above?):

Undervoltage Load Shedding

1) Establish a results-based standard with requirements that ensure an integrated approach to the design, evaluation, and reliable operation of applicable UVLS programs.

SAR Information

2) Ensure coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Special Protection Systems (SPSs), and other UVLS programs.

Underfrequency Load Shedding

This SAR proposes to revise PRC-006-1 to address an outstanding FERC directive and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel). Specifically, the SDT should address the directive from FERC Order No. 763 Paragraph 48, which provides, in part, "Notwithstanding NERC's comments, the Commission is not persuaded that Requirement R9 requires corrective action in accordance with a schedule established by the planning coordinator. Based on its comments, however, NERC has expressed no opposition to such a requirement. We accept NERC's comments that Requirement R9 requires a schedule established by the planning coordinator, but NERC's reading of Requirement R9 should be made clear in the Requirement itself. Accordingly, we direct NERC to make that requirement explicit in future versions of the Reliability Standard."

Identify the objectives of the proposed standard's requirements (What specific reliability deliverables are required to achieve the goal?):

Undervoltage Load Shedding

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally-controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS programs.

SAR Information
• Create a single, results-based standard that addresses current reliability issues associated with UVLS programs. **Underfrequency Load Shedding** The objective is to revise PRC-006-1 to address the directive included in FERC Order No. 763 and to provide for clear, unambiguous design and documentation requirements for automatic underfrequency load shedding programs that arrest declining frequency and assist recovery of frequency following system events leading to frequency degradation.
Brief Description (Provide a paragraph that describes the scope of this standard action.)
Undervoltage Load Shedding PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1, and PRC-022-1 and be revised to PRC-010-1, which will provide specific requirements for the design, evaluation, and coordinated operation of the UVLS programs to which the standard is applicable. The revised standard will be accompanied by a recommendation to retire PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. **Underfrequency Load Shedding** PRC-006-1 should be revised to address the FERC directive included in FERC Order No. 763 and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel).
Detailed Description (Provide a description of the proposed project with sufficient details for the standard drafting team to execute the SAR. Also provide a justification for the development or revision of the standard, including an assessment of the reliability and market interface impacts of implementing or not implementing the standard action.)
Undervoltage Load Shedding The four existing NERC UVLS standards will be consolidated to create one comprehensive standard, which will reduce the total number of standards and eliminate PRC-020-1 and PRC-021-1's applicability to and involvement of the RRO. PRC-010-0 will absorb appropriate requirements from PRC-020-1, PRC-021-1,

SAR Information
and PRC-022-1, and the existing requirements and measures will be revised to establish a results-based standard that clearly defines the responsibilities of applicable entities to: • Pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS programs to which the standard is applicable. • Ensure the coordination of these UVLS programs with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, SPSs, and other UVLS programs. • Perform periodic program assessment and performance analysis. • Establish proper and meaningful database requirements for these UVLS programs. The revised standard **WILL**: • Establish continent-wide requirements applicable to entities responsible for the design and implementation of the UVLS programs to which the standard is applicable. • Address requirements for these programs after the need for UVLS has been determined by the appropriate planning studies. • Be developed with due consideration to any necessary coordinating changes with other standards or standards projects to meet its design. The revised standard **WILL NOT**: • Require a UVLS program. • Apply to centrally-controlled undervoltage-based load shedding programs (see Related SARs section below). • Apply to the Generator Owner or Generator Operator; Generator Owner data reporting necessary for UVLS coordination is addressed in PRC-024-1. • Include the previously applicable Load-Serving Entity since this function does not own physical assets. If a Load-Serving Entity is also registered as a Distribution Provider, the entity will be included under that applicable function. • Include the previously applicable Transmission Operator because the requirements are more accurately applicable to asset owners (Transmission Owner and Distribution Provider). No market interface impacts are anticipated. **Underfrequency Load Shedding** The SDT shall revise PRC-006-1 to address the FERC directive included in FERC Order No. 763 and review the standard to determine if any steady state modifications are appropriate (*i.e.*, Paragraph 81 criteria and recommendations of the Independent Expert Review Panel).

Reliability Functions		
The Standard will Apply to the Following Functions (Check each one that applies.)		
☐	Regional Reliability Organization	Conducts the regional activities related to planning and operations, and coordinates activities of Responsible Entities to secure the reliability of the Bulk Electric System within the region and adjacent regions.
☐	Reliability Coordinator	Responsible for the real-time operating reliability of its Reliability Coordinator Area in coordination with its neighboring Reliability Coordinator's wide area view.
☐	Balancing Authority	Integrates resource plans ahead of time, and maintains load-interchange-resource balance within a Balancing Authority Area and supports Interconnection frequency in real time.
☐	Interchange Authority	Ensures communication of interchange transactions for reliability evaluation purposes and coordinates implementation of valid and balanced interchange schedules between Balancing Authority Areas.
☒	Planning Coordinator	Assesses the longer-term reliability of its Planning Coordinator Area.
☐	Resource Planner	Develops a >one year plan for the resource adequacy of its specific loads within a Planning Coordinator area.
☒	Transmission Planner	Develops a >one year plan for the reliability of the interconnected Bulk Electric System within its portion of the Planning Coordinator area.
☐	Transmission Service Provider	Administers the transmission tariff and provides transmission services under applicable transmission service agreements (e.g., the pro forma tariff).
☒	Transmission Owner	Owns and maintains transmission facilities.
☐	Transmission Operator	Ensures the real-time operating reliability of the transmission assets within a Transmission Operator Area.
☒	Distribution Provider	Delivers electrical energy to the End-use customer.
☐	Generator Owner	Owns and maintains generation facilities.
☐	Generator Operator	Operates generation unit(s) to provide real and reactive power.

Reliability Functions		
☐	Purchasing-Selling Entity	Purchases or sells energy, capacity, and necessary reliability-related services as required.
☐	Market Operator	Interface point for reliability functions with commercial functions.
☐	Load-Serving Entity	Secures energy and transmission service (and reliability-related services) to serve the End-use Customer.

Reliability and Market Interface Principles	
Applicable Reliability Principles (Check all that apply).	
☒	1. Interconnected bulk power systems shall be planned and operated in a coordinated manner to perform reliably under normal and abnormal conditions as defined in the NERC Standards.
☒	2. The frequency and voltage of interconnected bulk power systems shall be controlled within defined limits through the balancing of real and reactive power supply and demand.
☒	3. Information necessary for the planning and operation of interconnected bulk power systems shall be made available to those entities responsible for planning and operating the systems reliably.
☒	4. Plans for emergency operation and system restoration of interconnected bulk power systems shall be developed, coordinated, maintained and implemented.
☒	5. Facilities for communication, monitoring and control shall be provided, used and maintained for the reliability of interconnected bulk power systems.
☐	6. Personnel responsible for planning and operating interconnected bulk power systems shall be trained, qualified, and have the responsibility and authority to implement actions.
☒	7. The security of the interconnected bulk power systems shall be assessed, monitored and maintained on a wide area basis.
☐	8. Bulk power systems shall be protected from malicious physical or cyber attacks.

Does the proposed Standard comply with all of the following Market Interface Principles?	Enter (yes/no)
1. A reliability standard shall not give any market participant an unfair competitive advantage.	Yes
2. A reliability standard shall neither mandate nor prohibit any specific market structure.	Yes
3. A reliability standard shall not preclude market solutions to achieving compliance with that standard.	Yes

Reliability and Market Interface Principles	
4. A reliability 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

Related Standards	
Standard No.	Explanation
TPL-001-4	Development of PRC-010-1 is based on implementation of FERC-approved TPL-001-4.
EOP-003-2	Project 2009-03 Emergency Operations (proposed EOP-011-1) will retire EOP-003-2, and Requirements R2, R4, and R7 will be moved to Project 2008-02 UVLS (proposed PRC-010-1). The UVLSSDT will address these overlapping requirements as part of the revision and mapping process.
PRC-004-2.1a	The UVLSSDT will consider if PRC-004 is the more appropriate standard to address UVLS Misoperations and will coordinate with Project 2010-05.1 Protection Systems (Misoperations) (proposed PRC-004-3).
PRC-005-2 and other standards as identified	The UVLSSDT will evaluate the use of references to UVLS with respect to any proposed defined terms by PRC-010-1 and will coordinate with Project 2007-17.3 Protection System Maintenance and Testing (Sudden Pressure Relays) (proposed PRC-005-4) and other standards or standard development projects as necessary.

Related SARs	
Project	Explanation
Project 2010-05.2 Protection Systems (Special Protection Systems)	The UVLSSDT is recommending that Project 2010-05.2 Protection Systems (Special Protection Systems) adjust the definition of Special Protection System to include centrally-controlled undervoltage-based load shedding.

Regional Variances	
Region	Explanation
ERCOT	None
FRCC	None
MRO	None
NPCC	PRC-006-NPCC-1
RFC	None
SERC	PRC-006-SERC-02
SPP	None
WECC	None

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Project 2008-02 Undervoltage Load Shedding

Mapping Document

This mapping document shows translation of the requirements of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, PRC-022-1 – Under-Voltage Load Shedding Program Performance, and specific requirements from EOP-003-2 – Load Shedding Plans to the requirements of PRC-010-1 – Undervoltage Load Shedding.

Project 2008-02 – Undervoltage Load Shedding (PRC-010-1) retires Reliability Standards PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. Project 2009-03 – Emergency Operations (EOP-011-1), which is following a concurrent development timeline with Project 2008-02, retires EOP-003-2, Requirements R2, R4, and R7. The reliability objectives of those three requirements is reflected in PRC-010-1, and the respective translations are illustrated in the mapping documents for both projects.

The drafting team has established the applicability of PRC-010-1 to its proposed new NERC Glossary term "Undervoltage Load Shedding Program (UVLS Program)." This term explicitly excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) with respect to reliability requirement-related needs. As such, centrally controlled undervoltage-based load shedding should be subject to SPS or RAS-related standards. This clarification is being facilitated by way of a conforming revision to the definition of the term "Remedial Action Scheme" by concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems). This project is also subsequently revising the SPS or RAS-related Reliability Standards.

In addition, the requirements for PRC-010-1 apply to UVLS Program development and assessment and not to equipment. As PRC-022-1 addresses UVLS equipment Misoperations, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Program equipment. A change to make PRC-004 explicitly applicable to UVLS Program equipment will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall periodically (at least every five years or as required by changes in system conditions) conduct and document an assessment of the effectiveness of the UVLS program. This assessment shall be conducted with the associated Transmission Planner(s) and Planning Authority(ies). **R1.1.** This assessment shall include, but is not limited to: **R1.1.1.** Coordination of the UVLS programs with other protection and control systems in the Region and with other Regional Reliability Organizations, as appropriate. **R1.1.2.** Simulations that demonstrate that the UVLS programs performance is consistent with Reliability Standards TPL-001-0, TPL-002-0, TPL-003-0 and TPL-004-0. **R1.1.3.** A review of the voltage set points and timing.	**PRC-010-0 R1 maps to PRC-010-1 R3**. Applicability changed to Planning Coordinator or Transmission Planner since the Planning Coordinator or Transmission Planner is responsible for the program design. **PRC-010-0 R1.1.1 maps to PRC-010-1 R3, part 3.2**. **PRC-010-0 R1.1.2 and R1.1.3 are inherently embedded in PRC-010-1 R3** (comprehensive assessment). The specific items listed in R1.1.2 and R1.1.3 are described in PRC-010-1's Guidelines and Technical Basis.	**R3.** Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. The assessment shall include, but is not limited to, studies and analyses that evaluate whether: **3.1.** The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed. **3.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall provide documentation of its current UVLS program assessment to its Regional Reliability Organization and NERC on request (30 calendar days).	FERC-approved retirement of Requirement R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Regional Reliability Organization shall establish, maintain and annually update a database for UVLS programs implemented by entities within the region to mitigate the risk of voltage collapse or voltage instability in the BES. This database shall include the following items: **R1.1.** Owner and operator of the UVLS program. **R1.2.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.3.** Corresponding voltage set points and overall scheme clearing times. **R1.4.** Time delay from initiation to trip signal. **R1.5.** Breaker operating times. **R1.6.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	**PRC-020-1 R1 maps to PRC-010-1 R6.** Applicability changed from the Regional Reliability Organization to the Planning Coordinator since the Planning Coordinator is responsible for maintaining information about programs in its area (and requirements can no longer be applicable to Regional Reliability Organizations). **PRC-020-1 R1.1– R1.6 are inherently embedded in PRC-010-1 R6**. The specific items listed in R1.1–R1.6 are described in PRC-010-1's Guidelines and Technical Basis.	**R6.** Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year.

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Regional Reliability Organization shall provide the information in its UVLS database to the Planning Authority, the Transmission Planner, or other Regional Reliability Organizations and to NERC within 30 calendar days of a request.	**PRC-020-1 R2 maps to PRC-010-1 R8**. Applicability changed from the Regional Reliability Organization to the Planning Coordinator since the Planning Coordinator is responsible for maintaining information about programs in its area (and requirements are no longer applicable to Regional Reliability Organizations). Eliminated specificity to the Regional Reliability Organization as a receiving entity by replacing it with "other functional entities with a reliability need." Eliminated NERC as a receiving entity since the ERO Rules of Procedures, Section 401:3. Data Access, provide the ability for NERC to obtain this information.	**R8.** Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Owner and Distribution Provider that owns a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall annually update its UVLS data to support the Regional UVLS program database. The following data shall be provided to the Regional Reliability Organization for each installed UVLS system: **R1.1.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.2.** Corresponding voltage set points and overall scheme clearing times. **R1.3.** Time delay from initiation to trip signal. **R1.4.** Breaker operating times. **R1.5.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	**PRC-021-1 R1 maps to PRC-010-1 R7**. Replaced the Regional Reliability Organization with the Planning Coordinator as the receiving entity since the Planning Coordinator is assigned responsibility for maintaining the database. **PRC-021-1 R1.1–R1.5 are inherently embedded in PRC-010-1 R7**. The specific items listed in R1.1–R1.5 are described in PRC-010-1's Guidelines and Technical Basis.	**R7.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Owner and Distribution Provider that owns a UVLS program shall provide its UVLS program data to the Regional Reliability Organization within 30 calendar days of a request.	**PRC-021-1 R2 maps to PRC-010-1 R7**. Replaced the Regional Reliability Organization with the Planning Coordinator as the receiving entity since the Planning Coordinator is assigned responsibility for maintaining the database.	**R7.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall analyze and document all UVLS operations and Misoperations. The analysis shall include: **R1.1.** A description of the event including initiating conditions. **R1.2.** A review of UVLS set points and tripping times. **R1.3.** A simulation of the event, if deemed appropriate by the Regional Reliability Organization. For most events, analysis of sequence of events may be sufficient and dynamic simulations may not be needed. **R1.4.** A summary of the findings. **R1.5.** For any Misoperation, a Corrective Action Plan to avoid future Misoperations of a similar nature.	**PRC-022-1 R1 maps to PRC-010-1 R4 and R5.** Applicability changed to Planning Coordinator or Transmission Planner since the Planning Coordinator or Transmission Planner is responsible for the program design. **PRC-022-1 R1.1 and R1.4 are part of the measure for PRC-010-1 R4.** **PRC-022-1 R1.2 and R1.3 are inherently embedded in PRC-010-1 R4**. The specific items listed in R1.2 and R1.3 are described in PRC-010-1's Guidelines and Technical Basis. **PRC-022-1 R1.5 is included as part of PRC-010-1 R5.** Also see last paragraph of the second page of this mapping document.	**R4**. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. **R5.** Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of completing the assessment.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall provide documentation of its analysis of UVLS program performance to its Regional Reliability Organization within 90 calendar days of a request.	FERC-approved retirement of Requirement R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator shall establish plans for automatic load shedding for undervoltage conditions if the Transmission Operator or its associated Transmission Planner(s) or Planning Coordinator(s) determine that an under-voltage load shedding scheme is required.	**EOP-003-2 R2 maps to PRC-010-1 R1**. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R4. A Transmission Operator shall consider one or more of these factors in designing an automatic under voltage load shedding scheme: voltage level, rate of voltage decay, or power flow levels.	**EOP-003-2 R4 is inherently embedded in PRC-010-1 R1, part 1.1.** The specific items noted are described in PRC-010-1's Guidelines and Technical Basis. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R7. The Transmission Operator shall coordinate automatic undervoltage load shedding throughout their areas with tripping of shunt capacitors, and other automatic actions that will occur under abnormal voltage, or power flow conditions.	**EOP-003-2 R7 is inherently embedded in PRC-010-1 R1, part 1.2**. The specific items noted are described in PRC-010-1's Guidelines and Technical Basis. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Project 2008-02 Undervoltage Load Shedding (PRC-010-1)

VRF and VSL Justifications

This document provides the Undervoltage Load Shedding Standard Drafting Team's (drafting team's) justification for assignment of violation risk factors (VRFs) and violation severity levels (VSLs) for each requirement in PRC-010-1 – Undervoltage Load Shedding.

Each primary requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violations of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

The drafting team applied the following NERC criteria and FERC Guidelines when proposing VRFs and VSLs for the requirements under this project:

NERC Criteria - Violation Risk Factors

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, place the Bulk Electric System at an unacceptable risk of instability, separation, or Cascading failures, or hinder restoration to a normal condition.

Medium Risk Requirement

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 is administrative in nature and 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; or, a requirement that is administrative in nature and 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.

FERC Violation Risk Factor Guidelines

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report

The Commission seeks to ensure that Violation Risk Factors assigned to requirements of reliability standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard

The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards

The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level

Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation

Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such requirements must not be watered down to reflect the lower risk level associated with the less important objective of the reliability standard.

The following discussion addresses how the drafting team considered FERC's VRF Guidelines 2 through 5. The team did not address Guideline 1 directly because of an apparent conflict between Guidelines 1 and 4. Whereas Guideline 1 identifies a list of topics that encompass nearly all topics within NERC's Reliability Standards and implies that these requirements should be assigned a "High" VRF, Guideline 4 directs assignment of VRFs based on the impact of a specific requirement to the reliability of the system. The drafting team believes that Guideline 4 is reflective of the intent of VRFs in the first instance and, therefore, concentrated its approach on the reliability impact of the requirements.

PRC-010-1 – Undervoltage Load Shedding is a standard revision with the stated purpose: *To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs.* FERC Order No. 693 requested that PRC-010-0 be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency loading shedding (UFLS) and undervoltage load shedding (UVLS) programs. PRC-010-1 addresses this directive in addition to consolidating and revising PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program with three (3) other existing UVLS standards: PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

PRC-010-1 has eight (8) requirements that incorporate and enhance the intent of the requirements of PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The revised standard requires that entities developing an Undervoltage Load Shedding Program (UVLS Program) evaluate the program's effectiveness prior to providing the program specifications and schedule to applicable entities. Applicable entities are then required to adhere to the UVLS Program specifications and implementation schedule, including those specifications and schedules associated with Corrective Action Plans (CAPs) for existing programs. The standard also requires an assessment of a UVLS Program at least once every 60 months, and an assessment to evaluate program performance within 12 months of an applicable event. If program deficiencies are identified as a result of either of these assessments, entities are required to develop and provide a CAP to applicable entities within three (3) months. In addition, there are requirements to update, provide data for, and share a UVLS Program database containing information necessary to model the program for use in event analyses and assessments.

The requirements of PRC-010-1 do not map, one-to-one, with the requirements of the legacy standards. The new requirements comingle various reliability attributes of the legacy standards with new reliability objectives, thus a requirement-to-requirement comparison of VRFs is not always possible. In developing the new VRFs for the requirements of PRC-010-1, the drafting team carefully considered the NERC criteria for developing VRFs, as well as the FERC VRF guidelines. The VRFs of FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding influenced the drafting team's VRF decisions (citing FERC VRF Guideline 3), as the drafting team used PRC-006-1 as a model with respect to PRC-010-1's language and construct.

NERC Criteria - Violation Severity Levels

VSLs define the degree to which compliance with a requirement was not achieved. Each requirement must have at least one VSL. While it is preferable to have four VSLs for each requirement, some requirements do not have multiple "degrees" of noncompliant performance, and may have only one, two, or three VSLs.

VSLs should be based on the guidelines shown in the table below:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance. The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC Order on Violation Severity Levels

In its June 19, 2008 Order on Violation Severity Levels, FERC indicated it would use the following four guidelines for determining whether to approve VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior Levels of Non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when Levels of Non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

Guideline 2a: A violation of a "binary" type requirement must be a "Severe" VSL.

Guideline 2b: Do not use ambiguous terms such as "minor" and "significant" to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

. . . unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties on a per violation per day basis is the "default" for penalty calculations.

VRF and VSL Justifications – PRC-010-1 Requirement R1	
Proposed VRF	High
NERC VRF Discussion	PRC-010-1 Requirement R1 meets the NERC criterion for a High VRF. Failure to evaluate a UVLS Program to show that it resolves the undervoltage issue it was designed for, and that it is coordinated with generator voltage ride-through capabilities and other protection and control systems, could lead to implementation of an ineffective or counterproductive program. In addition, failure to subsequently provide the UVLS Program specifications and implementation schedule to applicable entities would negate proper program implementation. Both these implications could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System (BES) instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R1 has parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R1 is similar to EOP-003-2, Requirements R3, R4, and R7, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R1 meets the NERC criterion for a High VRF. Failure to evaluate a UVLS Program to show that it resolves the undervoltage issue it was designed for, and that it is coordinated with generator voltage ride-through capabilities and other protection and control systems, could lead to implementation of an ineffective or counterproductive program. In addition, failure to subsequently provide the UVLS Program specifications and implementation schedule to applicable entities would negate proper program implementation. Both these implications could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligations in PRC-010-1 Requirement R1, which are to evaluate the effectiveness of a UVLS Program according to the criteria specified in the two parts and subsequently provide the program specifications and implementation schedule to applicable entities, are all equally critical elements that failure to meet could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or

VRF and VSL Justifications – PRC-010-1 Requirement R1	
	Cascading failures. Therefore, the assigned VRF of High is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in parts 1.1 and 1.2.
NERC VSL Guidelines Discussion	The proposed VSL for PRC-010-1 Requirement R1 meets NERC's VSL Guidelines in that there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two parts.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** The basis for the current level of compliance in relation to PRC-010-1 Requirement R1 is EOP-003-2 Requirements R3, R4, and R7, as these requirements are being retired because they map to PRC-010-1 Requirement R1. Since the VSL for PRC-010-1 Requirement R1 is binary, the current level of compliance is met or exceeded when compared to the VSLs for EOP-003-2 Requirements R3, R4, and R7.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** The proposed VSL for PRC-010-1 Requirement R1 is binary and is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL for PRC-010-1 Requirement R1 uses the term "effectiveness" from the associated requirement, which could be considered ambiguous terminology; however, Requirement R1 does qualify the term "effectiveness" by indicating that the applicable entity must include what is listed in the requirement's parts in its evaluation of effectiveness. The VSL subsequently notes that the items specified in the parts must be included. This thereby supports uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1 Requirement R1	
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSL for PRC-010-1 Requirement R1 uses similar terminology to that used in the requirement and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSL for PRC-010-1 Requirement R1 is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R2	
Proposed VRF	High
NERC VRF Discussion	PRC-010-1 Requirement R2 meets the NERC criterion for a High VRF. Failure to implement a UVLS Program by adhering to the program specifications and implementation schedule increases the risk that the program will not perform properly. Under anticipated Emergency, abnormal, or restorative conditions, this could directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R2 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R2 is similar to PRC-006-1 Requirement R9 and EOP-003-2 Requirement R5, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R2 meets the NERC criterion for a High VRF. Failure to implement a UVLS Program by adhering to the program specifications and implementation schedule increases the risk that the program will not perform properly. Under anticipated Emergency, abnormal, or restorative conditions, this could directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligations required in PRC-010-1 Requirement R2 are to adhere to the UVLS Program specifications and implementation schedule associated with program development (per Requirement R1) and corrective action (per Requirement R5). The requirement to develop a CAP in Requirement R5 is assigned a Medium VRF; therefore, execution of the corrective actions required by Requirement R2 has a commensurate VRF of Medium. However, since the obligations related to the development of a UVLS Program in Requirement R1 are assigned a High VRF, the failure to implement the program per Requirement R2 could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures. Therefore, Requirement R2 is assigned a High VRF to reflect the higher risk level associated with the more critical objective.
Proposed Lower VSL	N/A

VRF and VSL Justifications – PRC-010-1 Requirement R2	
Proposed Moderate VSL	N/A
Proposed High VSL	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.
Proposed Severe VSL	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R2 meets NERC's VSL Guidelines in that the VSLs cover aspects of the requirement that are equal in importance.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R2 is a new requirement; therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R2 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R2 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R2 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R3	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R3 meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of a UVLS Program at least once every 60 calendar months could lead to failure to identify and address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly and adversely affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to do a periodic comprehensive assessment of the program, which supplements the annual Transmission Planning (TPL) assessment required by NERC Reliability Standards, would have implications on the BES. Therefore, a violation of Requirement R3 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R3 has parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R3 is consistent with the current requirement it is replacing (PRC-010-0 Requirement R1), which has an approved VRF of Medium. Similar performance exists in PRC-006-1 Requirement R4, which has an approved VRF of High. This discrepancy is justified due to the differing nature of the programs these standards are addressing, as PRC-006-1 addresses mandatory UFLS programs and PRC-010-1 covers optional UVLS Programs. A UFLS program inherently has a more likely overall impact on the BES.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R3 meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of a UVLS Program at least once every 60 calendar months could lead to failure to identify and address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly and

VRF and VSL Justifications – PRC-010-1 Requirement R3	
	adversely affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to do a periodic comprehensive assessment of the program, which supplements the annual TPL assessment required by NERC Reliability Standards, would have implications on the BES. Therefore, a violation of Requirement R3 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligation required in PRC-010-1 Requirement R3 is to periodically evaluate the effectiveness of a UVLS Program according to the criteria specified in the two parts; the parts are equally critical elements that failure to meet could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures. However, violation of these commensurate elements is unlikely to lead to BES instability, separation, or Cascading failures. Therefore, the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in parts 3.1 and 3.2.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R3 meets NERC's VSL Guidelines in that there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two parts.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** The proposed VSL for PRC-010-1 Requirement R3 is consistent in nature with the VSL for the requirement it is replacing (PRC-010-0 Requirement R1) and therefore does not lower the current level of compliance.

VRF and VSL Justifications – PRC-010-1 Requirement R3	
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** The proposed VSL for PRC-010-1 Requirement R3 for this binary requirement is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL for PRC-010-1 Requirement R3 does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSL for PRC-010-1 Requirement R3 uses similar terminology to that used in the requirement and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSL for PRC-010-1 Requirement R3 is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R4	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R4 meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event in a timely manner could lead to failure to identify and address a necessary program modification. This could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event would have implications on the BES, as these are infrequent and would be done in addition to the annual TPL assessment required by NERC Reliability Standards. Therefore, a violation of Requirement R4 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R4 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R4 is similar to PRC-022-1 Requirement 1 and PRC-006-1 Requirement R11, which have approved VRFs of Medium.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R4 meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event in a timely manner could lead to failure to identify and address a necessary program modification. This could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or

VRF and VSL Justifications – PRC-010-1 Requirement R4	
	counterproductive program if the criteria is not met, it is less likely that failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event would have implications on the BES, as these are infrequent and would be done in addition to the annual TPL assessment required by NERC Reliability Standards. Therefore, a violation of Requirement R4 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R4 does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.
Proposed Moderate VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.
Proposed High VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.
Proposed Severe VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R4 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R4 is different in construct from the requirement it is replacing (PRC-022-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.

VRF and VSL Justifications – PRC-010-1 Requirement R4	
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R4 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R4 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R4 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R5 meets NERC's criterion for a Medium VRF. Failure to develop and subsequently provide a CAP to address the deficiencies identified as a result of a UVLS Program assessment in a timely manner could lead to failure to address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, since the development of a CAP in Requirement R5 is dependent on the outcomes of Requirement R3 or R4, the likelihood of implications on the BES is commensurate with those of Requirements R3 and R4, which are assigned Medium VRFs. Therefore, a violation of Requirement R5 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R5 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R5 is similar to PRC-022-1 Requirement R1.5, which has an approved VRF of Medium.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R5 meets NERC's criterion for a Medium VRF. Failure to develop and subsequently provide a CAP to address the deficiencies identified as a result of a UVLS Program assessment in a timely manner could lead to failure to address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, since the development of a CAP in Requirement R5 is dependent on the outcomes of Requirement R3 or R4, the likelihood of implications on the BES is commensurate with those of Requirements R3 and R4, which are assigned Medium VRFs. Therefore, a violation of Requirement R5 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R5 does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.
Proposed High VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R5 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R5 is different in construct from the requirement it is replacing (PRC-022-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R5 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R5 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R5 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R6	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R6 meets NERC's criterion for a Lower VRF. Though having a current UVLS Program database is necessary to properly inform accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to annually update a UVLS Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** The requirement has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R6 similar to PRC-006-1 Requirement R6, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R6 meets NERC's criterion for a Lower VRF. Though having a current UVLS Program database is necessary to properly inform accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to annually update a UVLS Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R6 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.
Proposed Moderate VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.
Proposed High VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90

VRF and VSL Justifications – PRC-010-1 Requirement R6	
	calendar days.
Proposed Severe VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R6 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R6 is replacing PRC-020-1 Requirement R1, which is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R6 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R6 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R6 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R7	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R7 meets NERC's criterion for a Lower VRF. Though providing current and formatted data is necessary to properly support a UVLS Program database, which subsequently informs accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to provide the data according to the format and schedule specified would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R7 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3 Consistency among Reliability Standards:** PRC-010-1 Requirement R7 is similar to PRC-006-1 Requirement R8, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R7 meets NERC's criterion for a Lower VRF. Though providing current and formatted data is necessary to properly support a UVLS Program database, which subsequently informs accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to provide the data according to the format and schedule specified would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R7 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR

VRF and VSL Justifications – PRC-010-1 Requirement R7	
	The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.
Proposed Moderate VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.
Proposed High VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.
Proposed Severe VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R7 meets NERC's VSL Guidelines in that the VSLs cover aspects of the requirement that are not equal in importance; there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R7 is different in construct from the requirement it is replacing (PRC-021-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R7 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R7 use similar terminology to that used in the requirement and are therefore consistent with the requirement.

VRF and VSL Justifications – PRC-010-1 Requirement R7	
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R7 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R8	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R8 meets NERC's criterion for a Lower VRF. Though sharing a UVLS Program database with applicable entities in a timely manner supports an integrated and coordinated approach to UVLS programs, this is a planning requirement that is administrative in nature; failure to share the database within 30 calendar days of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** The requirement has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R8 is similar to PRC-006-1 Requirement R7, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R8 meets NERC's criterion for a Lower VRF. Though sharing a UVLS Program database with applicable entities in a timely manner supports an integrated and coordinated approach to UVLS programs, this is a planning requirement that is administrative in nature; failure to share the database within 30 calendar days of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R8 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.

VRF and VSL Justifications – PRC-010-1 Requirement R8	
Proposed High VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R8 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R8 is replacing PRC-020-1 Requirement R2, which is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R8 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R8 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R8 are based on a single violation and not cumulative violations.

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Project 2008-02 Undervoltage Load Shedding

Coordination Plan | June 24, 2014

Background

Project 2008-02 Undervoltage Load Shedding ("UVLS Project") proposes to consolidate and retire PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 to create PRC-010-1 – Undervoltage Load Shedding. During development, the drafting team identified the following necessary corresponding changes to meet the design of PRC-010-1:

1) Retire three requirements in EOP-003-2 – Load Shedding Plans whose required performance is reflected in proposed PRC-010-1.

2) Modify the current NERC Glossary definition of the term Special Protection System (SPS), which excludes UVLS, to include a subset of UVLS programs that are more appropriately categorized as SPSs and covered by SPS-related standards.

3) Modify PRC-004-3 – Protection System Misoperation Identification and Correction, which excludes UVLS, to include certain types of UVLS programs as part of its applicable facilities.

In order to make the necessary changes, the UVLS Project needs to coordinate with ongoing development work in three active NERC standard development projects as follows:

- Project 2009-03 – Emergency Operations ("EOP Project")
- Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) ("SPS Project")
- Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems) ("Misoperations Project")

Current Coordination Plan

NERC has identified a preferred project plan to coordinate the above-mentioned projects to properly align legacy standard retirements and revised standard and definition implementations due to the differences in each project's timing.

1) The EOP and UVLS Projects will progress simultaneously and coordinate necessary changes. Comment periods and ballots for each project will either run concurrently or overlap.

2) The SPS Project is proposing to revise the definition of SPS in advance of revising the SPS standards. The UVLS Project will progress simultaneously with the SPS definition revision in order to properly transfer certain aspects of the legacy UVLS standards into coverage under the SPS standards. Comment periods and ballots for each project will either run concurrently or overlap.

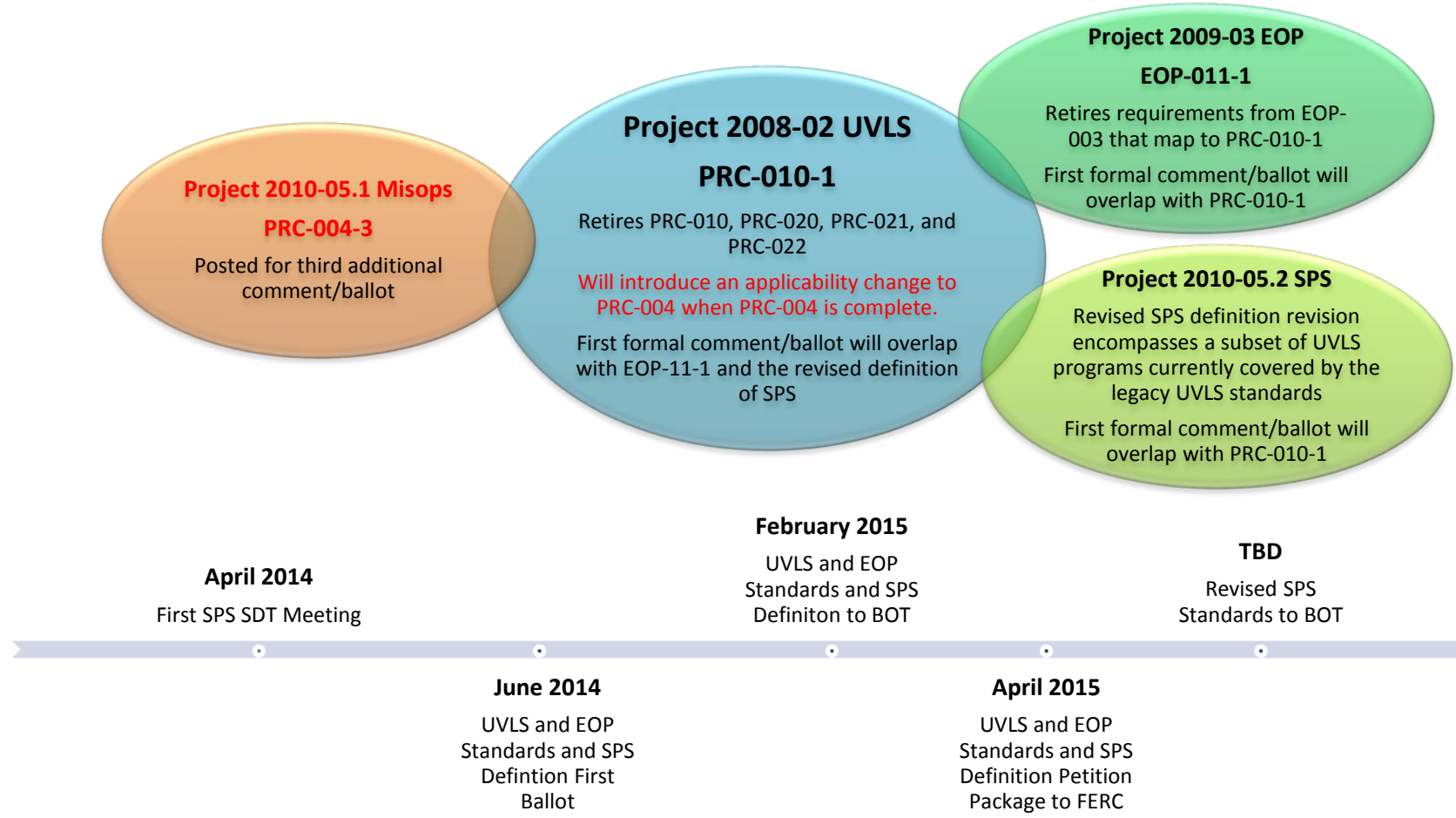
3) The UVLS Project will address the conforming changes needed to PRC-004 after PRC-004-3 is complete. How and when this will occur depends on when PRC-004-3 obtains approval from the ballot body and is adopted by the NERC Board of Trustees.

An illustrative diagram of this coordination appears on the next page. This plan is subject to change as necessary.

General Considerations

The revised definition of SPS, the UVLS Project, and the EOP Project should be presented simultaneously to industry, the NERC Board of Trustees, and applicable regulatory authorities. The associated effective dates and retirements for these projects need to align to accommodate the needed transitions of standard coverage.

The implementation plan for the revised SPS definition will need to address entities that will have newly identified SPSs resulting from the application of the defined term with respect to the inclusion of the subset of UVLS programs that are proposed as more appropriately categorized as SPSs and covered by SPS-related standards.


Project 2010-05.1 Misops
PRC-004-3
Posted for third additional comment/ballot
Project 2008-02 UVLS
PRC-010-1
Retires PRC-010, PRC-020, PRC-021, and PRC-022
Will introduce an applicability change to PRC-004 when PRC-004 is complete.
First formal comment/ballot will overlap with EOP-11-1 and the revised definition of SPS
Project 2009-03 EOP
EOP-011-1
Retires requirements from EOP-003 that map to PRC-010-1
First formal comment/ballot will overlap with PRC-010-1
Project 2010-05.2 SPS
Revised SPS definition revision encompasses a subset of UVLS programs currently covered by the legacy UVLS standards
First formal comment/ballot will overlap with PRC-010-1
April 2014
First SPS SDT Meeting
June 2014
UVLS and EOP Standards and SPS Defintion First Ballot
February 2015
UVLS and EOP Standards and SPS Definiton to BOT
April 2015
UVLS and EOP Standards and SPS Definition Petition Package to FERC
TBD
Revised SPS Standards to BOT

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PRC-010-1 Frequently Asked Questions

Project 2008-02 Undervoltage Load Shedding

June 24, 2014

RELIABILITY | ACCOUNTABILITY




3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

Table of Contents

Introduction

Over the course of the development of PRC-010-1, the Project 2008-02 Undervoltage Load Shedding (UVLS) Standard Drafting Team (drafting team) conducted two informal comment periods and multiple outreach sessions with industry. In addition to providing individual responses to the second informal comment period that was conducted in March 2014, the drafting team has also developed this Frequently Asked Questions (FAQ) document to succinctly address common comment themes with respect to drafting team approach and intent.

All comments submitted during the two informal comment periods and the responses provided for the March 17–April 16, 2014 informal comment period may be reviewed on the project page.

If you have any further concerns you would like to discuss with the drafting team, you can contact the Standards Developer, Erika Chanzes, at 404-446-2583 or at erika.chanzes@nerc.net.

Frequently Asked Questions

To succinctly address common comment themes that require drafting team response on Project 2008-02 UVLS (proposed PRC-010-1), the drafting team provides the following discussion in the construct of an FAQ format.

Purpose of Standard Revision

1) What is the basis for a revision of the existing UVLS standards?

The initial input into a revision of the existing UVLS standards is FERC Order No. 693, Paragraph 1509, which directed the ERO to develop a modification of PRC-010-0 that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs." In addition, *The Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* ("August 14 Blackout Report") showed that proper coordination would have mitigated effects if UVLS was used as a tool.

Additional inputs included 1) recommendations from the NERC System Protection and Control Subcommittee (SPCS) in its December 2010 *Technical Review of UVLS-Related Standards* to combine the four existing UVLS standards, revise the applicability to entities responsible for UVLS program design, implementation, and coordination, specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, and differentiate post-event validation of UVLS program design from verifying correct operation of UVLS equipment; 2) the existing UVLS standards were not in the current results-based format; 3) the preceding revision of the underfrequency load shedding (UFLS) standards had similar types of requirements and had been completed under the construct of a consolidation; and 4) the Independent Expert Review Panel recommendations, which included an evaluation of the existing standards' applicability and level of specificity.

The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability. As part of the revision to address this, the drafting team also agreed that an evaluation and consolidation of the existing UVLS standards was necessary to meet current Reliability Standard development initiatives and to provide clear, comprehensive requirements to address the application and coordination of UVLS.

2) UVLS programs are not mandatory—is compliance for an optional tool necessary?

The drafting team asserts that a key takeaway from the August 14 Blackout Report is that coordination of UVLS with other protection systems could have mitigated the effects if UVLS was used as a tool. Although the use of UVLS is not mandatory, if it is determined that this system preservation measure is necessary to support reliability and a UVLS program is installed, the program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term "UVLS Program," which limits the standard's applicability to only those undervoltage-based load shedding programs whose performance has an impact on system reliability.

Coordination with Project 2009-03 Emergency Operations

3) EOP-003-2 has potential redundant requirements with proposed PRC-010-1—how is this being addressed?

As part of its five-year review, Project 2009-03 Emergency Operations (EOP) identified EOP-003-2, Requirements R2, R4, and R7 as being more properly covered by Project 2008-02 UVLS. Now that both projects are in formal development, they are strategically coordinating to move in lockstep from a timing perspective to address these requirements. Project 2009-03 EOP, which is proposing to revise and consolidate EOP-001-2.1b, EOP-002-3, and EOP-003-2 to create EOP-011-1, will retire the noted EOP-003-2 requirements (among other revisions), and the Project 2008-02 UVLS Mapping Document will show how PRC-010-1 encompasses the retired content accordingly. Slated to have aligning effective dates, both EOP-011-1 and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition. Please see the posted Project 2008-02 UVLS Project Coordination Plan for more information.

"UVLS Program" Definition

4) Why is the introduction of the new NERC Glossary term "UVLS Program" necessary?

The drafting team found it necessary to introduce the term "UVLS Program" because different types of UVLS systems need to be treated appropriately with respect to reliability requirements. Therefore, the term establishes which UVLS systems PRC-010-1 will apply to: "automatic load shedding programs consisting of distributed relays and controls used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES)."

The definition is meant to inherently exclude locally-applied relays that are designed to protect a contained area or, in other words, are not designed to mitigate wide-area voltage collapse. This exclusion is not explicit in these terms in the definition's enforceable language since the meaning and measurement of "local" or "wide-area" varies greatly on a continent-wide basis and could potentially be interpreted differently by auditors and the applicable functional entities. Therefore, the definition as written is meant to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to its impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). To further support the intended exclusion, further discussion and an example are provided on page 18 of the standard document in the Guidelines and Technical Basis section.

The definition does explicitly note that the term excludes centrally controlled undervoltage-based load shedding. This type of load shedding is excluded because the drafting team asserts that the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) and should therefore be subject to SPS or RAS-related Reliability Standards. See page 18 of the standard document in the Guidelines and Technical Basis section for further discussion.

5) If the definition excludes certain types of UVLS, does this preclude an "integrated" approach (FERC Order No. 693, Paragraph 1509)?

The defined term "UVLS Program" clarifies which UVLS systems are subject to the requirements in PRC-010-1. The resulting exclusions from PRC-010-1 do not preclude an "integrated" approach because the standard requires that

an entity coordinate with all other protection and control systems as necessary, which may include other types of UVLS (i.e., locally-applied UVLS relays and centrally controlled undervoltage-based load shedding).

6) Where will centrally controlled undervoltage-based load shedding be covered?

As explained immediately above, the requirements of PRC-010-1 are applicable to the proposed new NERC Glossary term "UVLS Program," which excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of an SPS or RAS. However, the current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Special Protection Systems (Phase 2 of Protection Systems), which is currently revising the NERC Glossary definition of "Special Protection System" and proposing the single term "Remedial Action Scheme," will also revise the definition of this term to exclude UVLS Programs, therefore including centrally controlled undervoltage-based shedding.

Consequently, the introduction of the term "UVLS Program" and the conforming revision to the term "Remedial Action Scheme" will explicitly clarify that RAS-related standards are applicable to centrally controlled undervoltage-based load shedding. The implementation plan for the revised definition of "Remedial Action Scheme" will address entities that will have newly identified RAS resulting from the application of the defined term.

Similar to the coordination effort with Project 2009-03 EOP explained above, Project 2008-02 UVLS and Project 2010-05.2 SPS are working together in lockstep from a timing perspective to ensure that the effective dates of the revised definition of "Remedial Action Scheme," the proposed new term "UVLS Program," proposed PRC-010-1, and all associated retirements align. Both the proposed revised definition of "Remedial Action Scheme" and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition.

7) Is the term "UVLS Program" inclusive of a collection of independent UVLS relays?

No; multiple independent relays do not constitute a program. While the definition stipulates that a UVLS Program consists of distributed relays and controls, the definition specifies that it must be an automatic load shedding *program* that mitigates the specified conditions impacting the BES. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose.

Applicability

8) What is meant by the phrase "Planning Coordinator or Transmission Planner"?

PRC-010-1 is applicable to both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs. The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity. In addition, the requirements containing this phrase have specific language to qualify the responsible entity. For example, Requirement R1 states: "Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ." This language provides clarity that the applicable entity would be the one that is developing the program.

9) Why is the Transmission Operator not included?

While the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance for the Transmission Operator that was necessary to capture within PRC-010-1, since the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party.

To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is covered under current EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).

10) What about UVLS schemes owned by Transmission Owners, Distribution Providers, or Transmission Operators that are not required by the planner?

PRC-010-1 is applicable to its proposed defined term "UVLS Program." The drafting team notes that, by its defining attributes, a UVLS Program would be required and developed by a Planning Coordinator or Transmission Planner. The nature of a UVLS scheme developed or required by a Transmission Owner, Distribution Provider, or Transmission Operator would not meet the attributes of the defined term and would therefore not have the design and characteristics necessary to be subject to the requirements of PRC-010-1.

Requirements R1, R3, R4, and R5

11) What is required to evaluate the coordination referenced in Requirement R1, part 1.2?

Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. As such, the requirement is meant to provide flexibility for an entity to make the proper determinations, including the considerations for coordination, with respect to program effectiveness based on system characteristics. For further guidance on and examples of coordination considerations, please see the portion of the Guidelines and Technical Basis section that addresses Requirement R1 on pages 19–20 of the standard document.

12) Requirements R1, R3, and R4 seem to all require evaluations of program effectiveness—how are they different?

Requirements R1, R3, and R4 do all require evaluations of program effectiveness, but they are each at distinct points in time.

Requirement R1 requires evaluation of program effectiveness (by way of the qualifying parts) at the onset of program development, or during the initial planning stage, prior to implementation. Requirement R3 requires the

same objectives of an evaluation of effectiveness, but at the point of a mandatory periodic review (at least once every 60 calendar months). Requirement R4 addresses a UVLS Program's performance after an event (applicable voltage excursion) to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event.

It is noted that, because of the separate activities of each requirement, UVLS Program deficiencies found as a result of the assessments performed in Requirement R3 or R4 would not be violations of Requirement R1.

13) Requirement R4 would require the Planning Coordinator or Transmission Planner to review all voltage excursions—isn't this unduly burdensome?

While Requirement R4 essentially requires the Planning Coordinator or Transmission Planner to review all voltage excursions to see if they fall below the initializing set points of the UVLS Program, the drafting team contends that it will be clearly evident if voltage falls below the UVLS threshold because either a) UVLS devices will operate; or b) the system will experience the adverse conditions the UVLS Program was installed to mitigate.

In addition, the drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have the ability to know when voltage excursions are occurring since they are not operating entities. However, a process for the Transmission Operator, Transmission Owner, or Distribution Provider to notify the Transmission Planner or Planning Coordinator of such voltage excursion events is consistent with standard utility practice.

14) PRC-022-1 required the analysis of UVLS Misoperations. How is this addressed in PRC-010-1?

One of the recommendations in the SPCS report was to clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities addressed in PRC-010-1) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

Relative to a UVLS Program, PRC-010-1 Requirements R4 and R5 require event analysis and a Corrective Action Plan to address any identified program deficiencies. The UVLS drafting team maintains that verifying correct operation of UVLS equipment should be addressed in PRC-004 and is coordinating an applicability change to this standard with respect to the development timeline of Project 2010-05.1 Misoperations (Phase 1 of Protection Systems), which is in the later stages of development of PRC-004-3. Please see the posted PRC-010-1 Mapping Document and Project 2008-02 UVLS Project Coordination Plan for further information.

Requirements R6, R7, and R8

15) Do Requirements R6, R7, and R8 overlap with the requirements of MOD-032-1?

While both MOD-032-1 and Requirements R6, R7, and R8 of PRC-010-1 address data requirements, MOD-032-1 establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas the PRC-010-1 requirements address the need to maintain and share data and databases for the purposes of studies for use in event analyses for UVLS Programs specifically. While Reliability Standards in general may have overlap in this manner, the activities in these requirements remain distinctly different.

16) Requirements R6, R7, and R8 appear to be administrative—doesn't this conflict with Paragraph 81 criteria?

Proper maintenance and timely sharing of UVLS Program data as required by Requirements R6, R7, and R8 is necessary to inform the Planning Coordinator or Transmission Planner's studies and analyses. While administrative tasks are required, the tasks have a core reliability-based need.

In addition, Requirements R6, R7, and R8 were written to emulate FERC-approved PRC-006-1 Automatic Underfrequency Load Shedding data requirements. While some of these analogous requirements in PRC-006-1 are listed as candidates for Phase 2 of the Paragraph 81 project, they are not yet approved as meeting the criteria; furthermore, the Independent Expert Review Panel has recommended that these Paragraph 81 candidates not be included for deletion, citing that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters".

Attachment A – Drafting Team Members

Project 2008-02 UVLS Standard Drafting Team		
	Participant	**Entity**
Chair	Greg Vassallo	Bonneville Power Administration
Member	José Conto	Electric Reliability Council of Texas, Inc.
Member	Bill Harm	PJM Interconnection, LLC
Member	Sharma Kolluri	Entergy Corporation
Member	Charles-Eric Langlois	Hydro-Quebec TransEnergie
Member	Manish Patel	Southern Company Transmission
Member	Fabio Rodriguez	Duke Energy Florida
Member	Hari Singh	Xcel Energy, Inc.
Member	Matthew H. Tackett	MISO

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Standards Announcement Reminder

Project 2008-02 Undervoltage Load Shedding
PRC-010-1

Ballot and Non-Binding Poll Now Open through August 7, 2014

Now Available

A ballot for **PRC-010-1 – Undervoltage Load Shedding** and non-binding poll of the associated Violation Risk Factors (VRFs) and Violation Severity Levels (VSLs) is open through **8 p.m. Eastern on Thursday, August 7, 2014.**

Background information for this project can be found on the project page.

Instructions for Balloting

Members of the ballot pools associated with this project may log in and submit their vote for the standard and associated VRFs and VSLs by clicking here.

Next Steps

The ballot results will be announced and posted on the project page. The drafting team will consider all comments received during the formal comment period and, if needed, make revisions to the standard and post it for an additional ballot. If the comments do not show the need for significant revisions, the standard will proceed to a final ballot**.**

For information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, or at 404-446-2560.

North American Electric Reliability Corporation
3353 Peachtree Rd, NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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Standards Announcement

Project 2008-02 Undervoltage Load Shedding
PRC-010-1

Formal Comment Period Now Open through August 7, 2014
Ballot Pools Forming Now through July 23, 2014

Now Available

A 45-day formal comment period for **PRC-010-1 – Undervoltage Load Shedding** is open through **8 p.m. Eastern on Thursday, August 7, 2014.**

When reviewing PRC-010-1, stakeholders should also review the proposed revised definition of **Special Protection System/Remedial Action Scheme Definition** by Project 2010-05.2 Special Protection Systems (Phase 2 of Protection Systems), as both projects are working together to clarify that a subset of UVLS systems, i.e., centrally controlled undervoltage-based load shedding, is more appropriately categorized as a Remedial Action Scheme (RAS) and covered by the RAS-related standards. A 45-day comment period for the proposed definition is open through 8 p.m. Eastern on Friday, July 25, 2014.

Project 2009-03 Emergency Operations will also soon be posting a proposed **EOP-011-1** (intended to consolidate and replace EOP-001-2.1b, EOP-002-3.1, and EOP-003-2) for a 45-day comment period with a ballot conducted during the last 10 days. Stakeholders may wish to review both projects with respect to the transition of certain requirements from EOP-003-2 to PRC-010-1.

If you have questions please contact Erika Chanzes via email or by telephone at (404) 446-2583.

Background information for this project can be found on the project page.

Instructions for Commenting

Please use the electronic form to submit comments on the standard. If you experience any difficulties in using the electronic form, please contact Wendy Muller. An off-line, unofficial copy of the comment form is posted on the project page.

Instructions for Joining Ballot Pools

Ballot pools are currently being formed. Registered Ballot Body members must join the ballot pools to be eligible to cast ballots. Registered Ballot Body members may join the ballot pools at the following page: Join Ballot Pool

During the pre-ballot window, members of the ballot pool may communicate with one another by using their "ballot pool list server." (Once the balloting begins, ballot pool members are prohibited from using the ballot pool list servers.) The list servers for this project are:

Ballot: bp-2008-02_PRC-010-1_in@nerc.com
Non-Binding Poll: bp-2008-02_PRC-010-1_NB_in@nerc.com

Next Steps

A ballot for the standard and non-binding poll of the associated Violation Risk Factors and Violation Severity Levels will be conducted **July 29 – August 7, 2014.**

For information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, or at 404-446-2560.

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Standards Announcement

Project 2008-02 Undervoltage Load Shedding
PRC-010-1

Formal Comment Period Now Open through August 7, 2014
Ballot Pools Forming Now through July 23, 2014

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Non-Binding Poll: bp-2008-02_PRC-010-1_NB_in@nerc.com

Next Steps

A ballot for the standard and non-binding poll of the associated Violation Risk Factors and Violation Severity Levels will be conducted **July 29 – August 7, 2014.**

For information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, or at 404-446-2560.

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Standards Announcement

Project 2008-02 Undervoltage Load Shedding PRC-010-1

Initial Ballot and Non-Binding Poll Results

Now Available

An initial ballot for **PRC-010-1 – Undervoltage Load Shedding** and non-binding poll of the associated Violation Risk Factors and Violation Severity Levels concluded at **8 p.m. Eastern on Friday, August 8, 2014**.

The standard achieved a quorum and sufficient affirmative votes for approval. Voting statistics are listed below, and the Ballot Results page provides a link to the detailed results for the ballot.

Ballot	Non-Binding Poll
Quorum /Approval	Quorum/Supportive Opinions
76.37% / 76.91%	75.38% / 79.17%

Background information for this project can be found on the project page.

Next Steps

The drafting team will consider all comments received during the formal comment period and, if needed, make revisions to the standard and post it for an additional ballot. If the comments do not show the need for significant revisions, the standard will proceed to a final ballot.

For more information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, or at 404-446-2560.

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Ballot Results	
Ballot Name:	Project 2008-02 UVLS PRC-010-1
Ballot Period:	7/29/2014 - 8/8/2014
Ballot Type:	Initial
Total # Votes:	278
Total Ballot Pool:	364
Quorum:	**76.37 % The Quorum has been reached**
Weighted Segment Vote:	76.91 %
Ballot Results:	**The ballot has closed**

Summary of Ballot Results

Segment	Ballot Pool	Segment Weight	Affirmative # Votes	Affirmative Fraction	Negative # Votes	Negative Fraction	Negative Vote without a Comment	Abstain	No Vote
1 - Segment 1	101	1	36	0.735	13	0.265	0	24	28
2 - Segment 2	8	0.7	2	0.2	5	0.5	0	0	1
3 - Segment 3	81	1	36	0.8	9	0.2	0	21	15
4 - Segment 4	27	1	15	0.882	2	0.118	0	4	6
5 - Segment 5	77	1	30	0.769	9	0.231	0	18	20
6 - Segment 6	55	1	27	0.844	5	0.156	0	10	13
7 - Segment 7	1	0	0	0	0	0	0	0	1
8 - Segment 8	4	0.2	1	0.1	1	0.1	0	0	2
9 - Segment 9	2	0.2	2	0.2	0	0	0	0	0

10 - Segment 10	8	0.7	7	0.7	0	0	0	1	0
Totals	**364**	**6.8**	**156**	**5.23**	**44**	**1.57**	**0**	**78**	**86**

Individual Ballot Pool Results

Segment	Organization	Member	Ballot	NERC Notes
1	Ameren Services	Eric Scott	Negative	SUPPORTS THIRD PARTY COMMENTS - (Ameren)
1	American Electric Power	Paul B Johnson	Affirmative	
1	American Transmission Company, LLC	Andrew Z Pusztai	Negative	COMMENT RECEIVED
1	Arizona Public Service Co.	Brian Cole		
1	Associated Electric Cooperative, Inc.	John Bussman	Abstain	
1	Austin Energy	James Armke	Affirmative	
1	Avista Utilities	Heather Rosentrater		
1	Balancing Authority of Northern California	Kevin Smith	Affirmative	
1	Baltimore Gas & Electric Company	Christopher J Scanlon	Affirmative	
1	Basin Electric Power Cooperative	David Rudolph		
1	BC Hydro and Power Authority	Patricia Robertson	Abstain	
1	Beaches Energy Services	Don Cuevas	Affirmative	
1	Black Hills Corp	Wes Wingen	Abstain	
1	Bonneville Power Administration	Donald S. Watkins	Affirmative	
1	Bryan Texas Utilities	John C Fontenot	Affirmative	
1	CenterPoint Energy Houston Electric, LLC	John Brockhan	Affirmative	
1	Central Iowa Power Cooperative	Kevin J Lyons	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)
1	Clark Public Utilities	Jack Stamper		
1	Cleco Corporation	John Lindsey	Abstain	
1	Colorado Springs Utilities	Shawna Speer		
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
1	CPS Energy	Glenn Pressler	Affirmative	
1	Dairyland Power Coop.	Robert W. Roddy	Affirmative	
1	Dayton Power & Light Co.	Hertzel Shamash		
1	Dominion Virginia Power	Larry Nash	Negative	SUPPORTS THIRD PARTY COMMENTS - (Dominion's)
1	Duke Energy Carolina	Doug E Hils	Negative	SUPPORTS THIRD PARTY COMMENTS - (Duke Energy)
1	Encari	Steven E Hamburg		
1	Entergy Transmission	Oliver A Burke	Affirmative	
1	FirstEnergy Corp.	William J Smith	Affirmative	
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton		
1	Florida Power & Light Co.	Mike O'Neil	Affirmative	
1	Gainesville Regional Utilities	Richard Bachmeier	Affirmative	
1	Georgia Transmission Corporation	Jason Snodgrass	Affirmative	
1	Great River Energy	Gordon Pietsch		
1	Hydro One Networks, Inc.	Muhammed Ali	Negative	COMMENT RECEIVED
1	Hydro-Quebec TransEnergie	Martin Boisvert	Affirmative	
1	Idaho Power Company	Molly Devine	Affirmative	
1	International Transmission Company Holdings Corp	Michael Moltane	Affirmative	
1	JDRJC Associates	Jim D Cyrulewski	Abstain	
1	KAMO Electric Cooperative	Walter Kenyon	Abstain	
1	Kansas City Power & Light Co.	Daniel Gibson	Affirmative	

1	Keys Energy Services	Stanley T Rzad		
1	Lakeland Electric	Larry E Watt	Affirmative	
1	Lincoln Electric System	Doug Bantam	Affirmative	
1	Long Island Power Authority	Robert Ganley		
1	Los Angeles Department of Water & Power	faranak sarbaz	Affirmative	
1	Lower Colorado River Authority	Martyn Turner	Abstain	
1	M & A Electric Power Cooperative	William Price	Abstain	
1	MEAG Power	Danny Dees	Affirmative	
1	MidAmerican Energy Co.	Terry Harbour	Affirmative	
1	Minnkota Power Coop. Inc.	Daniel L Inman	Abstain	
1	Muscatine Power & Water	Andrew J Kurriger		
1	N.W. Electric Power Cooperative, Inc.	Mark Ramsey	Abstain	
1	National Grid USA	Michael Jones	Negative	SUPPORTS THIRD PARTY COMMENTS - (National Grid supports NPCC's comments.)
1	NB Power Corporation	Alan MacNaughton	Abstain	
1	Nebraska Public Power District	Jamison Cawley	Affirmative	
1	New York Power Authority	Bruce Metruck	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC comments)
1	Northeast Missouri Electric Power Cooperative	Kevin White	Abstain	
1	Northeast Utilities	William Temple		
1	Northern Indiana Public Service Co.	Julaine Dyke	Abstain	
1	Oklahoma Gas and Electric Co.	Terri Pyle	Abstain	
1	Omaha Public Power District	Doug Peterchuck	Abstain	
1	Oncor Electric Delivery	Jen Fiegel	Affirmative	
1	Orlando Utilities Commission	Brad Chase		
1	Otter Tail Power Company	Daryl Hanson		
1	Pacific Gas and Electric Company	Bangalore Vijayraghavan		
1	Platte River Power Authority	John C. Collins	Affirmative	
1	Portland General Electric Co.	John T Walker	Abstain	
1	Potomac Electric Power Co.	David Thorne	Abstain	
1	PPL Electric Utilities Corp.	Brenda L Truhe		
1	Public Service Company of New Mexico	Laurie Williams		
1	Public Service Electric and Gas Co.	Kenneth D. Brown	Affirmative	
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel	Abstain	
1	Puget Sound Energy, Inc.	Denise M Lietz	Negative	SUPPORTS THIRD PARTY COMMENTS - (Eleanor Ewry, Puget Sound Energy)
1	Rochester Gas and Electric Corp.	John C. Allen	Abstain	
1	Sacramento Municipal Utility District	Tim Kelley	Affirmative	
1	Salt River Project	Robert Kondziolka		
1	San Diego Gas & Electric	Will Speer		
1	SaskPower	Wayne Guttormson		
1	Seattle City Light	Pawel Krupa	Affirmative	
1	Seminole Electric Cooperative, Inc.	Glenn Spurlock	Abstain	
1	Snohomish County PUD No. 1	Long T Duong	Affirmative	
1	South Carolina Electric & Gas Co.	Tom Hanzlik		
1	South Carolina Public Service Authority	Shawn T Abrams	Abstain	
1	Southern California Edison Company	Steven Mavis	Affirmative	
1	Southern Company Services, Inc.	Robert A. Schaffeld	Affirmative	
1	Southern Illinois Power Coop.	William Hutchison		
1	Southwest Transmission Cooperative, Inc.	John Shaver	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)
1	Sunflower Electric Power Corporation	Noman Lee Williams	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)

1	Tacoma Power	John Merrell	Abstain	
1	Tampa Electric Co.	Beth Young		
1	Tennessee Valley Authority	Howell D Scott	Affirmative	
1	Trans Bay Cable LLC	Steven Powell		
1	Tri-State Generation & Transmission Association, Inc.	Tracy Sliman	Affirmative	
1	Tucson Electric Power Co.	John Tolo		
1	U.S. Bureau of Reclamation	Richard T Jackson		
1	United Illuminating Co.	Jonathan Appelbaum	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
1	Westar Energy	Allen Klassen	Abstain	
1	Western Area Power Administration	Lloyd A Linke		
1	Wolverine Power Supply Coop., Inc.	Michelle Clements	Abstain	
1	Xcel Energy, Inc.	Gregory L Pieper	Affirmative	
2	California ISO	Rich Vine	Negative	SUPPORTS THIRD PARTY COMMENTS - (ISO/RTO Standards Review Committee)
2	Electric Reliability Council of Texas, Inc.	Cheryl Moseley	Negative	COMMENT RECEIVED
2	Independent Electricity System Operator	Leonard Kula	Affirmative	
2	ISO New England, Inc.	Matthew F Goldberg	Negative	COMMENT RECEIVED
2	MISO	Marie Knox	Negative	SUPPORTS THIRD PARTY COMMENTS - (ISO/RTO SRC)
2	New York Independent System Operator	Gregory Campoli	Negative	SUPPORTS THIRD PARTY COMMENTS - (IRC/SRC and NPCC/RSC)
2	PJM Interconnection, L.L.C.	stephanie monzon	Affirmative	
2	Southwest Power Pool, Inc.	Charles H. Yeung		
3	AEP	Michael E Deloach	Affirmative	
3	Alabama Power Company	Robert S Moore	Affirmative	
3	Ameren Corp.	David J Jendras	Negative	COMMENT RECEIVED
3	APS	Sarah Kist	Negative	COMMENT RECEIVED
3	Associated Electric Cooperative, Inc.	Todd Bennett	Abstain	
3	Atlantic City Electric Company	NICOLE BUCKMAN	Abstain	
3	Avista Corp.	Scott J Kinney	Affirmative	
3	Basin Electric Power Cooperative	Jeremy Voll	Abstain	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Affirmative	
3	Central Electric Power Cooperative	Adam M Weber	Abstain	
3	City of Austin dba Austin Energy	Andrew Gallo	Affirmative	
3	City of Bartow, Florida	Matt Culverhouse	Affirmative	
3	City of Clewiston	Lynne Mila	Affirmative	
3	City of Farmington	Linda R Jacobson		
3	City of Green Cove Springs	Mark Schultz	Affirmative	
3	City of Homestead	Orestes J Garcia	Affirmative	
3	City of Redding	Bill Hughes	Affirmative	
3	City of Tallahassee	Bill R Fowler	Abstain	
3	Cleco Corporation	Michelle A Corley	Abstain	
3	Colorado Springs Utilities	Jean Mueller	Affirmative	
3	ComEd	John Bee	Affirmative	
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
3	Consumers Energy Company	Gerald G Farringer	Affirmative	
3	Cowlitz County PUD	Russell A Noble		
3	Delmarva Power & Light Co.	Michael R. Mayer	Abstain	
				SUPPORTS

3	Dominion Resources, Inc.	Connie B Lowe	Negative	THIRD PARTY COMMENTS - (Dominion's)
3	DTE Electric	Kent Kujala	Abstain	
3	FirstEnergy Corp.	Cindy E Stewart	Affirmative	
3	Florida Keys Electric Cooperative	Tom B Anthony		
3	Florida Municipal Power Agency	Joe McKinney	Affirmative	
3	Florida Power Corporation	Lee Schuster	Negative	SUPPORTS THIRD PARTY COMMENTS - (Duke Energy)
3	Gainesville Regional Utilities	Kenneth Simmons	Affirmative	
3	Georgia System Operations Corporation	Scott McGough	Affirmative	
3	Great River Energy	Brian Glover	Negative	SUPPORTS THIRD PARTY COMMENTS - (See ACES comments)
3	Hydro One Networks, Inc.	Ayesha Sabouba	Negative	SUPPORTS THIRD PARTY COMMENTS - (Muhammed Ali)
3	JEA	Garry Baker		
3	Kansas City Power & Light Co.	Joshua D Bach	Affirmative	
3	Kissimmee Utility Authority	Gregory D Woessner	Affirmative	
3	Lakeland Electric	Mace D Hunter	Affirmative	
3	Lincoln Electric System	Jason Fortik		
3	Los Angeles Department of Water & Power	Mike Anctil		
3	Louisville Gas and Electric Co.	Charles A. Freibert		
3	M & A Electric Power Cooperative	Stephen D Pogue	Abstain	
3	MEAG Power	Roger Brand	Affirmative	
3	MidAmerican Energy Co.	Thomas C. Mielnik	Affirmative	
3	Modesto Irrigation District	Jack W Savage	Affirmative	
3	Muscatine Power & Water	Jenn Stover	Abstain	
3	National Grid USA	Brian E Shanahan		
3	Nebraska Public Power District	Tony Eddleman	Affirmative	
3	New York Power Authority	David R Rivera	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC TFSP Team)
3	Northern Indiana Public Service Co.	Ramon J Barany	Abstain	
3	NW Electric Power Cooperative, Inc.	David McDowell	Abstain	
3	Ocala Utility Services	Randy Hahn	Affirmative	
3	Oklahoma Gas and Electric Co.	Donald Hargrove	Abstain	
3	Omaha Public Power District	Blaine R. Dinwiddie	Abstain	
3	Orlando Utilities Commission	Ballard K Mutters		
3	Owensboro Municipal Utilities	Thomas T Lyons		
3	Pacific Gas and Electric Company	John H Hagen	Affirmative	
3	Platte River Power Authority	Terry L Baker	Affirmative	
3	PNM Resources	Michael Mertz		
3	Portland General Electric Co.	Thomas G Ward	Abstain	
3	Potomac Electric Power Co.	Mark Yerger	Abstain	
3	Public Service Electric and Gas Co.	Jeffrey Mueller	Affirmative	
3	Puget Sound Energy, Inc.	Mariah R Kennedy	Negative	COMMENT RECEIVED
3	Sacramento Municipal Utility District	James Leigh-Kendall	Affirmative	
3	Salt River Project	John T. Underhill		
3	Santee Cooper	James M Poston	Abstain	
3	Seattle City Light	Dana Wheelock	Affirmative	
3	Seminole Electric Cooperative, Inc.	James R Frauen	Abstain	
3	Sho-Me Power Electric Cooperative	Jeff L Neas		
3	Snohomish County PUD No. 1	Mark Oens	Affirmative	
3	South Carolina Electric & Gas Co.	Hubert C Young		
3	Southern California Edison Company	Lujuanna Medina	Affirmative	
3	Tacoma Power	Marc Donaldson	Abstain	
3	Tampa Electric Co.	Ronald L. Donahey		
3	Tennessee Valley Authority	Ian S Grant	Affirmative	
	Tri-State Generation & Transmission			

3	Association, Inc.	Janelle Marriott	Affirmative	
3	Westar Energy	Bo Jones	Abstain	
3	Wisconsin Electric Power Marketing	James R Keller	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold	Affirmative	
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Abstain	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian		
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle	Affirmative	
4	City of Redding	Nicholas Zettel	Affirmative	
4	City Utilities of Springfield, Missouri	John Allen	Abstain	
4	Consumers Energy Company	Tracy Goble	Affirmative	
4	Cowlitz County PUD	Rick Syring		
4	DTE Electric	Daniel Herring	Abstain	
4	Flathead Electric Cooperative	Russ Schneider	Negative	COMMENT RECEIVED
4	Florida Municipal Power Agency	Carol Chinn	Affirmative	
4	Fort Pierce Utilities Authority	Cairo Vanegas	Affirmative	
4	Georgia System Operations Corporation	Guy Andrews	Affirmative	
4	Herb Schrayshuen	Herb Schrayshuen	Affirmative	
4	Illinois Municipal Electric Agency	Bob C. Thomas	Affirmative	
4	Madison Gas and Electric Co.	Joseph DePoorter	Affirmative	
4	Modesto Irrigation District	Spencer Tacke		
4	Ohio Edison Company	Douglas Hohlbaugh	Affirmative	
4	Old Dominion Electric Coop.	Mark Ringhausen		
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Affirmative	
4	Sacramento Municipal Utility District	Mike Ramirez	Affirmative	
4	Seattle City Light	Hao Li	Affirmative	
4	Seminole Electric Cooperative, Inc.	Steven R Wallace		
4	South Mississippi Electric Power Association	Steve McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Abstain	
4	Utility Services, Inc.	Brian Evans-Mongeon	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
4	Wisconsin Energy Corp.	Anthony P Jankowski	Affirmative	
5	Amerenue	Sam Dwyer	Negative	SUPPORTS THIRD PARTY COMMENTS - (Ameren)
5	American Electric Power	Thomas Foltz	Affirmative	
5	Arizona Public Service Co.	Scott Takinen	Negative	SUPPORTS THIRD PARTY COMMENTS - (Previous comments submitted by AZPS)
5	Associated Electric Cooperative, Inc.	Matthew Pacobit		
5	Avista Corp.	Steve Wenke		
5	Basin Electric Power Cooperative	Mike Kraft	Abstain	
5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla		
5	Bonneville Power Administration	Francis J. Halpin	Affirmative	
5	Brazos Electric Power Cooperative, Inc.	Shari Heino		
5	Calpine Corporation	Hamid Zakery	Abstain	
5	City and County of San Francisco	Daniel Mason		
5	City of Austin dba Austin Energy	Jeanie Doty	Affirmative	
5	City of Redding	Paul A. Cummings	Affirmative	
5	City of Tallahassee	Karen Webb	Abstain	
5	City Water, Light & Power of Springfield	Steve Rose		
5	Cleco Power	Stephanie Huffman	Abstain	
5	Cogentrix Energy Power Management, LLC	Mike D Hirst	Abstain	
5	Colorado Springs Utilities	Kaleb Brimhall	Affirmative	
5	Con Edison Company of New York	Brian O'Boyle	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	

5	Cowlitz County PUD	Bob Essex		
5	Dominion Resources, Inc.	Mike Garton	Negative	SUPPORTS THIRD PARTY COMMENTS - (Dominion)
5	DTE Electric	Mark Stefaniak	Abstain	
5	Duke Energy	Dale Q Goodwine	Negative	SUPPORTS THIRD PARTY COMMENTS - (Duke Energy)
5	Dynegy Inc.	Dan Roethemeyer	Abstain	
5	E.ON Climate & Renewables North America, LLC	Dana Showalter		
5	Entergy Services, Inc.	Tracey Stubbs	Affirmative	
5	Exelon Nuclear	Mark F Draper	Affirmative	
5	First Wind	John Robertson		
5	FirstEnergy Solutions	Kenneth Dresner	Affirmative	
5	Florida Municipal Power Agency	David Schumann	Affirmative	
5	Great River Energy	Preston L Walsh	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)
5	Independence Power & Light Dept.	James Nail	Negative	SUPPORTS THIRD PARTY COMMENTS - (Southwest Power Pool)
5	Kansas City Power & Light Co.	Brett Holland	Affirmative	
5	Kissimmee Utility Authority	Mike Blough		
5	Lakeland Electric	James M Howard	Affirmative	
5	Liberty Electric Power LLC	Daniel Duff		
5	Lincoln Electric System	Dennis Florom	Affirmative	
5	Los Angeles Department of Water & Power	Kenneth Silver	Affirmative	
5	Lower Colorado River Authority	Dixie Wells	Abstain	
5	Luminant Generation Company LLC	Rick Terrill	Affirmative	
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Abstain	
5	Nebraska Public Power District	Don Schmit	Affirmative	
5	Nevada Power Co.	Richard Salgo	Affirmative	
5	New York Power Authority	Wayne Sipperly	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC TFSP comments)
5	NextEra Energy	Allen D Schriver	Affirmative	
5	Northern Indiana Public Service Co.	Michael D Melvin	Abstain	
5	Oglethorpe Power Corporation	Bernard Johnson	Affirmative	
5	Oklahoma Gas and Electric Co.	Henry L Staples	Abstain	
5	Omaha Public Power District	Mahmood Z. Safi	Abstain	
5	Pacific Gas and Electric Company	Alex Chua		
5	Platte River Power Authority	Christopher R Wood		
5	Portland General Electric Co.	Matt E. Jastram		
5	PPL Generation LLC	Annette M Bannon	Abstain	
5	PSEG Fossil LLC	Tim Kucey	Affirmative	
5	Public Utility District No. 2 of Grant County, Washington	Michiko Sell	Abstain	
5	Puget Sound Energy, Inc.	Lynda Kupfer	Negative	SUPPORTS THIRD PARTY COMMENTS - (PSE)
5	Sacramento Municipal Utility District	Susan Gill-Zobitz	Affirmative	
5	Salt River Project	William Alkema		
5	Santee Cooper	Lewis P Pierce	Abstain	
5	Seattle City Light	Michael J. Haynes	Affirmative	
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins		
5	Snohomish County PUD No. 1	Sam Nietfeld	Affirmative	
5	South Carolina Electric & Gas Co.	Edward Magic		
5	Southern California Edison Company	Denise Yaffe	Affirmative	
5	Southern Company Generation	William D Shultz	Affirmative	

5	Tacoma Power	Chris Mattson	Abstain	
5	Tampa Electric Co.	RJames Rocha	Affirmative	
5	Tri-State Generation & Transmission Association, Inc.	Mark Stein		
5	TVA Power System Operations (PSO)	Brandy B Spraker	Affirmative	
5	U.S. Army Corps of Engineers	Melissa Kurtz		
5	USDI Bureau of Reclamation	Erika Doot		
5	Westar Energy	Bryan Taggart	Abstain	
5	Wisconsin Electric Power Co.	Linda Horn	Affirmative	
5	Xcel Energy, Inc.	Mark A Castagneri	Affirmative	
6	AEP Marketing	Edward P. Cox		
6	Ameren Missouri	Robert Quinlivan	Negative	SUPPORTS THIRD PARTY COMMENTS - (Ameren)
6	APS	Randy A. Young	Negative	COMMENT RECEIVED
6	Associated Electric Cooperative, Inc.	Brian Ackermann		
6	Basin Electric Power Cooperative	Stephen Farnsworth		
6	Bonneville Power Administration	Brenda S. Anderson	Affirmative	
6	Calpine Energy Services	Agus Bintoro		
6	City of Austin dba Austin Energy	Lisa Martin	Affirmative	
6	City of Redding	Marvin Briggs	Affirmative	
6	Cleco Power LLC	Robert Hirchak	Abstain	
6	Colorado Springs Utilities	Shannon Fair	Affirmative	
6	Con Edison Company of New York	David Balban	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
6	Constellation Energy Commodities Group	David J Carlson	Affirmative	
6	Dominion Resources, Inc.	Louis S. Slade	Negative	SUPPORTS THIRD PARTY COMMENTS - (Dominion)
6	Duke Energy	Greg Cecil		
6	FirstEnergy Solutions	Kevin Querry	Affirmative	
6	Florida Municipal Power Agency	Richard L. Montgomery	Affirmative	
6	Florida Municipal Power Pool	Thomas Reedy	Affirmative	
6	Florida Power & Light Co.	Silvia P Mitchell	Affirmative	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Affirmative	
6	Lakeland Electric	Paul Shipps	Affirmative	
6	Lincoln Electric System	Eric Ruskamp	Affirmative	
6	Los Angeles Department of Water & Power	Brad Packer	Affirmative	
6	Lower Colorado River Authority	Michael Shaw		
6	Luminant Energy	Brenda Hampton	Affirmative	
6	Modesto Irrigation District	James McFall	Affirmative	
6	Muscatine Power & Water	John Stolley	Abstain	
6	New York Power Authority	Shivaz Chopra	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC TFSP and RSC)
6	New York State Electric & Gas Corp.	Julie S King		
6	Northern Indiana Public Service Co.	Joseph O'Brien	Abstain	
6	Oglethorpe Power Corporation	Donna Johnson	Affirmative	
6	Oklahoma Gas and Electric Co.	Jerry Nottnagel	Abstain	
6	Omaha Public Power District	Douglas Collins	Abstain	
6	PacifiCorp	Sandra L Shaffer	Affirmative	
6	Platte River Power Authority	Carol Ballantine	Affirmative	
6	Portland General Electric Co.	Shawn P Davis	Abstain	
6	Powerex Corp.	Gordon Dobson-Mack	Abstain	
6	PPL EnergyPlus LLC	Elizabeth Davis		
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Affirmative	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen		
6	Sacramento Municipal Utility District	Diane Enderby	Affirmative	
6	Salt River Project	William Abraham		
6	Santee Cooper	Michael Brown	Abstain	
6	Seattle City Light	Dennis Sismaet	Affirmative	
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak	Abstain	
6	Snohomish County PUD No. 1	Kenn Backholm	Affirmative	

6	South Carolina Electric & Gas Co.	Matt H Bullard		
6	Southern California Edison Company	Joseph T Marone	Affirmative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Affirmative	
6	Tacoma Public Utilities	Michael C Hill		
6	Tampa Electric Co.	Benjamin F Smith II		
6	Tennessee Valley Authority	Marjorie S. Parsons	Affirmative	
6	Westar Energy	Grant L Wilkerson	Abstain	
6	Western Area Power Administration - UGP Marketing	Mark Messerli	Affirmative	
6	Xcel Energy, Inc.	Peter Colussy	Affirmative	
7	Luminant Mining Company LLC	Stewart Rake		
8		Roger C Zaklukiewicz	Affirmative	
8		David L Kiguel	Negative	COMMENT RECEIVED
8	Massachusetts Attorney General	Frederick R Plett		
8	Volkmann Consulting, Inc.	Terry Volkmann		
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson	Affirmative	
9	New York State Public Service Commission	Diane J Barney	Affirmative	
10	Florida Reliability Coordinating Council	Linda C Campbell	Affirmative	
10	Midwest Reliability Organization	Russel Mountjoy	Affirmative	
10	New York State Reliability Council	Alan Adamson	Affirmative	
10	Northeast Power Coordinating Council	Guy V. Zito	Affirmative	
10	ReliabilityFirst	Anthony E Jablonski	Abstain	
10	SERC Reliability Corporation	Joseph W Spencer	Affirmative	
10	Texas Reliability Entity, Inc.	Karin Schweitzer	Affirmative	
10	Western Electricity Coordinating Council	Steven L. Rueckert	Affirmative	

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Non-Binding Poll Results

Project 2008-2 Undervoltage Load Shedding
PRC-010-1

Non-Binding Poll Results	
Non-Binding Poll Name:	Project 2008-02 UVLS PRC-010-1 Non-Binding Poll 2014
Poll Period:	7/29/2014 - 8/8/2014
Total # Opinions:	248
Total Ballot Pool:	329
Summaray Results:	75.38% of those who registered to participate provided an opinion or an abstention; 79.17% of those who provided an opinion indicated support for the VRFs and VSLs.

Individual Ballot Pool Results

Segment	Organization	Member	Ballot	NERC Notes
1	Ameren Services	Eric Scott	Abstain	
1	American Electric Power	Paul B Johnson	Abstain	
1	Arizona Public Service Co.	Brian Cole		
1	Associated Electric Cooperative, Inc.	John Bussman	Abstain	
1	Austin Energy	James Armke	Affirmative	
1	Avista Utilities	Heather Rosentrater		
1	Balancing Authority of Northern California	Kevin Smith	Affirmative	
1	Basin Electric Power Cooperative	David Rudolph		
1	BC Hydro and Power Authority	Patricia Robertson	Abstain	
1	Beaches Energy Services	Don Cuevas	Affirmative	
1	Bonneville Power Administration	Donald S. Watkins	Affirmative	
1	Bryan Texas Utilities	John C Fontenot	Affirmative	
1	CenterPoint Energy Houston Electric, LLC	John Brockhan	Abstain	
1	Central Iowa Power Cooperative	Kevin J Lyons	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)
1	Clark Public Utilities	Jack Stamper		
1	Cleco Corporation	John Lindsey	Abstain	
1	Colorado Springs Utilities	Shawna Speer		
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	SUPPORTS THIRD PARTY

				COMMENTS - (NPCC)
1	CPS Energy	Glenn Pressler	Affirmative	
1	Dairyland Power Coop.	Robert W. Roddy	Affirmative	
1	Dayton Power & Light Co.	Hertzel Shamash		
1	Dominion Virginia Power	Larry Nash	Abstain	
1	Duke Energy Carolina	Doug E Hils	Negative	SUPPORTS THIRD PARTY COMMENTS - (Duke Energy)
1	Encari	Steven E Hamburg		
1	Entergy Transmission	Oliver A Burke	Affirmative	
1	FirstEnergy Corp.	William J Smith	Affirmative	
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton		
1	Florida Power & Light Co.	Mike O'Neil	Affirmative	
1	Gainesville Regional Utilities	Richard Bachmeier	Affirmative	
1	Georgia Transmission Corporation	Jason Snodgrass	Affirmative	
1	Great River Energy	Gordon Pietsch		
1	Hydro One Networks, Inc.	Muhammed Ali	Negative	COMMENT RECEIVED
1	Hydro-Quebec TransEnergie	Martin Boisvert	Affirmative	
1	Idaho Power Company	Molly Devine	Affirmative	
1	International Transmission Company Holdings Corp	Michael Moltane	Abstain	
1	JDRJC Associates	Jim D Cyrulewski	Abstain	
1	KAMO Electric Cooperative	Walter Kenyon	Abstain	
1	Kansas City Power & Light Co.	Daniel Gibson	Affirmative	
1	Keys Energy Services	Stanley T Rzad		
1	Lakeland Electric	Larry E Watt	Affirmative	
1	Lincoln Electric System	Doug Bantam	Affirmative	
1	Long Island Power Authority	Robert Ganley		
1	Los Angeles Department of Water & Power	faranak sarbaz	Affirmative	
1	Lower Colorado River Authority	Martyn Turner	Abstain	
1	M & A Electric Power Cooperative	William Price	Abstain	
1	MEAG Power	Danny Dees	Affirmative	
1	MidAmerican Energy Co.	Terry Harbour	Affirmative	
1	Minnkota Power Coop. Inc.	Daniel L Inman	Abstain	
1	Muscatine Power & Water	Andrew J Kurriger		
1	N.W. Electric Power Cooperative, Inc.	Mark Ramsey	Abstain	
1	National Grid USA	Michael Jones	Negative	SUPPORTS THIRD PARTY COMMENTS - (National Grid supports NPCC's comments.)

1	Nebraska Public Power District	Jamison Cawley	Abstain	
1	New York Power Authority	Bruce Metruck	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC Comments)
1	Northeast Missouri Electric Power Cooperative	Kevin White	Abstain	
1	Northeast Utilities	William Temple		
1	Northern Indiana Public Service Co.	Julaine Dyke	Abstain	
1	Oklahoma Gas and Electric Co.	Terri Pyle	Abstain	
1	Omaha Public Power District	Doug Peterchuck	Abstain	
1	Oncor Electric Delivery	Jen Fiegel	Affirmative	
1	Orlando Utilities Commission	Brad Chase		
1	Otter Tail Power Company	Daryl Hanson		
1	Pacific Gas and Electric Company	Bangalore Vijayraghavan		
1	Platte River Power Authority	John C. Collins	Abstain	
1	Portland General Electric Co.	John T Walker	Abstain	
1	PPL Electric Utilities Corp.	Brenda L Truhe		
1	Public Service Company of New Mexico	Laurie Williams		
1	Public Service Electric and Gas Co.	Kenneth D. Brown	Abstain	
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel	Abstain	
1	Puget Sound Energy, Inc.	Denise M Lietz	Negative	SUPPORTS THIRD PARTY COMMENTS - (Eleanor Ewry, Puget Sound Energy)
1	Sacramento Municipal Utility District	Tim Kelley	Affirmative	
1	Salt River Project	Robert Kondziolka		
1	San Diego Gas & Electric	Will Speer		
1	SaskPower	Wayne Guttormson		
1	Seminole Electric Cooperative, Inc.	Glenn Spurlock	Abstain	
1	Snohomish County PUD No. 1	Long T Duong	Affirmative	
1	South Carolina Electric & Gas Co.	Tom Hanzlik		
1	South Carolina Public Service Authority	Shawn T Abrams	Abstain	
1	Southern California Edison Company	Steven Mavis	Affirmative	
1	Southern Company Services, Inc.	Robert A. Schaffeld	Affirmative	
1	Southern Illinois Power Coop.	William Hutchison		
1	Southwest Transmission Cooperative, Inc.	John Shaver	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)
1	Sunflower Electric Power Corporation	Noman Lee Williams	Negative	SUPPORTS THIRD PARTY

				COMMENTS - (ACES)
1	Tacoma Power	John Merrell	Abstain	
1	Tampa Electric Co.	Beth Young		
1	Tennessee Valley Authority	Howell D Scott	Abstain	
1	Trans Bay Cable LLC	Steven Powell		
1	Tri-State Generation & Transmission Association, Inc.	Tracy Sliman	Affirmative	
1	Tucson Electric Power Co.	John Tolo		
1	U.S. Bureau of Reclamation	Richard T Jackson		
1	United Illuminating Co.	Jonathan Appelbaum	Affirmative	
1	Westar Energy	Allen Klassen	Abstain	
1	Western Area Power Administration	Lloyd A Linke		
1	Wolverine Power Supply Coop., Inc.	Michelle Clements	Abstain	
1	Xcel Energy, Inc.	Gregory L Pieper		
2	California ISO	Rich Vine	Negative	SUPPORTS THIRD PARTY COMMENTS - (ISO/RTO Standards Review Committee)
2	Electric Reliability Council of Texas, Inc.	Cheryl Moseley	Negative	COMMENT RECEIVED
2	Independent Electricity System Operator	Leonard Kula	Affirmative	
2	ISO New England, Inc.	Matthew F Goldberg	Negative	COMMENT RECEIVED
2	MISO	Marie Knox	Negative	SUPPORTS THIRD PARTY COMMENTS - (ISO/RTO SRC)
2	New York Independent System Operator	Gregory Campoli	Abstain	
2	PJM Interconnection, L.L.C.	stephanie monzon	Affirmative	
3	AEP	Michael E Deloach	Abstain	
3	Alabama Power Company	Robert S Moore	Affirmative	
3	Ameren Corp.	David J Jendras	Abstain	
3	APS	Sarah Kist	Negative	COMMENT RECEIVED
3	Associated Electric Cooperative, Inc.	Todd Bennett	Abstain	
3	Avista Corp.	Scott J Kinney	Affirmative	
3	Basin Electric Power Cooperative	Jeremy Voll	Abstain	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Affirmative	
3	Central Electric Power Cooperative	Adam M Weber	Abstain	
3	City of Austin dba Austin Energy	Andrew Gallo	Affirmative	
3	City of Bartow, Florida	Matt Culverhouse	Affirmative	
3	City of Clewiston	Lynne Mila	Affirmative	

3	City of Farmington	Linda R Jacobson		
3	City of Green Cove Springs	Mark Schultz	Affirmative	
3	City of Homestead	Orestes J Garcia	Affirmative	
3	City of Tallahassee	Bill R Fowler	Abstain	
3	Cleco Corporation	Michelle A Corley	Abstain	
3	Colorado Springs Utilities	Jean Mueller	Affirmative	
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
3	Consumers Energy Company	Gerald G Farringer	Affirmative	
3	Cowlitz County PUD	Russell A Noble		
3	Dominion Resources, Inc.	Connie B Lowe	Abstain	
3	DTE Electric	Kent Kujala	Abstain	
3	FirstEnergy Corp.	Cindy E Stewart	Affirmative	
3	Florida Keys Electric Cooperative	Tom B Anthony		
3	Florida Municipal Power Agency	Joe McKinney	Affirmative	
3	Florida Power Corporation	Lee Schuster	Negative	SUPPORTS THIRD PARTY COMMENTS - (Duke Energy)
3	Gainesville Regional Utilities	Kenneth Simmons	Affirmative	
3	Georgia System Operations Corporation	Scott McGough	Affirmative	
3	Great River Energy	Brian Glover	Negative	SUPPORTS THIRD PARTY COMMENTS - (See ACES comments)
3	Hydro One Networks, Inc.	Ayesha Sabouba	Negative	SUPPORTS THIRD PARTY COMMENTS - (Muhammed Ali)
3	JEA	Garry Baker		
3	Kansas City Power & Light Co.	Joshua D Bach	Affirmative	
3	Kissimmee Utility Authority	Gregory D Woessner	Affirmative	
3	Lakeland Electric	Mace D Hunter	Affirmative	
3	Lincoln Electric System	Jason Fortik		
3	Los Angeles Department of Water & Power	Mike Anctil		
3	Louisville Gas and Electric Co.	Charles A. Freibert		
3	M & A Electric Power Cooperative	Stephen D Pogue	Abstain	
3	MEAG Power	Roger Brand	Affirmative	
3	MidAmerican Energy Co.	Thomas C. Mielnik	Affirmative	
3	Modesto Irrigation District	Jack W Savage	Affirmative	
3	Muscatine Power & Water	Jenn Stover	Abstain	
3	National Grid USA	Brian E Shanahan		
3	Nebraska Public Power District	Tony Eddleman	Abstain	

3	New York Power Authority	David R Rivera	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC TFSP Team)
3	Northern Indiana Public Service Co.	Ramon J Barany	Abstain	
3	NW Electric Power Cooperative, Inc.	David McDowell	Abstain	
3	Ocala Utility Services	Randy Hahn	Affirmative	
3	Oklahoma Gas and Electric Co.	Donald Hargrove	Abstain	
3	Omaha Public Power District	Blaine R. Dinwiddie	Abstain	
3	Owensboro Municipal Utilities	Thomas T Lyons		
3	Pacific Gas and Electric Company	John H Hagen	Affirmative	
3	Platte River Power Authority	Terry L Baker	Abstain	
3	PNM Resources	Michael Mertz		
3	Portland General Electric Co.	Thomas G Ward	Abstain	
3	Public Service Electric and Gas Co.	Jeffrey Mueller	Abstain	
3	Puget Sound Energy, Inc.	Mariah R Kennedy	Negative	COMMENT RECEIVED
3	Sacramento Municipal Utility District	James Leigh-Kendall	Affirmative	
3	Salt River Project	John T. Underhill		
3	Santee Cooper	James M Poston	Abstain	
3	Seminole Electric Cooperative, Inc.	James R Frauen	Abstain	
3	Sho-Me Power Electric Cooperative	Jeff L Neas		
3	Snohomish County PUD No. 1	Mark Oens	Affirmative	
3	South Carolina Electric & Gas Co.	Hubert C Young		
3	Southern California Edison Company	Lujuanna Medina	Affirmative	
3	Tacoma Power	Marc Donaldson	Abstain	
3	Tampa Electric Co.	Ronald L. Donahey		
3	Tennessee Valley Authority	Ian S Grant	Abstain	
3	Tri-State Generation & Transmission Association, Inc.	Janelle Marriott	Affirmative	
3	Westar Energy	Bo Jones	Abstain	
3	Xcel Energy, Inc.	Michael Ibold	Abstain	
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Abstain	
4	Blue Ridge Power Agency	Duane S Dahlquist	Affirmative	
4	City of Austin dba Austin Energy	Reza Ebrahimian		
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle	Affirmative	
4	City Utilities of Springfield, Missouri	John Allen	Abstain	
4	Consumers Energy Company	Tracy Goble	Affirmative	
4	Cowlitz County PUD	Rick Syring		
4	DTE Electric	Daniel Herring	Abstain	
4	Flathead Electric Cooperative	Russ Schneider	Negative	COMMENT RECEIVED
4	Florida Municipal Power Agency	Carol Chinn	Affirmative	
4	Fort Pierce Utilities Authority	Cairo Vanegas	Affirmative	

4	Georgia System Operations Corporation	Guy Andrews	Affirmative	
4	Herb Schrayshuen	Herb Schrayshuen	Affirmative	
4	Illinois Municipal Electric Agency	Bob C. Thomas	Abstain	
4	Madison Gas and Electric Co.	Joseph DePoorter	Abstain	
4	Ohio Edison Company	Douglas Hohlbaugh	Affirmative	
4	Old Dominion Electric Coop.	Mark Ringhausen		
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Affirmative	
4	Sacramento Municipal Utility District	Mike Ramirez	Affirmative	
4	Seminole Electric Cooperative, Inc.	Steven R Wallace		
4	South Mississippi Electric Power Association	Steve McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Abstain	
4	Utility Services, Inc.	Brian Evans-Mongeon	Abstain	
4	Wisconsin Energy Corp.	Anthony P Jankowski	Affirmative	
5	Amerenue	Sam Dwyer	Abstain	
5	American Electric Power	Thomas Foltz	Abstain	
5	Arizona Public Service Co.	Scott Takinen	Negative	SUPPORTS THIRD PARTY COMMENTS - (Preious comments submitted by AZPS)
5	Associated Electric Cooperative, Inc.	Matthew Pacobit		
5	Avista Corp.	Steve Wenke		
5	Basin Electric Power Cooperative	Mike Kraft	Abstain	
5	Bonneville Power Administration	Francis J. Halpin	Affirmative	
5	Brazos Electric Power Cooperative, Inc.	Shari Heino		
5	Calpine Corporation	Hamid Zakery	Abstain	
5	City of Austin dba Austin Energy	Jeanie Doty	Affirmative	
5	City of Tallahassee	Karen Webb	Abstain	
5	City Water, Light & Power of Springfield	Steve Rose		
5	Cleco Power	Stephanie Huffman	Abstain	
5	Cogentrix Energy Power Management, LLC	Mike D Hirst	Abstain	
5	Colorado Springs Utilities	Kaleb Brimhall	Affirmative	
5	Con Edison Company of New York	Brian O'Boyle	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	Cowlitz County PUD	Bob Essex		
5	Dominion Resources, Inc.	Mike Garton	Abstain	
5	DTE Electric	Mark Stefaniak	Abstain	
5	Duke Energy	Dale Q Goodwine	Negative	SUPPORTS THIRD PARTY COMMENTS - (Duke Energy)

5	Dynegy Inc.	Dan Roethemeyer	Abstain	
5	E.ON Climate & Renewables North America, LLC	Dana Showalter		
5	Entergy Services, Inc.	Tracey Stubbs	Affirmative	
5	First Wind	John Robertson		
5	FirstEnergy Solutions	Kenneth Dresner	Affirmative	
5	Florida Municipal Power Agency	David Schumann	Affirmative	
5	Great River Energy	Preston L Walsh	Negative	SUPPORTS THIRD PARTY COMMENTS - (ACES)
5	Kansas City Power & Light Co.	Brett Holland	Affirmative	
5	Kissimmee Utility Authority	Mike Blough		
5	Liberty Electric Power LLC	Daniel Duff		
5	Lincoln Electric System	Dennis Florom	Affirmative	
5	Los Angeles Department of Water & Power	Kenneth Silver	Affirmative	
5	Lower Colorado River Authority	Dixie Wells	Abstain	
5	Luminant Generation Company LLC	Rick Terrill	Affirmative	
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Abstain	
5	Nebraska Public Power District	Don Schmit	Abstain	
5	Nevada Power Co.	Richard Salgo	Abstain	
5	New York Power Authority	Wayne Sipperly	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC TFSP comments)
5	NextEra Energy	Allen D Schriver	Affirmative	
5	Northern Indiana Public Service Co.	Michael D Melvin	Abstain	
5	Oglethorpe Power Corporation	Bernard Johnson	Affirmative	
5	Oklahoma Gas and Electric Co.	Henry L Staples	Abstain	
5	Omaha Public Power District	Mahmood Z. Safi	Abstain	
5	Pacific Gas and Electric Company	Alex Chua		
5	Platte River Power Authority	Christopher R Wood		
5	Portland General Electric Co.	Matt E. Jastram		
5	PPL Generation LLC	Annette M Bannon	Abstain	
5	PSEG Fossil LLC	Tim Kucey	Abstain	
5	Public Utility District No. 2 of Grant County, Washington	Michiko Sell	Abstain	
5	Puget Sound Energy, Inc.	Lynda Kupfer	Negative	SUPPORTS THIRD PARTY COMMENTS - (PSE)
5	Sacramento Municipal Utility District	Susan Gill-Zobitz	Affirmative	
5	Salt River Project	William Alkema		

5	Santee Cooper	Lewis P Pierce	Abstain	
5	Seattle City Light	Michael J. Haynes	Affirmative	
5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins		
5	Snohomish County PUD No. 1	Sam Nietfeld	Affirmative	
5	South Carolina Electric & Gas Co.	Edward Magic		
5	Southern California Edison Company	Denise Yaffe	Affirmative	
5	Southern Company Generation	William D Shultz	Affirmative	
5	Tacoma Power	Chris Mattson	Abstain	
5	Tampa Electric Co.	RJames Rocha	Affirmative	
5	Tri-State Generation & Transmission Association, Inc.	Mark Stein		
5	TVA Power System Operations (PSO)	Brandy B Spraker	Abstain	
5	U.S. Army Corps of Engineers	Melissa Kurtz		
5	USDI Bureau of Reclamation	Erika Doot		
5	Xcel Energy, Inc.	Mark A Castagneri	Affirmative	
6	AEP Marketing	Edward P. Cox		
6	Ameren Missouri	Robert Quinlivan	Abstain	
6	APS	Randy A. Young	Negative	COMMENT RECEIVED
6	Associated Electric Cooperative, Inc.	Brian Ackermann		
6	Basin Electric Power Cooperative	Stephen Farnsworth		
6	Bonneville Power Administration	Brenda S. Anderson	Affirmative	
6	Calpine Energy Services	Agus Bintoro		
6	City of Austin dba Austin Energy	Lisa Martin	Affirmative	
6	Cleco Power LLC	Robert Hirchak	Abstain	
6	Colorado Springs Utilities	Shannon Fair	Affirmative	
6	Con Edison Company of New York	David Balban	Negative	SUPPORTS THIRD PARTY COMMENTS - (NPCC)
6	Duke Energy	Greg Cecil		
6	FirstEnergy Solutions	Kevin Querry	Affirmative	
6	Florida Municipal Power Agency	Richard L. Montgomery	Affirmative	
6	Florida Municipal Power Pool	Thomas Reedy	Affirmative	
6	Florida Power & Light Co.	Silvia P Mitchell	Affirmative	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Affirmative	
6	Lakeland Electric	Paul Shipps	Affirmative	
6	Lincoln Electric System	Eric Ruskamp	Affirmative	
6	Los Angeles Department of Water & Power	Brad Packer	Affirmative	
6	Lower Colorado River Authority	Michael Shaw		
6	Luminant Energy	Brenda Hampton	Abstain	
6	Modesto Irrigation District	James McFall	Affirmative	
6	Muscatine Power & Water	John Stolley	Abstain	
6	New York Power Authority	Shivaz Chopra	Negative	SUPPORTS THIRD PARTY COMMENTS -

				(NPCC TFSP and RSC)
6	New York State Electric & Gas Corp.	Julie S King		
6	Northern Indiana Public Service Co.	Joseph O'Brien	Abstain	
6	Oglethorpe Power Corporation	Donna Johnson	Affirmative	
6	Oklahoma Gas and Electric Co.	Jerry Nottnagel	Abstain	
6	Omaha Public Power District	Douglas Collins	Abstain	
6	PacifiCorp	Sandra L Shaffer	Abstain	
6	Platte River Power Authority	Carol Ballantine	Abstain	
6	Portland General Electric Co.	Shawn P Davis	Abstain	
6	Powerex Corp.	Gordon Dobson-Mack	Abstain	
6	PPL EnergyPlus LLC	Elizabeth Davis		
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Abstain	
6	Sacramento Municipal Utility District	Diane Enderby	Affirmative	
6	Salt River Project	William Abraham		
6	Santee Cooper	Michael Brown	Abstain	
6	Seattle City Light	Dennis Sismaet	Affirmative	
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak	Abstain	
6	Snohomish County PUD No. 1	Kenn Backholm	Affirmative	
6	South Carolina Electric & Gas Co.	Matt H Bullard		
6	Southern California Edison Company	Joseph T Marone	Affirmative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Affirmative	
6	Tacoma Public Utilities	Michael C Hill		
6	Tampa Electric Co.	Benjamin F Smith II		
6	Tennessee Valley Authority	Marjorie S. Parsons	Abstain	
7	Luminant Mining Company LLC	Stewart Rake		
8		Roger C Zaklukiewicz	Affirmative	
8		David L Kiguel	Abstain	
8	Massachusetts Attorney General	Frederick R Plett		
8	Volkmann Consulting, Inc.	Terry Volkmann		
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson	Affirmative	
10	Florida Reliability Coordinating Council	Linda C Campbell	Affirmative	
10	Midwest Reliability Organization	Russel Mountjoy	Affirmative	
10	New York State Reliability Council	Alan Adamson	Affirmative	
10	Northeast Power Coordinating Council	Guy V. Zito	Affirmative	
10	ReliabilityFirst	Anthony E Jablonski	Affirmative	
10	SERC Reliability Corporation	Joseph W Spencer	Affirmative	
10	Texas Reliability Entity, Inc.	Karin Schweitzer	Affirmative	
10	Western Electricity Coordinating Council	Steven L. Rueckert	Abstain	

Individual or group. (38 Responses)
Name (24 Responses)
Organization (24 Responses)
Group Name (14 Responses)
Lead Contact (14 Responses)
Contact Organization (14 Responses)
IF YOU WISH TO EXPRESS SUPPORT FOR ANOTHER ENTITY'S COMMENTS WITHOUT ENTERING ANY ADDITIONAL COMMENTS, YOU MAY DO SO HERE. (4 Responses)
Comments (38 Responses)
Question 1 (30 Responses)
Question 1 Comments (34 Responses)
Question 2 (30 Responses)
Question 2 Comments (34 Responses)
Question 3 (30 Responses)
Question 3 Comments (34 Responses)

Group
Northeast Power Coordinating Council
Guy Zito
Northeast Power Coordinating Council
No
The defined term, the Rationale for Definition, and Guidelines for UVLS Program Definition do not provide clarity for the scope of the UVLS Program. Each section subtly defines the term and objective differently. All three do emphasize in a similar manner that the term UVLS Program applies to distributed relays and controls and not to centrally controlled programs. Differences are: The definition utilizes the words “mitigate undervoltage conditions”, whereas the Guidelines state “a UVLS Program must mitigate risk of one or more of the following:” and Item 1 of the Rationale says “with respect to the impact on the reliability of the BES.” Standardizing on the UVLS program mitigates the risk of an undervoltage condition that will result in voltage instability, voltage collapse, or Cascading across a majority of Elements in an Interconnection. The present definition uses the concept of impacting the BES, but this is problematic because voltage instability can impact a small portion of the BES as pointed out in the Technical Guideline. In the proposed revision suggest using the word Interconnection. We support the intention of the definition of the new term “UVLS Program”, primarily the exclusion of centrally controlled undervoltage-based load shedding and the inclusion of only the UVLS used to mitigate serious impacts to the BES. However, although we agree to use the Guidelines as clarification for the definition, we feel that the concept of “contained area” (that we support) introduced in the Guidelines (radial BES with limited impact versus rest of the BES) is totally absent from the definition itself. The term “impacting the BES” used in the definition does not differentiate between a widespread BES undervoltage consequence and a contained “local area” issue. Without reviewing the whole definition, the SDT should consider at least introducing this concept in the definition. It brings a crucial clarification in classifying a UVLS scheme. Suggest that the standard explicitly define or describe that there are three Categories of UVLS schemes (or systems): 1. Centrally-controlled undervoltage-based schemes (or systems), which would be RAS. 2. UVLS Programs, as defined in the proposed PRC-010-1 (with additional clarity suggested below), to which PRC-010-1 applies. 3. The remaining UVLS schemes (or systems), meant to resolve local undervoltage issues or protect equipment, etc., which are neither RAS nor part of the UVLS Program. The lack of explicit distinction between Categories 2 and 3 (and some of the language in the proposed PRC-010-1) leads to the interpretation that all UVLS schemes are either RAS or UVLS Program, as is apparently the case in the revised definition of RAS (Project 2010-05.2), where it includes Category 1 in RAS and excludes Category 2 from RAS, but does not recognize and mention Category 3. To distinguish between UVLS Programs and non-Programs (Categories 2 and 3), the standard proposes examining the impact of the contingency which the UVLS scheme (or system) is intended to mitigate. In the proposed definition of UVLS Program, if the contingency is “impacting the BES” the UVLS becomes a Program. This could lead to the interpretation that if the impact is

even on only one BES element that is directly affected by the contingency, the UVLS is a Program. Since voltage instability or collapse could be very localized, we suggest clarifying the definition by changing “impacting the BES” to “impacting the BES outside the contained area” as indicated in the Guidelines and Technical Basis section, or a similar description to provide clarity for differentiating the UVLS Program from non-Programs.
Yes
R1 should be divided into two separate requirements. One requirement should be to develop an effective UVLS Program, and the second requirement should be to provide the program specifications to UVLS Entities. In R1 replace the word “developing” with the phrase “identifies the need for a UVLS Program…” Also, it is unclear if the phrase in R1 “but is not limited to…” is applied to the criteria for evaluation in Parts 1.1 and 1.2, or if it applies to the “studies and analyses”. R1 would be revised to: Each Planning Coordinator or Transmission Planner that identifies the risk of undervoltage contingencies that will result in voltage instability, voltage collapse, or Cascade across a majority of Elements in an Interconnection shall develop a UVLS Program to address these risks. The UVLS program shall at a minimum: 1.1 Resolve or mitigate the identified risks it was required to mitigate. 1.2 Integrate through coordination with generator voltage ride through, etc….. The implementation portion of R1 would become a new requirement. The PC or TPL that develops a UVLS program shall provide the program specifications and implementation schedule to the UVLS Entities responsible for the UVLS Program implementation. The SDT should consider if a time period between completion assessment and delivery of implementation is required similar to R5. The need for studies and analyses in R1 would move to M1 as a measure. We have a concern with Requirement R2 in that it gives considerable authority to the Planning Coordinator or Transmission Planner. Nowhere in the new standard is there any proviso for an UVLS entity such as a TO to comment or advise on the feasibility of the program specification, and particularly the implementation schedule. There should be an opportunity for the UVLS entity to provide input to the plan and schedule, and a mechanism for resolving disagreement. We have a similar concern with Requirement R5 with regard to the specification and execution of the CAP. It is unclear if the phrase in R3 “but is not limited to,…” is applying to the criteria for evaluation in Parts 3.1 and 3.2, or if it applies to the studies and analyses. Consider revising the second sentence in R3 to read “The PC or TPL shall at a minimum evaluate the existing UVLS program for the following criteria:” R3 is about an evaluation of the effectiveness of an existing program. So Part 3.1 should address that the program continues to resolve the risks. Suggest revising Part 3.1 to “The UVLS Program continues to resolve the risk of undervoltage contingencies identified in R1 that will result in voltage instability, voltage collapse, or Cascading across a majority of Elements in an Interconnection.” R4 presently requires a post-event evaluation that evaluates whether the UVLS Program resolved the undervoltage issues associated with the event. Post-event analysis should evaluate two items; whether the UVLS Program operated as designed, and whether it prevented the undervoltage issue leading to voltage instability, voltage collapse or Cascading. In R5 consider replacing “deficiencies” with the phrase “needed modifications”.
Yes
In the Guidelines for Requirements R6-R8 on page 23, there is a list of specific items to be included in the UVLS Program database. This should be written as items to be considered for database inclusion. If the SDT intends to make these items mandatory then they should be in a Requirement, and be auditable.
Individual
Muhammed Ali
Hydro One
No
We suggest that the standard explicitly define or describe that there are three categories of UVLS schemes (or systems): 1. Centrally-controlled undervoltage-based schemes (or systems), which would be RAS. 2. UVLS Programs, as defined in the proposed PRC-010-1 (with additional clarity suggested below), to which PRC-010-1 applies. 3. The remaining UVLS schemes (or systems), meant to resolve local undervoltage issues or protect equipment, etc., which are neither RAS nor UVLS Program. The lack of explicit distinction between Category 2 and 3 (and some of the language in the proposed PRC-010-1) leads to the interpretation that all UVLS schemes are either RAS or

UVLS Program, as is apparently the case in the revised definition of RAS (Project 2010-05.2), where it includes category 1 in RAS and excludes category 2 from RAS, but does not recognize and mention category 3. To distinguish between UVLS Programs and non-Programs (category 2 and 3), the standard proposes examining the impact of the contingency which the UVLS scheme (or system) is intended to mitigate. In the proposed definition of UVLS Program, if the contingency is “impacting the BES”, the UVLS becomes a Program. This could lead to the interpretation that if the impact is even on only one BES element, that is directly affected by the contingency, the UVLS is a Program. Since voltage instability or collapse could be very localized, we suggest clarifying the definition by changing “impacting the BES” to ““impacting the BES outside the contained area” as indicated in the Guidelines and Technical Basis section, or a similar description to provide clarity for differentiating UVLS Programs from non-Programs
Group
Arizona Public Service Co
Janet Smith
Arizona Public Service Co
Yes
Yes
Requirement R7 is unnecessary. R2 requires each UVLS entity to adhere to UVLS program designed by Transmission Planner. It is not necessary for UVLS entities to turn around and supply the same data back to Transmission Planner. They already have the data.
No
Individual
Si Truc PHAN
Hydro-Quebec TransEnergie
Yes
Hydro-Québec supports the intention of the definition of the new term “UVLS Program”, mainly the exclusion of Centrally controlled undervoltage-based load shedding and the inclusion of only those UVLS used to mitigate serious impacts on the BES. However, although we agree to use the guidelines as additional inputs to the definition, we feel that the concept of “contained area” (that we support) introduced in the guidelines (radial BES with limited impact versus rest of the BES) is totally absent from the definition itself. The terms “impacting the BES” used in the definition do not bring any nuance between a widespread BES undervoltage consequence and a contained “local area” issue. Without reviewing the whole definition, it seems like the SDT should consider at least introducing this concept in the definition, as it brings a crucial clarification in classifying a UVLS scheme.
No
No
Individual
Dan Inman
Minnkota Power Cooperative
Yes
Is it possible that the word “program” could be replaced with a more generic term (such as “system” as used in page 18 in the Guidelines and Technical Basis document). We would recommend that a

search be done for all the instances of the word “program” (lower case “p”) in the standard, and they be change in like manner to avoid confusion with the definition. So, the definition would read: Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding system consisting of distributed relays and controls used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES). Centrally -controlled undervoltage-based load shedding is not included.
No
No
Individual
Russ Schneider
Flathead Electric Cooperative, Inc.
No
The phrase "Cascading impacting the Bulk Electric System (BES)" is not really specific to what UVLS is, but rather what the standard should apply too and don't think it fits in the definition. Only UVLS equipment that could result in these types of impacts should be in scope, but that isn't really the definition of UVLS per se.
No
No
Individual
Amy Casuscelli
Xcel Energy
Yes
no comment
No
Individual
Andrew Z Pusztai
American Transmission Company LLC
No
ATC remains concerned that the temporary UVLSs used to support maintenance or construction outages in the Real Time and Operations Planning time horizons are not explicitly excluded from PRC-010-1. ATC recommends the inclusion of text that explicitly states that the standard does not apply to the development and implementation of temporary UVLS Programs for maintenance or construction outage purposes in the Operations Planning horizon. ATC recommends revising the second sentence in the proposed definition of Undervoltage Load Shedding Program (UVLS Program) to read, “Centrally-controlled undervoltage-based load shedding and temporary undervoltage-based load shedding developed and implemented for maintenance and construction outage purposes in the Operations Planning horizon are not included.” As an alternative to modifying the definition of UVLS Program, ATC recommends adding text such as, “ The development and implementation of temporary UVLS Programs for maintenance or construction outage purposes in the Operations Planning horizon do not apply to this standard” at the end of Section A.4. “Applicability” or Section A.5. “Background.”
No

No
Group
Dominion
Louis Slade
NERC Compliance Policy
No
The definition of UVLS Program states in part, “An automatic load shedding program…” while the Rational for Definition item #3 states “the definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically…” Dominion suggests that the SDT provide clarity on this perceived conflict. The definition of the UVLS program uses both the term “voltage instability” and “voltage collapse.” In the NERC glossary of terms, Stability is defined as “The ability of an electric system to maintain a state of equilibrium during normal and abnormal conditions or disturbances.” Voltage instability, then, means that the voltage never reaches an equilibrium. In other words, it continues to fall (collapses) towards zero. Therefore “voltage instability” and “voltage collapse” are the same term and redundant. One might have a voltage stability problem for a voltage rise such as due to the Ferranti effect, but certainly a UVLS program would not help with that. Dominion suggests the drafting team should either 1) delete the term “voltage instability” and use the term “voltage collapse” only or say instead “…to mitigate undervoltage conditions leading to voltage instability (voltage collapse) or Cascading impacting …”
No
Individual
Thomas Foltz
American Electric Power
No
AEP appreciates the efforts of the drafting team to provide clarification that the programs specified are only those which impact the BES, however as written, the definition could possibly be misinterpreted that only the word “cascading” is associated with the phrase “impacting the Bulk Electric System (BES)”. To avoid potential misinterpretation, AEP suggests using “An automatic load shedding program consisting of distributed relays and controls used to mitigate undervoltage conditions leading to BES voltage instability, BES voltage collapse, or BES Cascading.” In addition, the callout states “The definition provides flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term…” We do not believe “flexibility” is an appropriate attribute of a definition. Might the team actually mean “clarity” rather than “flexibility”? Please explain.
No
Group
Florida Power & Light
Mike O'Neil
Florida Power & Light
Yes
Yes
R1.2 and R3.2 require studies and analyses that evaluate whether the UVLS program is integrated through coordination with generator voltage ride-through capabilities and other protection and

control systems. The generator low voltage ride through capabilities may be extremely difficult to determine without performing load threatening staged tests. R1.2 and R3.2 should require "coordination with known or assumed generator voltage ride-through capabilities," similar to TPL-001-4. If precise generator undervoltage relay settings are used this will be a minor concession and will significantly reduce the compliance burden to the UVLS entity.
No
Group
Tennessee Valley Authority
Dennis Chastain
Tennessee Valley Authority
Yes
Yes
R6 requires that the UVLS database be updated each calendar year. If the PC has not made any changes to the UVLS schemes over the previous year they should not be required to update the database. The requirement should require the PC to review the database each year and update as needed based on that review.
No
Individual
Puget Sound Energy
Puget Sound Energy
Yes
Yes
This Standard enforces sanctions on PC's and TP's in cases where UVLS is designed only as a safety-net for events outside of the scope of the TPL standards. We own such a safety-net that has never operated and maintain it because it may minimize the potential for a wide-area black-out due to a beyond Category D event. The effect of anticipated sanctions has led several area utilities to disable their safety-net UVLS Programs. There is continued concern that utilities will not invest in safety-net programs if they are accompanied by the potential for NERC fines. It is also unclear what metrics are to be used to evaluate the effectiveness of the program. There are no defined metrics to meet for contingencies outside of the scope of the TPL standards.
No
Individual
Trevor Schultz
Idaho Power Company
Yes
It was actually a phone call from a drafting team member that helped provide clarity more than anything else.
No
No
Group
MRO NERC Standards Review Forum

Joe DePoorter
Madison Gas & Electric
Yes
: Recommend that the word “failures” be added after Cascading to a line with the definition of Reliable Operation.
No
No
Individual
Mark Wilson
Independent Electricity System Operator
Yes
No
No
Individual
Chris Scanlon
Exelon Companies
Yes
No
No
Group
BC Hydro
Patricia Robertson
BC Hydro
Yes
Yes
It’s not clear what the reliability standard is when a UVLS Program is designed. It’s clear that the UVLS Program is designed for under-voltage conditions which will lead to voltage instability, voltage collapse, or cascading impacting the BES. But it not clear for application of the program under what kind of contingency categories. Can the scheme be designed for TPL Category B events?
No
Individual
Larry Watt
Lakeland Electric
Agree
FMPA

Individual
Kayleigh Wilkerson
Lincoln Electric System
Yes
As currently written PRC-010-1 does not define a role for the Transmission Planner (TP) in the submission of its UVLS Program to the Planning Coordinator's (PC) database. Although Requirement R7 has each UVLS entity providing data to its PC per the format and schedule specified by the PC, the standard fails to account for the TP-developed UVLS Programs. In consideration that the TP is required to provide ongoing assessments to evaluate its effectiveness both on a 60 month cycle (R3) and after a voltage excursion event that triggers operation of the UVLS Program (R4), it seems the TP should have some supporting role in the submission of its UVLS Program to the PC and, at a minimum, be included in the communications between the PC and UVLS entity. Furthermore, the UVLS entity may not be familiar with the power flow and dynamic models being used by both the PC and TP in their assessments.
Individual
Paul Shipps
Lakeland Electric
Agree
FMPA
Individual
John Pearson/ Matt Goldberg
ISO New England
Agree
ISO RTO Council Standards Review Committee (SRC)
Individual
Texas Reliability Entity, Inc.
Texas Reliability Entity, Inc.
Yes
Yes
1) Texas Reliability Entity, Inc. (Texas RE)supports the rationale for Requirement R1 to include the phrase "Planning Coordinator or Transmission Planner" to provide flexibility for applicability to the entity that will perform the action. Texas RE recommends applying that rationale to Requirements R6, R7 and R8 as well. Conceivably, TPs may be the only entity to have a UVLS Program. If the TP has the UVLS Program, then the TP should maintain a database containing necessary data to model its UVLS Program and a UVLS entity should provide data to support maintenance of that database to the TP with the UVLS Program. However, it seems burdensome to for the TP to have to request UVLS entity data that it needs to perform assessment of its own UVLS Program from the PC (per Requirement R8). We recognize the importance of the PC having UVLS Program data but assert that the TP needs to obtain this data from UVLS entities for its Program as well. Texas RE recommends adding "or Transmission Planner" after "Planning Coordinator" to Requirements R6, R7 and R8. 2) Texas RE recommends updating Requirement R3 language to mirror Requirement R1 as follows: "…every 60 calendar months and subsequently provide the UVLS Program's specifications to the UVLS entities responsible for implementing the program…" 3) Texas RE also recommends updating the Requirement R3 VSL to mirror Requirement R1 VSL as follows: "…60 calendar months and subsequently provide the UVLS Program's specifications to the UVLS entities responsible for implementing the program…"
Yes

Texas RE is concerned that centrally controlled ULVS may be overlooked by entities or even by Regions since it is explicitly excluded from the ULVS definition but is not explicitly included in the proposed definition of Remedial Action Scheme (RAS). The PRC-010-1 FAQ document addresses the issue very well, but after balloting is complete the document may not be reviewed by registered entities again. Texas RE requests the PRC-010-1 SDT work with the RAS SDT to add language in the standard specifying the inclusion of centrally controlled undervoltage-based shedding.
Individual
Anthony Jablonski
ReliabilityFirst
Yes
ReliabilityFirst submits the following comments for consideration: 1. Requirement R1, Part 1.2 - ReliabilityFirst believes the term “coordination” by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration: “The UVLS Program [does not conflict] with generator voltage ride-through capabilities and [settings of] other protection and control systems…” 2. Requirement 3, Part 3.2 - ReliabilityFirst believes the term “coordination” by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration: “The UVLS Program [does not conflict] with generator voltage ride-through capabilities and [settings of] other protection and control systems…” 3.Requirement R3 - ReliabilityFirst recommends removing the term “comprehensive” since it adds little or no value to the requirement. ReliabilityFirst recommends the following for consideration: “Each Planning Coordinator or Transmission Planner shall perform [an in depth Protection System coordination] assessment to evaluate the effectiveness…”
Group
SERC Protection and Controls Subcommittee
David Greene
SERC RRO
Yes
No
Yes
Is a ‘Centrally controlled undervoltage-based load shedding system’ the same as a ‘non-distributed UVLS system’ as referred to in PRC-005-2? How does the definition of a UVLS Program impact the maintenance requirements for a Centrally controlled undervoltage-based load shedding system? The comments expressed herein represent a consensus of the views of the above-named members of the SERC EC Protection and Control Subcommittee only and should not be construed as the position of SERC Reliability Corporation, its board, or its officers.
Individual
David Jendras
Ameren
Yes
No
Yes
(1) We support the SERC PCS comments for Project 2008-02 UVLS and include them by reference. (2) We believe that the Transmission Planner (TP) should develop the program, not the Planning

Coordinator (PC). In our opinion the TP is more familiar with the BES in their area. We are concerned that R1, R3, R4, and R5 now say 'TP or PC' therefore it is not clear who leads this effort. We believe that it makes more sense for the TP to decide if UVLS is needed then report up to PC for coordination with neighboring PC and TP.
Individual
Gul Khan
Oncor Electric Delivery LLC
Yes
No
Yes
The SPS term was replaced with RAS throughout the standard. With the July 24, 2014 ballot for project 2010-5.2, revised definition of SPS/RAS, not receiving sufficient affirmative votes for approval we recommend that the standard be restored to its original verbiage.
Group
Duke Energy
Colby Bellville
Duke Energy
No
Duke Energy requests further clarification from the standard drafting team on whether this standard would apply to UVLS relays that only protect small a area (e.g. a small city). In this instance, this would not be considered to be a “distributed relays and controls,” however, it is possible that voltage collapse, as referenced in the definition, could occur in a small area. This could be interpreted as a UVLS application, and one that is not centrally controlled. Furthermore, we request the standard drafting team to more clearly define what constitutes a “program,” as opposed to one relay that protects one city to prevent voltage collapse in that specific area. In this instance, would this be considered an SPS/RAS, or would it fall under the “UVLS Program” definition?
Yes
Requirements: R1) No comment R2) No comment R3) With regard to the 60 calendar month timeframe with which an entity must perform its comprehensive assessment, when does the 60 calendar month timeframe begin? Does the day that the standard obtains regulatory approval start the clock for the 60 calendar month timeframe? Or does the 60 calendar month timeframe begin prior to the standard’s implementation date? Please clarify when the 60 calendar month timeframe officially begins. R4) No comment R5) We request the drafting team’s consideration of whether a clause should be inserted to address the necessity of coordinating for potential unforeseen circumstance in the implementation schedule of the Corrective Action Plan. It is possible for instances to occur that may prevent a UVLS entity to fully implement all obligations designated to it in the CAP. Should there be a provision to allow for communication and coordination between the PC/TP and the UVLS entity in the event a deadline cannot be met? R6) No comment R7) No comment R8) We request the drafting team’s consideration of inserting a provision in R8 that specifically states that the format that a PC provides its UVLS Program database to others, only be required to be in the format used by the PC providing the database. Requiring a PC to change its own format to satisfy the requestor seems to be overly burdensome. VRF/VSL: R2) Duke Energy believes that the VRF/VSL for R2 should be amended based on the concerns we outlined for R5 above. If unforeseen circumstances arose, and a UVLS entity could not execute an obligation per the CAP implementation schedule, the UVLS entity would be in non-compliance of R2 with the potential severity level of being High or Severe.
No
Group

IRC Standards Review Committee
Greg Campoli
NYISO
No
The proposed definition still needs improvement. The drafting team has added the phrase “impacting the Bulk Electric System (BES)” to the definition in an attempt to clarify that local programs are not included in the definition of UVLS Program. However, the impact would be only to the local area if a single BES element is affected. Thus, the definition should clearly state that local programs do not fall under the definition of UVLS Program. We recommend adopting this language: Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of relays and controls that operated in a coordinated manner to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading that have an impact beyond the local area as determined by the Planning Coordinator or Transmission Planner. Centrally controlled undervoltage-based load shedding or multiple independent relays are not included. In addition, in its response to comments received on the previous version of the standard, the drafting team states that “the intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES.” The SRC does not believe that the proposed definition provides that flexibility. The drafting team also states that “multiple independent relays do not constitute a program” and that a UVLS program “would include relays that are coordinated and act in concert for this purpose.” The SRC suggests that these concepts be expressly reflected in the definition of UVLS Program. The standard, technical paper and definition need to clarify the distinction between ‘centrally controlled’ and ‘locally applied’. There seems to be a contradiction for the exclusion allowed in the definition and the exception explained in the FAQ.
Yes
Under R5, the Planning Coordinator or Transmission Planner is required to develop a Corrective Action Plan (CAP). The Planning Coordinator or Transmission Planner can determine the necessary performance requirements. However, the UVLS entities should be required to develop the CAP, not the Planning Coordinator or Transmission Planner. We note that, in the current Guidelines and Technical Basis, CAP Examples 1 and 2 under “Guidelines for Requirement 2” reflect that the equipment owner (i.e. the UVLS entity) of the UVLS entity develops the CAP.
Yes
We recommend a general review to improve clarity and understanding across all the corresponding documentation related to this standard.
Individual
Richard Vine
California ISO
Agree
ISO/RTO Standards Review Committee (SRC)
Group
Florida Municipal Power Agency
Carol Chinn
Florida Municipal Power Agendy
Yes
Yes
The revised Measures are very rigid and prescriptive which goes against the flexibility afforded by the Requirements themselves. The use of the terms “must include” and “date-stamped” are of particular concern.
Yes

FMPA requests the drafting team consider adding a requirement similar to PRC-006-1 R14 which would require the PC or TP to contemplate comments provided by UVLS entities in development of the UVLS Program. As an example, without the ability to provide input, a PC or TP could obligate a UVLS entity to adhere to a UVLS Program with an implementation schedule that is not feasible. Additionally, it does not appear that centrally controlled undervoltage-based load shedding has been addressed by the Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) team.
Individual
Steve Rueckert
WECC
Yes
No
Yes
In the last sentence in what I believe is the seventh paragraph of the Background section, it is stated that the drafting team for Project 2010-05.2 is prposing to change the term from SPS to RAS and accordingly PRC-010-1 uses the term RAS instead of SPS. I agree. Howeever, in the rational for the definition of UVLS Program section, SPS is used several times. It is also used in the Background section sveral times ahead of the statement that it is not being used anymore. Should this term (SPS) be removed? In Requirement R3 the Rational addresses situations where assessments should be conducted sooner than the 60-month period if there are material changes to system topology or operating conditions. I support this. However, in the language of Requirement R3 the words "or sooner if material changes are made to system topology or operating conditions" were struck. Why were the words removed from the requirement? It seems like they should be there to clarify the requirement identified in the Rational Box. In the Rational for Applicability section it clarifies that PCs or TPs may develop UVLS Programs. In Requirement R1 It says each "PC or TP" that is developing a UVLS Program... In R2 UVLS Entities are required to adhere to implmentation schedules determine by its "PC or TP." Requirement R3 requires each "PC or TP" to perfomr conprehensive assessments to evaluste the effectiveness of each UVLS Program. Requirement R4 requires each "PC or TP" to assess program performance for each event that resultes in a voltage excursion for which its UVLS Program was designed to operate. In Requirement R5 "PCs and TPs" are again referenced. All of this supports the fact that either the PC or TP could develope UVLS Programs, and I suport this. However, in Requirements R6 and R7 only the PC is identified. IN R6 only the PC has to update its database and in R7 UFLS Entities only have to provide data to the PC. The TP has been left out. Is this intentional? Is it becasue only a PC develops and maintains a UVLS database?
Individual
Marc Donaldson
Tacoma Power
Yes
Yes
Did the SDT consider explicitly including UFLS schemes and controls of shunt capacitors, reactors, and statis Var systems under Requirements R1 and R3 as items to be coordinated with UVLS Programs? In the current draft, these are itemized in the Application Guidelines and Technical Basis.
Yes
In the Compliance section, under 1.2 for Evidence Retention, there should be a maximum evidence retention period. In the extreme, as written now, if an entity is not audited on PRC-010-1, it seems like the entity could have to keep the evidence forever. When developing a CAP, the Transmission Planner or Planning Coordinator should consult, as necessary, with the UVLS entity. Otherwise, the Transmission Planner or Planning Coordinator could specify activities or an implementaiotn schedule that is unreasonable. Rather than modifying the Requirements themselves, this issue should be

addressed in the Application Guidelines and Technical Basis. Similarly, in the Application Guideline and Technical Basis, the Guidelines for Requirement R2 discusses “deferrals or other relevant changes to the UVLS Program specifications or CAP…” While changes to a CAP should be an option, a UVLS entity should consult with the Transmission Planner or Planning Coordinator since the Transmission Planner or Planning Coordinator developed (hopefully in consultation with the UVLS entity) the CAP.

Group

ACES Standards Collaborators

Jason Marshall

ACES

No

While we believe the changes improve the definition, we believe there is still significant ambiguity in the definition that needs to be addressed. First, the example described in the last paragraph of the Guidelines and Technical Basis section on page 18 of the standard is not clearly excluded from the definition as the example implies. Because voltage collapse and instability are often difficult to assess accurately, undervoltage conditions could be a sign of a pending voltage collapse or instability. Thus, we suggest either the definition or example should be modified for clarification. Second, since “Cascading” would impact the BES by definition the inclusion of the clause “impacting the Bulk Electric System (BES)” after the term creates confusion and ambiguity. Is this term intended to apply to “Cascading” only or all items in the list including “voltage collapse” and “voltage instability”? Third, what is the intended difference between “voltage collapse” and “voltage instability”? Can one occur without the other occurring? If not, this creates ambiguity because it is not clear what was the drafting team intended to differentiate by including both terms. Fourth, we believe the inclusion of the clause “impacting the Bulk Electric System (BES)” is grammatically incorrect. It should be “that impacts the Bulk Electric System (BES).”

Yes

(1) This standard is inconsistent with PRC-006-1. PRC-006-1 only requires the PC to develop a UFLS program. The TP is not included in the applicability of the PRC-006-1 standard and, thus, the TP should not be included in the applicability ofPRC-010-1. Furthermore, inclusion of more than one entity in a requirement often creates confusion that leads to inefficiency in demonstrating compliance with the standard, inconsistent application in enforcing the standard, and, as a result, detracts from the true reliability purpose of requirement. When two entities are responsible for the same requirement, compliance and reliability work is often duplicated leading to additional costs for the industry, NERC and the Regional Entities. Compliance monitoring and enforcement is inefficient because NERC and the Regional Entities must assess compliance with multiple entities even if one has essentially taken on the responsibility. For example, when a requirement applies to the PC and TP, an RTO often performs the work that meets compliance. Yet, NERC and Regional Entities assess compliance against the RTO as the PC and all of the potentially dozens (especially for a large RTO) of TPs in its footprint. This is inefficient to say the least. Please remove all applicability to the TP. (2) Because some PC and TPs may ultimately decide to perform an annual assessment of their UVLS Programs as part of their normal planning studies or as part of the Planning Assessment required in the TPL standards, R3 and associated explanations in the Guidelines and Technical Basis should be modified to be clear that these studies will reset the 60-month timeline. The last paragraph of the “Guidelines for Requirement R3” section of the Guidelines and Technical Basis states clearly that if “a Planning Coordinator or Transmission Planner conducts a comprehensive assessment sooner for the reasons discussed above, the 60-month time period would restart upon completion of this assessment.” The “reasons discussed above” do not include that is more convenient to simply include the assessment in the TP’s or PC’s annual Planning Assessment and appear to primarily only include “a material change to system topology or operating conditions.” Thus, this would appear to exclude simply including the assessment in the annual Planning Assessment out of convenience. Please modify the language accordingly to be clear that any assessment performed of the UVLS Program resets the 60-month timeline. (3) Requirements R1 and R3 should use consistent language to avoid ambiguity. R3 uses the term “assessment,” while R1 uses the term “evaluate.” Is there an intended differentiation? If so, what is it? If not, then please settle on one term and use it throughout the standard. (4) We recommend modifying Requirement R4 because it will require

registered entities to prove the negative in order to show compliance. How does an entity prove that a voltage excursion for which the UVLS Program should have operated did not occur? Please consider this and work with NERC compliance to develop an RSAW that avoids the need to prove a voltage excursion did not occur. (5) How is this standard not redundant with the TPL standards? TPL-003-0b R1.3.10 already requires TPL studies to include “the effect of existing and planned protection systems.” Other TPL standards have similar requirements. Since PRC-005-2 includes UVLS in its maintenance interval tables, UVLS would clearly be considered a protection system. TPL-003-0b R2 further compels a PC and TP to develop a “written summary of its plans to achieve the required system performance.” The summary must include an implementation schedule. Obviously, one of the plans could be to install a UVLS system. Again, other TPL standards have similar requirements. Please reconsider if this standard is duplicative of the existing and future TPL standards. (6) R8 is clearly a P81 requirement because it is administrative in nature and provides no reliability benefit. More specifically, it meets criterion B4 – Reporting because it requires reporting to third parties and does not have a discernible impact on reliability. Furthermore, the requirement only compels action if another entity submits a request for the information. Thus, if no entity requests information the requirement compels no action and presumably has no reliability benefit. Thus, the requirement appears to recognize that other PCs and other functional entities more than likely do not have a reliability need. If there was a clear reliability need, the requirement should compel sharing of information without the need for other PCs and functional entities to request it.
Yes
(1) Protection systems should be capitalized throughout the Guidelines and Technical Basis section since it is a NERC defined term. (2) The example described in the last paragraph of the Guidelines and Technical Basis section on page 18 should be made consistent with the BES definition. A radial facility serving only load cannot be part of the BES. If the intention is that the loads in the one-line diagram actually are networked sub-transmission systems greater than 50 kV, then the lines are technically not radial per the BES definition. (3) Thank you for the opportunity to comment.
Group
SPP Standards Review Group
Robert Rhodes
Southwest Power Pool
No
In the 3rd item in the Rationale for Definition wouldn’t it be better if we said ‘…are armed manually or automatically providing the arming is done in anticipation of extreme conditions…’? Using ‘since’ makes it appear that this is an assumption but using ‘providing’ makes it a condition to qualify.
Yes
In the last line of the 1st paragraph following the bullet items on Page 5 (clean copy) in the Background section, insert a hyphen after SPS such that the line reads ‘by SPS- or RAS-related Reliability Standards.’ Also in the Background section, in the last sentence of the 1st paragraph on Page 6 (clean copy), the SDT indicates that PRC-010-1 uses the proposed term Remedial Action Scheme (RAS) rather than the traditional Special Protection System (SPS). We found this to be the case in the formal sections of the standard but note it apparently doesn’t apply to the Rationale Box for the Definition and the Background section of the standard. Wouldn’t it be better to do it throughout all the documentation? The term ‘protection system’ is used in the Background section, the Rationale Box for R3 and the Guidelines and Technical Basis section of the standard; in the FAQ document; and in the RSAW. Shouldn’t this be the capitalized version which is defined in the Glossary of Terms? In Requirement R1 the applicable entity is required to take two (2) actions – evaluate and provide. In order to avoid this multi-action requirement and the associated VSL complexity, shouldn’t R1 be split into two separate requirements – one for the evaluation of the UVLS Program and the second for the distribution of the UVLS Program specification and implementation schedule to the UVLS entities? The Severe VSL for R1 confirms this. The assumption in the VSL is that if the applicable entity didn’t evaluate the program, then they subsequently didn’t distribute the specification and implementation schedule. This may not be the case. How would this VSL be applied if the evaluation was done but the distribution didn’t occur? Splitting the requirement makes it much easier to handle situations like this. Be consistent with the use of hyphenation in phrases such as 60-calendar days, 12-calendar months, three-calendar months, etc. In some places

the SDT uses a hyphen and in others it does not. Please use the hyphen throughout. Sometimes the term Part (when referring to a portion of a requirement) is capitalized and sometimes it is not. It should be capitalized, just like Requirement is when it refers to a specific requirement in the standard. In Requirement R6, the Planning Coordinator is charged with maintaining the UVLS database for those UVLS Programs which exist within its Planning Coordinator area. UVLS Programs are local in nature and it is doubtful that impacts from one Transmission Planner's UVLS Program will bleed over into another Transmission Planner's area. In this situation, the Planning Coordinator doesn't need to play a role in either program so why is it charged with maintaining the UVLS database? If indeed the Planning Coordinator does own a UVLS Program, then it would be logical for the Planning Coordinator to maintain the database for that program only. In a similar vein, Requirement R7 requires the UVLS entities to provide data to the Planning Coordinator in order to maintain the UVLS Program database. If a program is owned by a Transmission Planner, there is no way for that program owner to obtain that data short of specifically requesting the data in Requirement R8. This seems awkward and a bit contrived. Shouldn't the Transmission Planner be added to Requirement R7 and the data be provided by the UVLS entities to the applicable owner of the program? We propose the following changes to Requirements R6, R7 and R8 to address these issues. R6 – Each Planning Coordinator or Transmission Planner that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year. R7 – Each UVLS entity shall provide data to the applicable UVLS Program owner according to the format and schedule specified by the UVLS Program owner to support maintenance of a UVLS Program database. R8 - Each applicable UVLS Program owner (Planning Coordinator or Transmission Planner) shall provide its UVLS Program database to other impacted functional entities with a reliability need, within 30-calendar days of receiving a written request. The proposed language for Requirement R8 also resolves another issue with the use of the phrase 'within its Interconnection'. Although this usage is in conjunction with a request for information, it is still too broad and would require the Planning Coordinator to provide information to entities which are not directly impacted by the Planning Coordinator's or Transmission Planner's UVLS Program. Our suggested changes address this issue by narrowing the focus of this requirement. The interpretation of both parts of the Severe VSL for Requirement R7 is that being more than 90-calendar days late is the same as not providing the data at all. If this is the case, then change the VSL to a simple statement such as 'The applicable entity failed to provide data in accordance with Requirement R7 within 90-calendar days of the specified schedule.' The same logic applies to the Severe VSL for Requirement R8 and a similar fix should be applied. In the 5th line of the 2nd paragraph under Guidelines for UVLS Program Definition on Page 18 (clean copy), delete the 'for' at the end of the line. In the 3rd line of the 3rd paragraph under Guidelines for UVLS Program Definition on Page 18 (clean copy), insert an 'or' between 'one' and 'more'. The term load(s) is used often in the Application Guidelines. Should this term be the capitalized version defined in the Glossary of Terms? In the 2nd line of the 2nd paragraph and in the 3rd line of the 3rd paragraph under Guidelines for Requirement R1 on Page 19 (clean copy), replace 'is' with 'be' in the phrase '…UVLS Program be coordinated with…'. In the 1st line of the 3rd paragraph under Guidelines for Requirement R3 on Page 21 (clean copy), delete the 'and' in 'system and topology'. In the 3rd line of the last paragraph under Guidelines for Requirement R3 on Page 22 (clean copy), replace '60-month' with '60-calendar month'. Make the same change in the 1st line of the 3rd bullet under Guidelines for Requirement R5 on Page 23 (clean copy).
Yes
In the FAQ document: In the 3rd question, replace 'potential' with 'potentially'.
Individual
Cheryl Moseley
Electric Reliability Council of Texas, Inc.
Yes
The SDT should revisit the assignment of responsibility under the standard with respect to all requirements. This review should be conducted relative to the functional model to ensure the responsibilities under the standard align with the scope of responsibilities under the functional

model. Additionally, the SDT should separate the responsibilities of the relevant functions under the standard (e.g. TP and PC) into separate requirements, and, again, the responsibilities under the requirements should be based on the appropriate responsibilities for the functions consistent with the NERC functional model.
Individual
David Kiguel
N/A
Yes
- R2 obligates the UVLS entity to adhere to the UVLS Program and implementation schedule developed by its PC or TP. The standard should include provisions for the UVLS entity to comment and agree with the program and its implementation. - R4 should contain provisions for the RC or TOP to inform the PC and TP on the occurrence of events resulting in voltage excursions for which the UVLS program was designed to operate. The PC and TP are not directly involved in the operation of the BES thus may not have events information. - R5: Identification of deficiencies should be done with participation of the corresponding UVLS entity.
No
Group
PacifiCorp
Sandra Shaffer
PacifiCorp
Yes
No
See Response to Question 3.
Yes
PacifiCorp generally supports the June 24, 2014 version of PRC-010-1, and recommends the Standard Drafting Team add “Transmission Planner” to Requirement R7 to read: “Each UVLS entity and Transmission Planner shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.” Adding the Transmission Planner helps ensure the Planning Coordinator will have the needed information to perform UVLS studies and for event analysis.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Consideration of Comments

Project 2008-02 Undervoltage Load Shedding (UVLS) & Underfrequency Load Shedding (UFLS)

The Project 2008-02 Drafting Team thanks all commenters who submitted comments on the Project 2008-02 Undervoltage Load Shedding (UVLS) draft standard PRC-010-1. These standards were posted for a 45-day public comment period from June 24, 2014 through August, 7, 2014. Stakeholders were asked to provide feedback on the standards and associated documents through a special electronic comment form. There were 38 sets of comments, including comments from approximately 127 different people from approximately 75 companies representing 9 of the 10 Industry Segments as shown in the table on the following pages.

Summary Consideration: The drafting team has carefully considered all comments and suggested revisions. First, some commenters proposed revisions to the language of the proposed NERC Glossary definition of UVLS Program. The drafting team carefully considered all suggested definition revisions. Ultimately, the drafting team determined that the language in the currently proposed UVLS Program definition is sufficient to identify the types of UVLS subject to the standard, however, the drafting team has implemented non-substantive revisions to refine the structure of the definition so that the drafting team's intent is further clarified.

Next, some commenters recommended that the drafting team include Transmission Planners as applicable entities to the Requirements that address UVLS Program databases. The drafting team determined that, as Planning Coordinators have data on all of the programs in their area, and additionally maintain access to adjacent area data, Planning Coordinators have the most comprehensive information available. While Transmission Planners may also maintain data, they may lack the visibility of the system available to the Planning Coordinator, and may access that data through the Planning Coordinator.

Finally, some commenters recommended that the drafting team address Requirement R1 as two separate requirements, one of which would address UVLS Program development, and the other of which would address provision of the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The drafting team agrees that the requirement could have been approached in this manner, yet, ultimately determined that providing program specifications for implementation by UVLS entities is a necessary part of the development of "an effective UVLS Program," and therefore decided not to decouple development with the natural result of that development. As a related matter, there were recommendations to provide a mechanism by which UVLS entities could provide input during the development of a UVLS Program. The team drafted the Requirements with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the development of a UVLS Program or a Corrective Action Plan, to include responding appropriately to inconsistencies, erroneous or incomplete

information, misunderstandings, or issues regarding implementation plans or other obligations that the UVLS entity brings to the attention of the PC or TP.

All comments submitted may be reviewed in their original format on the standard's project page.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process. If you feel there has been an error or omission, you can contact the Director of Standards, Valerie Agnew, at 404-446-2566 or at valerie.agnew@nerc.net . In addition, there is a NERC Reliability Standards Appeals Process.[1]

[1] The appeals process is in the Standard Processes Manual: http://www.nerc.com/comm/SC/Documents/Appendix_3A_StandardsProcessesManual.pdf

The Industry Segments are:

1 — Transmission Owners
2 — RTOs, ISOs
3 — Load-serving Entities
4 — Transmission-dependent Utilities
5 — Electric Generators
6 — Electricity Brokers, Aggregators, and Marketers
7 — Large Electricity End Users
8 — Small Electricity End Users
9 — Federal, State, Provincial Regulatory or other Government Entities
10 — Regional Reliability Organizations, Regional Entities

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
1.	Group	Guy Zito	Northeast Power Coordinating Council										X

	Additional Member	Additional Organization	Region	Segment Selection
1.	Alan Adamson	New York State Reliability Council, LLC	NPCC	10
2.	David Burke	Orange and Rockland Utilities Inc.	NPCC	3
3.	Greg Campoli	New York Independent Sysem Operator	NPCC	2
4.	Sylvain Clermont	Hydro-Quebec TransEnergie	NPCC	1
5.	Chris de Graffenried	Consolidated Edison Co. of New York, Inc.	NPCC	1
6.	Gerry Dunbar	Northeast Power Coordinating Council	NPCC	10
7.	Mike Garton	Dominion Resources Services, Inc.	NPCC	5
8.	Kathleen Goodman	ISO - New England	NPCC	2
9.	Michael Jones	National Grid	NPCC	1
10.	Mark Kenny	Northeast Utilities	NPCC	1
11.	Peter Yost	Consolidated Edison Co, of New York, Inc.	NPCC	3
12.	Helen Lainis	Independent Electricity System Operator	NPCC	2
13.	Alan MacNaughton	New Brunswick Power Corporation	NPCC	9

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10

14.	Bruce Metruck	New York Power Authority	NPCC	6
15.	Silvia Parada Mitchell	NextEra Energy, LLC	NPCC	5
16.	Lee Pedowicz	Northeast Power Coordinating Council	NPCC	10
17.	Robert Pellegrini	The United Illuminating Company	NPCC	1
18.	Si Truc Phan	Hydro-Quebec Trans-Energie	NPCC	1
19.	David Ramkalawan	Ontario Power Generation, Inc.	NPCC	5
20.	Brian Robinson	Utility Services	NPCC	8
21.	Ayesha Sabouba	Hydro One Networks Inc.	NPCC	1
22.	Brian Shanahan	National Grid	NPCC	1
23.	Wayne Sipperly	New York Power Authority	NPCC	5
24.	Ben Wu	Orange and Rockland Utilities Inc.	NPCC	1

2.	Group	Janet Smith	Arizona Public Service Co	X		X		X	X				

N/A

3.	Group	Louis Slade	Dominion	X		X		X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	Mike Garton	NERC Compliance Policy	NPCC	5, 6
2.	Connie Lowe	NERC Compliance Policy	RFC	5
3.	Randi Heise	NERC Compliance Policy	SERC	1, 3, 5, 6
4.	Chip Humphrey	Power Generation Compliance	SERC	5
5.	Jarad L Morton	Power Generation Compliance	NPCC	5
6.	Larry Whanger	Power Generation Compliance	RFC	5
7.	Larry Nash	Electric Transmission Compliance	SERC	1, 3
8.	Candace L Marshall	Electric Transmission Compliance	SERC	1, 3
9.	Angela Park	Electric Transmission Compliance	SERC	1, 3
10.	Jeffrey N Bailey	Nuclear Compliance	NA - Not Applicable	5

4.	Group	Mike O'Neil	Florida Power & Light	X									

N/A

5.	Group	Dennis Chastain	Tennessee Valley Authority	X		X		X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	DeWayne Scott		SERC	1
2.	Ian Grant		SERC	3

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10

3.	Brandy Spraker		SERC	5
4.	Marjorie Parsons		SERC	6

6.	Group	Joe DePoorter	MRO NERC Standards Review Forum	X	X	X	X	X	X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	Amy Casuscelli	Xcel Energy	MRO	1, 3, 5, 6
2.	Chuck Wicklund	Otter Tail Power Company	MRO	1, 3, 5
3.	Dan Inman	Minnkota Power Coop	MRO	1, 3, 5, 6
4.	Dave Rudolph	Basin Electric Power Coop	MRO	1, 3, 5, 6
5.	Kayleigh Wilkerson	Lincoln Electric System	MRO	1, 3, 5, 6
6.	Jodi Jensen	WAPA	MRO	1, 6
7.	Joseph DePoorter	Madison Gas & Electric	MRO	3, 4, 5, 6
8.	Ken Goldsmith	Alliant Energy	MRO	4
9.	Mahmood Safi	Omaha Public Power District	MRO	1, 3, 5, 6
10.	Marie Knox	MISO	MRO	2
11.	Mike Brytowski	Great River Energy	MRO	1, 3, 5, 6
12.	Randi Nyholm	Minnesota Power	MRO	1, 5
13.	Scott Nickels	Rochester Public Utilities	MRO	4
14.	Terry Harbour	MidAmerican Energy	MRO	1, 3, 5, 6
15.	Tom Breene	Wisconsin Public Service	MRO	3, 4, 5, 6
16.	Tony Eddleman	Nebraska Public Power District	MRO	1, 3, 5

7.	Group	Patricia Robertson	BC Hydro	X	X	X		X					

	Additional Member	Additional Organization	Region	Segment Selection
1.	Venkataramakrishnan Vinnakota	BC Hydro	WECC	2
2.	Pat G. Harrington	BC Hydro	WECC	3
3.	Clement Ma	BC Hydro	WECC	5

8.	Group	David Greene	SERC Protection and Controls Subcommittee										

	Additional Member	Additional Organization	Region	Segment Selection
1.	Charles Fink	Entergy		
2.	Paul Nauert	Ameren		

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10
3. Rebika Yitna	MEAG											
4. David Greene	SERC											
9. Group	Colby Bellville	Duke Energy	X		X		X	X				
Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1. Doug Hils	Duke Energy	RFC	1									
2. Lee Schuster	Duke Energy	FRCC	3									
3. Dale Goodwine	Duke Energy	SERC	5									
4. Greg Cecil	Duke Energy	RFC	6									
10. Group	Greg Campoli	IRC Standards Review Committee		X								
Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1. Ben Li	IESO	NPCC	2									
2. Charles Yeung	SPP	SPP	2									
3. Ali Miremadi	CAISO	WECC	2									
4. Cheryl Moseley	ERCOT	ERCOT	2									
5. Matt Goldberg	ISONE	NPCC	2									
6. Lori Spence	MISO	MRO	2									
7. Stephanie Monzon	PJM	RFC	2									
11. Group	Carol Chinn	Florida Municipal Power Agency	X		X	X	X	X				
Additional Member	**Additional Organization**	**Region**	**Segment Selection**									
1. Tim Beyrle	City of New Smyrna Beach	FRCC	4									
2. Jim Howard	Lakeland Electric	FRCC	3									
3. Greg Woessner	Kissimmee Utility Authority	FRCC	3									
4. Lynne Mila	City of Clewiston	FRCC	3									
5. Cairo Vanegas	Fort Pierce Utility Authority	FRCC	4									
6. Randy Hahn	Ocala Utility Service	FRCC	3									
7. Stanley Rzad	Keys Energy Services	FRCC	4									
8. Don Cuevas	Beaches Energy Services	FRCC	1									
9. Mark Schultz	City of Green Cove Springs	FRCC	3									
10. Tom Reedy	Florida Municipal Power Pool	FRCC	6									
11. Steve Lancaster	Beaches Energy Services	FRCC	3									

Group/Individual	Commenter	Organization	Registered Ballot Body Segment									
			1	2	3	4	5	6	7	8	9	10
12. Richard Bachmeier	Gainesville Regional Utility	FRCC 1										
13. Mike Blough	Kissimmee Utility Authority	FRCC 5										
12. Group	Jason Marshall	ACES Standards Collaborators						X				

	Additional Member	Additional Organization	Region	Segment Selection
1.	John Shaver	Arizona Electric Power Cooperative	WECC	4, 5
2.	John Shaver	Southwest Transmission Cooperative	WECC	1
3.	Shari Heino	Brazos Electric Power Cooperative	ERCOT	1, 5
4.	Kevin Lyons	Central Iowa Power Cooperative	MRO	1
5.	Michael Brytowski	Great River Energy	MRO	1, 3, 5, 6
6.	Mark Ringhausen	Old Dominion Electric Cooperative	SERC	3, 4
7.	Karl Kohlrus	Prairie Power	SERC	3
8.	Bill Hutchison	Southern Illinois Power Cooperative	SERC	1, 5
9.	Ellen Watkins	Sunflower Electric Power Corporation	SPP	1
10.	Bob Solomon	Hoosier Energy	RFC	1

13.	Group	Robert Rhodes	SPP Standards Review Group		X								

	Additional Member	Additional Organization	Region	Segment Selection
1.	Jonathan Hayes	Southwest Power Pool	SPP	2
2.	Shannon Mickens	Southwest Power Pool	SPP	2
3.	James Nail	City of Independence, MO	SPP	3

14.	Group	Sandra Shaffer	PacifiCorp						X				
N/A													
15.	Individual	Muhammed Ali	Hydro One	X		X							
16.	Individual	Si Truc PHAN	Hydro-Quebec TransEnergie	X									
17.	Individual	Dan Inman	Minnkota Power Cooperative	X									
18.	Individual	Russ Schneider	Flathead Electric Cooperative, Inc.			X	X						
19.	Individual	Amy Casuscelli	Xcel Energy	X		X		X	X				
20.	Individual	Andrew Z Pusztai	American Transmission Company LLC	X									
21.	Individual	Thomas Foltz	American Electric Power	X		X		X	X				

Group/Individual		Commenter	Organization	Registered Ballot Body Segment									
				1	2	3	4	5	6	7	8	9	10
22.	Individual	Puget Sound Energy	Puget Sound Energy	X		X		X					
23.	Individual	Trevor Schultz	Idaho Power Company	X									
24.	Individual	Mark Wilson	Independent Electricity System Operator		X								
25.	Individual	Chris Scanlon	Exelon Companies	X		X		X	X				
26.	Individual	Larry Watt	Lakeland Electric	X									
27.	Individual	Kayleigh Wilkerson	Lincoln Electric System	X		X		X	X				
28.	Individual	Paul Shipps	Lakeland Electric						X				
29.	Individual	John Pearson/ Matt Goldberg	ISO New England		X								
30.	Individual	Texas Reliability Entity, Inc.	Texas Reliability Entity, Inc.										X
31.	Individual	Anthony Jablonski	ReliabilityFirst										X
32.	Individual	David Jendras	Ameren	X		X		X	X				
33.	Individual	Gul Khan	Oncor Electric Delivery LLC	X									
34.	Individual	Richard Vine	California ISO		X								
35.	Individual	Steve Rueckert	WECC										X
36.	Individual	Marc Donaldson	Tacoma Power	X		X	X	X	X				
37.	Individual	Cheryl Moseley	Electric Reliability Council of Texas, Inc.		X								
38.	Individual	David Kiguel	N/A								X		

If you support the comments submitted by another entity and would like to indicate you agree with their comments, please select "agree" below and enter the entity's name in the comment section (please provide the name of the organization, trade association, group, or committee, rather than the name of the individual submitter).

Summary Consideration: **The drafting team thanks you for your comments. The drafting team has carefully considered all comments and suggested revisions.**

Organization	Agree	Supporting Comments of "Entity Name"
Lakeland Electric	Agree	FMPA
Lakeland Electric	Agree	FMPA
ISO New England	Agree	ISO RTO Council Standards Review Committee (SRC)
California ISO	Agree	ISO/RTO Standards Review Committee (SRC)

1. **The drafting team has proposed a new NERC Glossary term, "UVLS Program," and has included supporting information in an accompanying Rationale box and in the standard document's Guidelines and Technical Basis section. Does the defined term and supporting information provide the clarity necessary to understand which types of UVLS are applicable to the standard? If no, please indicate your concerns in the comment section and provide specific suggested changes.**

Summary Consideration: The drafting team has carefully considered all suggested definition revisions. The drafting team has determined that the language in the currently proposed UVLS Program definition is sufficient to identify the types of UVLS subject to the standard, however, the drafting team has implemented non-substantive revisions to refine the structure of the definition so that the drafting team's intent is further clarified. The drafting team notes that there has been much consideration given to using words such as "local" and "contained" to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide latitude for the Planning Coordinator or Transmission Planner to determine if UVLS falls under the defined term based on the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this latitude has been further clarified in the accompanying Rationale box.

Organization	Yes or No	Question 1 Comment
Northeast Power Coordinating Council	No	The defined term, the Rationale for Definition, and Guidelines for UVLS Program Definition do not provide clarity for the scope of the UVLS Program. Each section subtly defines the term and objective differently. All three do emphasize in a similar manner that the term UVLS Program applies to distributed relays and controls and not to centrally controlled programs. Differences are: The definition utilizes the words "mitigate undervoltage conditions", whereas the Guidelines state "a UVLS Program must mitigate risk of one or more of the following:" and Item 1 of the Rationale says "with respect to the impact on the reliability of the BES." Standardizing on the UVLS program mitigates the risk of an undervoltage condition that will result in voltage instability, voltage collapse, or Cascading across a majority of Elements in an Interconnection. The

Organization	Yes or No	Question 1 Comment
		present definition uses the concept of impacting the BES, but this is problematic because voltage instability can impact a small portion of the BES as pointed out in the Technical Guideline. In the proposed revision suggest using the word Interconnection. RESPONSE: The drafting team thanks you for your comments. The drafting team notes that the first quote is directed to the intended function of a UVLS program as defined, and the definition incorporates the language to which the commenter refers: "[A] UVLS Program must mitigate risk of one more of the following: voltage instability, voltage collapse, or Cascading impacting the BES." (Guidelines and Technical Basis document p.18.). Each document describes the UVLS program using language and terms that complement one another without contradiction, to provide a comprehensive description of the components of a UVLS Program as defined. Taken together, the documents clarify the term and thereby facilitate a more perfect understanding of what elements constitute a UVLS Program to which the standard is directed. We support the intention of the definition of the new term "UVLS Program", primarily the exclusion of centrally controlled undervoltage-based load shedding and the inclusion of only the UVLS used to mitigate serious impacts to the BES. However, although we agree to use the Guidelines as clarification for the definition, we feel that the concept of "contained area" (that we support) introduced in the Guidelines (radial BES with limited impact versus rest of the BES) is totally absent from the definition itself. The term "impacting the BES" used in the definition does not differentiate between a widespread BES undervoltage consequence and a contained "local area" issue. Without reviewing the whole definition, the SDT should consider at least introducing this concept in the definition. It brings a crucial clarification in classifying a UVLS scheme.

Organization	Yes or No	Question 1 Comment
		RESPONSE: The drafting team thanks you for your comment. The phrase "impacting the Bulk Electric System" has been added to the definition to further clarify the applicable UVLS. The drafting team also notes that, regardless of where the UVLS relays and controls are located and where they shed load, if a UVLS program is there to protect the BES, it falls under the definition and is subject to the standard. Suggest that the standard explicitly define or describe that there are three Categories of UVLS schemes (or systems):1. Centrally controlled undervoltage based schemes (or systems), which would be RAS.2. UVLS Programs, as defined in the proposed PRC 010 1 (with additional clarity suggested below), to which PRC 010 1 applies.3. The remaining UVLS schemes (or systems), meant to resolve local undervoltage issues or protect equipment, etc., which are neither RAS nor part of the UVLS Program. The lack of explicit distinction between Categories 2 and 3 (and some of the language in the proposed PRC 010 1) leads to the interpretation that all UVLS schemes are either RAS or UVLS Program, as is apparently the case in the revised definition of RAS (Project 2010 05.2), where it includes Category 1 in RAS and excludes Category 2 from RAS, but does not recognize and mention Category 3. RESPONSE: The drafting team thanks you for your comment. There is coordination between drafting teams, and changes will be made as appropriate to account for circumstances that occur during standards development. The drafting team has implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS. To distinguish between UVLS Programs and non Programs (Categories 2 and 3), the standard proposes examining the impact of the contingency which

Organization	Yes or No	Question 1 Comment
		the UVLS scheme (or system) is intended to mitigate. In the proposed definition of UVLS Program, if the contingency is "impacting the BES" the UVLS becomes a Program. This could lead to the interpretation that if the impact is even on only one BES element that is directly affected by the contingency, the UVLS is a Program. Since voltage instability or collapse could be very localized, we suggest clarifying the definition by changing "impacting the BES" to "impacting the BES outside the contained area" as indicated in the Guidelines and Technical Basis section, or a similar description to provide clarity for differentiating the UVLS Program from non Programs. RESPONSE: The drafting team thanks you for your suggestion. The drafting team notes that there has been much consideration given to using words such as "local" and "contained" to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide latitude for the Planning Coordinator or Transmission Planner to determine if a UVLS falls under the defined term based on the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this latitude has been further clarified in the accompanying Rationale box. The drafting team has also implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.

Organization	Yes or No	Question 1 Comment
Dominion	No	The definition of UVLS Program states in part, “An automatic load shedding program...” while the Rational for Definition item #3 states “the definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically...” Dominion suggests that the SDT provide clarity on this perceived conflict. The definition of the UVLS program uses both the term “voltage instability” and “voltage collapse.” In the NERC glossary of terms, Stability is defined as “The ability of an electric system to maintain a state of equilibrium during normal and abnormal conditions or disturbances.” Voltage instability, then, means that the voltage never reaches an equilibrium. In other words, it continues to fall (collapses) towards zero. Therefore “voltage instability” and “voltage collapse” are the same term and redundant. One might have a voltage stability problem for a voltage rise such as due to the Ferranti effect, but certainly a UVLS program would not help with that. Dominion suggests the drafting team should either 1) delete the term “voltage instability” and use the term “voltage collapse” only or say instead “...to mitigate undervoltage conditions leading to voltage instability (voltage collapse) or Cascading impacting ...” RESPONSE: The drafting team thanks you for your comments. The drafting team notes that: “When a generator of a heavily loaded electric power system reaches a reactive power limit, the system can become immediately unstable and a dynamic voltage collapse leading to blackout may follow.” Dobson, I; Lu, L., "Voltage collapse precipitated by the immediate change in stability when generator reactive power limits are encountered," *Circuits and Systems I: Fundamental Theory and Applications, IEEE Transactions on*, vol.39, no.9, pp.762,766, Sept. 1992.

Organization	Yes or No	Question 1 Comment
		Voltage instability, therefore, does not necessarily result in voltage collapse, rather, voltage instability may result in voltage collapse. The drafting team notes that, whether automatic or manual, the arming is in response to system conditions indicative of voltage concerns rather than in response to the actual instability or collapse.
Duke Energy	No	Duke Energy requests further clarification from the standard drafting team on whether this standard would apply to UVLS relays that only protect small a area (e.g. a small city). In this instance, this would not be considered to be a "distributed relays and controls," however, it is possible that voltage collapse, as referenced in the definition, could occur in a small area. This could be interpreted as a UVLS application, and one that is not centrally controlled. Furthermore, we request the standard drafting team to more clearly define what constitutes a "program," as opposed to one relay that protects one city to prevent voltage collapse in that specific area. In this instance, would this be considered an SPS/RAS, or would it fall under the "UVLS Program" definition? RESPONSE: The drafting team thanks you for your suggestion. The drafting team notes that there has been much consideration given to using words such as "local" and "contained" to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide latitude for the Planning Coordinator or Transmission Planner to determine if UVLS falls under the defined term based on the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" is included in the definition to provide further clarification,

Organization	Yes or No	Question 1 Comment
		and this latitude has been further clarified in the accompanying Rationale box. The drafting team has also implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.
IRC Standards Review Committee	No	The proposed definition still needs improvement. The drafting team has added the phrase "impacting the Bulk Electric System (BES)" to the definition in an attempt to clarify that local programs are not included in the definition of UVLS Program. However, the impact would be only to the local area if a single BES element is affected. Thus, the definition should clearly state that local programs do not fall under the definition of UVLS Program. We recommend adopting this language: Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program consisting of relays and controls that operated in a coordinated manner to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading that have an impact beyond the local area as determined by the Planning Coordinator or Transmission Planner. Centrally controlled undervoltage based load shedding or multiple independent relays are not included. In addition, in its response to comments received on the previous version of the standard, the drafting team states that "the intent of the definition is to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to the impact on the reliability of the BES." The SRC does not believe that the proposed definition provides that flexibility. RESPONSE: The drafting team thanks you for your suggestion. Upon consideration, the drafting team replaced the prior language of the

Organization	Yes or No	Question 1 Comment
		explanatory material with the term "latitude" to more clearly describe the drafting team's intention that the Planning Coordinator or Transmission Planner work within the boundaries of the standard to determine if UVLS falls under the defined term based on the impact on the reliability of the BES. The drafting team also states that "multiple independent relays do not constitute a program" and that a UVLS program "would include relays that are coordinated and act in concert for this purpose." The SRC suggests that these concepts be expressly reflected in the definition of UVLS Program. RESPONSE: The drafting team thanks you for your suggestion. The drafting team has also implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS. The standard, technical paper and definition need to clarify the distinction between 'centrally controlled' and 'locally applied'. There seems to be a contradiction for the exclusion allowed in the definition and the exception explained in the FAQ. RESPONSE: The drafting team thanks you for your suggestion. The drafting team notes that there has been much consideration given to using words such as "local" and "contained" to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide latitude for the Planning Coordinator or Transmission Planner to determine if a UVLS falls under the defined term based on the impact on the reliability of the BES

Organization	Yes or No	Question 1 Comment
		(voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this latitude has been further clarified in the accompanying Rationale box. The drafting team has also revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.
ACES Standards Collaborators	No	While we believe the changes improve the definition, we believe there is still significant ambiguity in the definition that needs to be addressed. First, the example described in the last paragraph of the Guidelines and Technical Basis section on page 18 of the standard is not clearly excluded from the definition as the example implies. Because voltage collapse and instability are often difficult to assess accurately, undervoltage conditions could be a sign of a pending voltage collapse or instability. Thus, we suggest either the definition or example should be modified for clarification. RESPONSE: The drafting team thanks you for your comments. The drafting team agrees with the comments regarding the example on page 18 of the Guidelines and Technical and has modified the example in accordance with your comment. Second, since "Cascading" would impact the BES by definition the inclusion of the clause "impacting the Bulk Electric System (BES)" after the term creates confusion and ambiguity. Is this term intended to apply to "Cascading" only or all items in the list including "voltage collapse" and "voltage instability"? RESPONSE: The drafting team thanks you for your comments. The drafting team agrees that Cascading as a defined term is applicable to the BES. The phrase "impacting the Bulk Electric System" has been added to the definition for the purpose of clarification and is intended to apply to

Organization	Yes or No	Question 1 Comment
		"voltage instability, voltage collapse, or Cascading". The drafting team has also implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS. Third, what is the intended difference between "voltage collapse" and "voltage instability"? Can one occur without the other occurring? If not, this creates ambiguity because it is not clear what was the drafting team intended to differentiate by including both terms. RESPONSE: The drafting team thanks you for your comments. The drafting team notes that: "When a generator of a heavily loaded electric power system reaches a reactive power limit, the system can become immediately unstable and a dynamic voltage collapse leading to blackout may follow." Dobson, I; Lu, L., "Voltage collapse precipitated by the immediate change in stability when generator reactive power limits are encountered," *Circuits and Systems I: Fundamental Theory and Applications, IEEE Transactions on*, vol.39, no.9, pp.762,766, Sept. 1992. Voltage instability, therefore, does not necessarily result in voltage collapse, rather, voltage instability may result in voltage collapse. Fourth, we believe the inclusion of the clause "impacting the Bulk Electric System (BES)" is grammatically incorrect. It should be "that impacts the Bulk Electric System (BES)." RESPONSE: The drafting team thanks you for your suggestion. The drafting team has implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified.

Organization	Yes or No	Question 1 Comment
SPP Standards Review Group	No	In the 3rd item in the Rationale for Definition wouldn't it be better if we said '...are armed manually or automatically providing the arming is done in anticipation of extreme conditions...'? Using 'since' makes it appear that this is an assumption but using 'providing' makes it a condition to qualify. RESPONSE: The drafting team thanks you for your comment. The drafting team considers "since" acceptable because the distinction is associated with timing of the arming rather than the intent (qualifying condition) of the arming.
Hydro One	No	We suggest that the standard explicitly define or describe that there are three categories of UVLS schemes (or systems):1. Centrally-controlled undervoltage-based schemes (or systems), which would be RAS.2. UVLS Programs, as defined in the proposed PRC-010-1 (with additional clarity suggested below), to which PRC-010-1 applies.3. The remaining UVLS schemes (or systems), meant to resolve local undervoltage issues or protect equipment, etc., which are neither RAS nor UVLS Program. The lack of explicit distinction between Category 2 and 3 (and some of the language in the proposed PRC-010-1) leads to the interpretation that all UVLS schemes are either RAS or UVLS Program, as is apparently the case in the revised definition of RAS (Project 2010-05.2), where it includes category 1 in RAS and excludes category 2 from RAS, but does not recognize and mention category 3. To distinguish between UVLS Programs and non-Programs (category 2 and 3), the standard proposes examining the impact of the contingency which the UVLS scheme (or system) is intended to mitigate. In the proposed definition of UVLS Program, if the contingency is "impacting the BES", the UVLS becomes a Program. This could lead to the interpretation that if the impact is even on only one BES element, that is directly affected by the contingency, the UVLS is a Program.

Organization	Yes or No	Question 1 Comment
		Since voltage instability or collapse could be very localized, we suggest clarifying the definition by changing “impacting the BES” to ““impacting the BES outside the contained area” as indicated in the Guidelines and Technical Basis section, or a similar description to provide clarity for differentiating UVLS Programs from non-Programs RESPONSE: The drafting team thanks you for your suggestion. The drafting team notes that there has been much consideration given to using words such as “local” and “contained” to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide latitude for the Planning Coordinator or Transmission Planner to determine if UVLS falls under the defined term based on the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase “impacting the Bulk Electric System” has been added to the definition for further clarification, and this latitude has been further clarified in the accompanying Rationale box.
Flathead Electric Cooperative, Inc.	No	The phrase "Cascading impacting the Bulk Electric System (BES)" is not really specific to what UVLS is, but rather what the standard should apply too and don't think it fits in the definition. Only UVLS equipment that could result in these types of impacts should be in scope, but that isn't really the definition of UVLS per se. RESPONSE: The drafting team thanks you for your suggestion. The drafting team has implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team’s intent is further clarified, and revised the examples in the Guidelines and

Organization	Yes or No	Question 1 Comment
		Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.
American Transmission Company LLC	No	ATC remains concerned that the temporary UVLSs used to support maintenance or construction outages in the Real Time and Operations Planning time horizons are not explicitly excluded from PRC-010-1. ATC recommends the inclusion of text that explicitly states that the standard does not apply to the development and implementation of temporary UVLS Programs for maintenance or construction outage purposes in the Operations Planning horizon. ATC recommends revising the second sentence in the proposed definition of Undervoltage Load Shedding Program (UVLS Program) to read, "Centrally-controlled undervoltage-based load shedding and temporary undervoltage-based load shedding developed and implemented for maintenance and construction outage purposes in the Operations Planning horizon are not included." As an alternative to modifying the definition of UVLS Program, ATC recommends adding text such as, " The development and implementation of temporary UVLS Programs for maintenance or construction outage purposes in the Operations Planning horizon do not apply to this standard" at the end of Section A.4. "Applicability" or Section A.5. "Background." RESPONSE: The drafting team thanks you for your comment. Upon consideration, the drafting team maintains that the requested explicit qualification that UVLS Programs are not temporary schemes is not necessary on the basis that the nature of such a scheme would not meet the attributes of the defined term. In addition, the drafting team has implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.

Organization	Yes or No	Question 1 Comment
American Electric Power	No	AEP appreciates the efforts of the drafting team to provide clarification that the programs specified are only those which impact the BES, however as written, the definition could possibly be misinterpreted that only the word "cascading" is associated with the phrase "impacting the Bulk Electric System (BES)". To avoid potential misinterpretation, AEP suggests using "An automatic load shedding program consisting of distributed relays and controls used to mitigate undervoltage conditions leading to BES voltage instability, BES voltage collapse, or BES Cascading. RESPONSE: The drafting team thanks you for your comments. Upon consideration, the drafting team has implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS. "In addition, the callout states "The definition provides flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term..." We do not believe "flexibility" is an appropriate attribute of a definition. Might the team actually mean "clarity" rather than "flexibility"? Please explain. RESPONSE: The drafting team thanks you for your comment. Upon consideration, the drafting team has determined that the term "latitude" more clearly describes the drafting team's intentions in relation to the rationale box to which you refer, and as such, has made the appropriate revisions to the explanation contained therein.
Arizona Public Service Co	Yes	RESPONSE: The drafting team thanks you for your support.

Organization	Yes or No	Question 1 Comment
Florida Power & Light	Yes	RESPONSE: The drafting team thanks you for your support.
Tennessee Valley Authority	Yes	RESPONSE: The drafting team thanks you for your support.
MRO NERC Standards Review Forum	Yes	: Recommend that the word “failures” be added after Cascading to a line with the definition of Reliable Operation. RESPONSE: The drafting team thanks you for your comments. Upon consideration, the drafting team has implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team’s intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.
BC Hydro	Yes	RESPONSE: The drafting team thanks you for your support.
SERC Protection and Controls Subcommittee	Yes	RESPONSE: The drafting team thanks you for your support.
Florida Municipal Power Agency	Yes	RESPONSE: The drafting team thanks you for your support.
PacifiCorp	Yes	RESPONSE: The drafting team thanks you for your support.
Hydro-Quebec TransEnergie	Yes	Hydro-Quebec supports the intention of the definition of the new term “UVLS Program”, mainly the exclusion of Centrally controlled undervoltage-based load shedding and the inclusion of only those UVLS used to mitigate serious impacts on the BES. However, although we agree to use the guidelines as additional inputs to the definition, we feel that the concept of “contained area” (that we support) introduced in the guidelines (radial BES with limited impact versus rest of the BES) is totally absent from the definition itself. The terms

Organization	Yes or No	Question 1 Comment
		"impacting the BES" used in the definition do not bring any nuance between a widespread BES undervoltage consequence and a contained "local area" issue. Without reviewing the whole definition, it seems like the SDT should consider at least introducing this concept in the definition, as it brings a crucial clarification in classifying a UVLS scheme. RESPONSE: The drafting team thanks you for your suggestion. The drafting team notes that there has been much consideration given to using words such as "local" and "contained" to help qualify those programs that are excluded from the definition (as per the example given in the Guidelines and Technical Basis). However, these terms are considered ambiguous and are not transportable on a continent-wide basis, and could therefore potentially be interpreted differently by auditors and the applicable functional entities. The intent of the definition is to provide latitude for the Planning Coordinator or Transmission Planner to determine if UVLS falls under the defined term based on the impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). The phrase "impacting the Bulk Electric System" has been added to the definition for further clarification, and this latitude has been further clarified in the accompanying Rationale box. The drafting team has also implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised the examples in the Guidelines and Technical Basis section to further illustrate the distinctions between UVLS Programs and other UVLS.
Minnkota Power Cooperative	Yes	Is it possible that the word "program" could be replaced with a more generic term (such as "system" as used in page 18 in the Guidelines and Technical Basis document). We would recommend that a search be done for all the instances of the word "program" (lower case "p") in the standard, and they be change in like manner to avoid confusion with the definition. So, the definition would read: Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding system consisting of distributed

Organization	Yes or No	Question 1 Comment
		relays and controls used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES). Centrally -controlled undervoltage-based load shedding is not included. RESPONSE: The drafting team thanks you for your comments. The drafting team has also implemented non-substantive revisions to the definition of UVLS Program to refine the structure of the definition so that the drafting team's intent is further clarified, and revised of instances of "UVLS program" and "UVLS system" to "UVLS" to address this issue.
Xcel Energy	Yes	RESPONSE: The drafting team thanks you for your support.
Puget Sound Energy	Yes	RESPONSE: The drafting team thanks you for your support.
Idaho Power Company	Yes	It was actually a phone call from a drafting team member that helped provide clarity more than anything else. RESPONSE: The drafting team thanks you for your comment.
Independent Electricity System Operator	Yes	RESPONSE: The drafting team thanks you for your support.
Exelon Companies	Yes	RESPONSE: The drafting team thanks you for your support.
Texas Reliability Entity, Inc.	Yes	RESPONSE: The drafting team thanks you for your support.
Ameren	Yes	RESPONSE: The drafting team thanks you for your support.
Oncor Electric Delivery LLC	Yes	RESPONSE: The drafting team thanks you for your support.
WECC	Yes	RESPONSE: The drafting team thanks you for your support.

Organization	Yes or No	Question 1 Comment
Tacoma Power	Yes	RESPONSE: The drafting team thanks you for your support.

2. Do you have any concerns with the standard itself, including the Applicability section, Requirements, Measures, Violation Risk Factors (VRFs), and Violation Severity Levels (VSLs)? If yes, please indicate your concerns in the comment section and provide specific suggested changes

Summary Consideration: It has been suggested that the drafting team address Requirement R1 as two separate requirements, one of which would address UVLS Program development, and the other of which would address provision of the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The drafting team agrees that the requirement could have been approached in this manner. Ultimately, it has determined that providing program specifications for implementation by UVLS entities is a necessary part of the development of "an effective UVLS Program," and therefore has determined not to decouple development with the natural result of that development. As a related matter, there were recommendations to provide a mechanism by which UVLS entities could provide input during the development of a UVLS Program. The Requirements were drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the development of a UVLS Program or a Corrective Action Plan, to include responding appropriately to inconsistencies, erroneous or incomplete information, misunderstandings, or issues regarding implementation plans or other obligations that the UVLS entity brings to the attention of the PC or TP. To design an effective UVLS Program or Corrective Action Plan, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that UVLS Program or Corrective Action Plan. It is expected that the developing entity will revise a Corrective Action Plan that is determined compromised by circumstances that prevent a UVLS entity from fulfilling obligations imposed by that plan, including schedule.

Organization	Yes or No	Question 2 Comment
MRO NERC Standards Review Forum	No	RESPONSE: The drafting team thanks you for your support.
SERC Protection and Controls Subcommittee	No	RESPONSE: The drafting team thanks you for your support.
PacifiCorp	No	See Response to Question 3.

Organization	Yes or No	Question 2 Comment
		RESPONSE: The drafting team thanks you for your input, please see Response to Question 3 comment.
Hydro-Quebec TransEnergie	No	RESPONSE: The drafting team thanks you for your support.
Minnkota Power Cooperative	No	RESPONSE: The drafting team thanks you for your support.
Flathead Electric Cooperative, Inc.	No	RESPONSE: The drafting team thanks you for your support.
American Transmission Company LLC	No	RESPONSE: The drafting team thanks you for your support.
American Electric Power	No	RESPONSE: The drafting team thanks you for your support.
Idaho Power Company	No	RESPONSE: The drafting team thanks you for your support.
Independent Electricity System Operator	No	RESPONSE: The drafting team thanks you for your support.
Exelon Companies	No	RESPONSE: The drafting team thanks you for your support.
Ameren	No	RESPONSE: The drafting team thanks you for your support.
Oncor Electric Delivery LLC	No	RESPONSE: The drafting team thanks you for your support.
WECC	No	RESPONSE: The drafting team thanks you for your support.
Northeast Power Coordinating Council	Yes	R1 should be divided into two separate requirements. One requirement should be to develop an effective UVLS Program, and the second requirement should be to provide the program specifications to UVLS Entities.

Organization	Yes or No	Question 2 Comment
		RESPONSE: The drafting team thanks the commenter for the suggestion, and agrees that the requirement could have been approached in this manner. The drafting team, however, determined that providing program specifications for implementation by UVLS entities is a necessary part of the development of "an effective UVLS Program," and therefore it is prudent to couple development with the natural result of that development. In R1 replace the word "developing" with the phrase "identifies the need for a UVLS Program..." RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that using the phrase "identifies the need for a UVLS Program" would serve as an acceptable alternative to using the term "developing" in Requirement R1. The drafting team notes that identification of the need for a UVLS Program is the first step of development. Therefore, the drafting team has determined that the language "Each Planning Coordinator or Transmission Planner that is developing a UVLS Program . . ." clearly expresses the expectation that the identification of the need for a ULVS Program will initiate development of a ULVS Program. Also, it is unclear if the phrase in R1 "but is not limited to..." is applied to the criteria for evaluation in Parts 1.1 and 1.2, or if it applies to the "studies and analyses". RESPONSE: The phrase "is not limited to . . ." is intended to convey that at a minimum, studies and analyses must be conducted that evaluate the particularities of the UVLS Program as required by R3, Part 3.1 and Part 3.2. The phrase indicates that any other available tools or methods that further inform evaluation of the UVLS Program may be available for use. R1 would be revised to: Each Planning Coordinator or Transmission Planner that identifies the risk of undervoltage contingencies that will result in voltage instability, voltage collapse, or Cascade across a majority of Elements in an Interconnection shall develop a UVLS Program to address these risks. The UVLS program shall at a minimum: 1.1 Resolve or mitigate the identified risks it was required to mitigate.

Organization	Yes or No	Question 2 Comment
		1.2 Integrate through coordination with generator voltage ride through, etc.....The implementation portion of R1 would become a new requirement. The PC or TPL that develops a UVLS program shall provide the program specifications and implementation schedule to the UVLS Entities responsible for the UVLS Program implementation. The SDT should consider if a time period between completion assessment and delivery of implementation is required similar to R5.The need for studies and analyses in R1 would move to M1 as a measure. RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that this approach would serve as an acceptable alternative to the approach selected by the drafting team. However, the drafting team asserts that the language expressed by Requirement R1 as currently drafted clearly conveys the expectation that the identification of the need for a ULVS Program will initiate development of a ULVS Program. We have a concern with Requirement R2 in that it gives considerable authority to the Planning Coordinator or Transmission Planner. Nowhere in the new standard is there any proviso for an UVLS entity such as a TO to comment or advise on the feasibility of the program specification, and particularly the implementation schedule. There should be an opportunity for the UVLS entity to provide input to the plan and schedule, and a mechanism for resolving disagreement. We have a similar concern with Requirement R5 with regard to the specification and execution of the CAP. RESPONSE: The drafting team thanks you for your comment. Requirement R2 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the design and development of a UVLS program, to include responding appropriately to inconsistencies, erroneous or incomplete information, or misunderstandings that the UVLS entity brings to the attention of the PC or TP. To design an effective UVLS Program, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that UVLS Program.

Organization	Yes or No	Question 2 Comment
		It is unclear if the phrase in R3 “but is not limited to,…” is applying to the criteria for evaluation in Parts 3.1 and 3.2, or if it applies to the studies and analyses. RESPONSE: The drafting team thanks you for your comment. The phrase “is not limited to . . .” is intended to convey that at a minimum, studies and analyses must be conducted that evaluate the particularities of the UVLS Program as required by R3, Part 3.1 and Part 3.2. The phrase indicates that any other available tools or methods that further inform evaluation of the UVLS Program may be available for use. Consider revising the second sentence in R3 to read “The PC or TPL shall at a minimum evaluate the existing UVLS program for the following criteria:”R3 is about an evaluation of the effectiveness of an existing program. So Part 3.1 should address that the program continues to resolve the risks. Suggest revising Part 3.1 to “The UVLS Program continues to resolve the risk of undervoltage contingencies identified in R1 that will result in voltage instability, voltage collapse, or Cascading across a majority of Elements in an Interconnection.” RESPONSE: The drafting team thanks you for your comment. Requirement R3 is intended to address any identified issues or contingencies, rather than addressing only the “contingencies identified in R1.” The drafting team has determined that revising the language of R1 as suggested would narrow the requirement beyond the issues or contingencies that are appropriately addressed by Requirement R3. R4 presently requires a post-event evaluation that evaluates whether the UVLS Program resolved the undervoltage issues associated with the event. Post-event analysis should evaluate two items; whether the UVLS Program operated as designed, and whether it prevented the undervoltage issue leading to voltage instability, voltage collapse or Cascading. RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the defined term UVLS Program includes as part of its definition “used to mitigate undervoltage conditions leading to voltage instability, voltage collapse, or Cascading impacting the Bulk Electric System (BES).” Therefore, the specific issues

Organization	Yes or No	Question 2 Comment
		identified by the commenter are already incorporated into R4 by reference to the defined term UVLS Program. "[W]hether the UVLS Program operated as designed" is inherently addressed in the requirement as written. In R5 consider replacing "deficiencies" with the phrase "needed modifications". RESPONSE: The drafting team thanks you for your comment. The SDT's position is that the word "deficiencies" correctly reflects the intention of the team as the trigger for R5, and clearly signals the required time for an entity to act under R5 to comply with the requirements of the standard. The drafting team agrees that an entity may determine that it is appropriate to act in the manner prescribed in Requirement R5 to further improve a UVLS Program beyond that required by Requirement R5, and notes that there is no language in the Requirement that prohibits such a conservative approach that goes beyond that required by Requirement R5.
Arizona Public Service Co	Yes	Requirement R7 is unnecessary. R2 requires each UVLS entity to adhere to UVLS program designed by Transmission Planner. It is not necessary for UVLS entities to turn around and supply the same data back to Transmission Planner. They already have the data. RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the information the UVLS entity is required to provide by Requirement R7, to include load data--is not static in nature. Furthermore, the data supplied by the UVLS entity will be actual data following installation rather than simply the design specifications provided by the Planning Coordinator or Transmission Planner. The Planning Coordinator should have the best data available to inform its database rather than initial design specifications.
Florida Power & Light	Yes	R1.2 and R3.2 require studies and analyses that evaluate whether the UVLS program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. The generator low voltage ride through capabilities may be extremely difficult to determine without performing load threatening staged tests. R1.2 and R3.2 should require "coordination with known or

Organization	Yes or No	Question 2 Comment
		assumed generator voltage ride-through capabilities," similar to TPL-001-4. If precise generator undervoltage relay settings are used this will be a minor concession and will significantly reduce the compliance burden to the UVLS entity. RESPONSE: The drafting team thanks you for your comments. The drafting team notes that the Requirements do not prevent an entity from using the best available data.
Tennessee Valley Authority	Yes	R6 requires that the UVLS database be updated each calendar year. If the PC has not made any changes to the UVLS schemes over the previous year they should not be required to update the database. The requirement should require the PC to review the database each year and update as needed based on that review. RESPONSE: The drafting team thanks you for your comment. With respect to the indication that the database update needs to be performed only as the UVLS Program is revised, the drafting team notes that the data being updated, particularly load, is not static in nature—the annual time frame allows the Planning Coordinator to periodically capture cumulative effects of small changes that would not warrant updates by themselves.
BC Hydro	Yes	It's not clear what the reliability standard is when a UVLS Program is designed. It's clear that the UVLS Program is designed for under-voltage conditions which will lead to voltage instability, voltage collapse, or cascading impacting the BES. But it not clear for application of the program under what kind of contingency categories. Can the scheme be designed for TPL Category B events? RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that the standard's requirements address development, evaluation, and reliable operation of a UVLS Program. A UVLS Program may be developed and implemented to serve to further system integrity in the event of an extreme Contingency or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under Transmission Planning (TPL) Reliability Standards. Therefore, program application, particularly regarding

Organization	Yes or No	Question 2 Comment
		defined categories of events, is beyond the scope of the standard as currently drafted.
Duke Energy	Yes	Requirements: R1) No commentR2) No commentR3) With regard to the 60 calendar month timeframe with which an entity must perform its comprehensive assessment, when does the 60 calendar month timeframe begin? Does the day that the standard obtains regulatory approval start the clock for the 60 calendar month timeframe? Or does the 60 calendar month timeframe begin prior to the standard's implementation date? Please clarify when the 60 calendar month timeframe officially begins. RESPONSE: The drafting team appreciates your request for clarification. The 60 calendar month timeframe to perform the comprehensive assessment is counted from implementation of a UVLS Program if the UVLS Program is developed after the standard becomes enforceable. If a UVLS Program is already in place, then the 60 calendar month timeframe to perform the comprehensive assessment is counted from the last program evaluation triggered by compliance with PRC-010-0, currently subject to enforcement. R4) No commentR5) We request the drafting team's consideration of whether a clause should be inserted to address the necessity of coordinating for potential unforeseen circumstance in the implementation schedule of the Corrective Action Plan. It is possible for instances to occur that may prevent a UVLS entity to fully implement all obligations designated to it in the CAP. Should there be a provision to allow for communication and coordination between the PC/TP and the UVLS entity in the event a deadline cannot be met? RESPONSE: The drafting team thanks you for your suggestion. Requirement R5 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the development of a Corrective Action Plan, to include responding appropriately to inconsistencies, erroneous or incomplete information, or misunderstandings that the UVLS entity brings to the attention of the PC or TP. To design an effective Corrective Action Plan,

Organization	Yes or No	Question 2 Comment
		a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that Corrective Action Plan. R6) No commentR7) No commentR8) We request the drafting team's consideration of inserting a provision in R8 that specifically states that the format that a PC provides its UVLS Program database to others, only be required to be in the format used by the PC providing the database. Requiring a PC to change its own format to satisfy the requestor seems to be overly burdensome. RESPONSE: The drafting team thanks you for your suggestion. Requirement R8 does not direct the PC to provide the database in a particular format. VRF/VSL:R2) Duke Energy believes that the VRF/VSL for R2 should be amended based on the concerns we outlined for R5 above. If unforeseen circumstances arose, and a UVLS entity could not execute an obligation per the CAP implementation schedule, the UVLS entity would be in non-compliance of R2 with the potential severity level of being High or Severe. RESPONSE: The drafting team thanks you for your suggestion. As stated above, Requirement R5 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the development of a Corrective Action Plan, to include responding appropriately to inconsistencies, erroneous or incomplete information, misunderstandings, or issues regarding implementation plans or other obligations that the UVLS entity brings to the attention of the PC or TP. To design an effective Corrective Action Plan, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that Corrective Action Plan. It is expected that the developing entity will revise a Corrective Action Plan that is determined compromised by circumstances that prevent a UVLS entity from fulfilling obligations imposed by that plan, including schedule.
IRC Standards Review Committee	Yes	Under R5, the Planning Coordinator or Transmission Planner is required to develop a Corrective Action Plan (CAP). The Planning Coordinator or Transmission Planner can

Organization	Yes or No	Question 2 Comment
		determine the necessary performance requirements. However, the UVLS entities should be required to develop the CAP, not the Planning Coordinator or Transmission Planner. We note that, in the current Guidelines and Technical Basis, CAP Examples 1 and 2 under "Guidelines for Requirement 2" reflect that the equipment owner (i.e. the UVLS entity) of the UVLS entity develops the CAP. RESPONSE: The drafting team thanks you for your suggestion. The examples provided in the Guidelines and Technical basis illustrate the expectation that the PC or TP and UVLS entity will work together to develop and implement Corrective Action Plan, because, a UVLS entity may not have access to the complete information to the network model needed to develop an effective CAP. Requirement R5 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the development of a Corrective Action Plan, to include responding appropriately to inconsistencies, erroneous or incomplete information, misunderstandings, or issues regarding implementation plans or other obligations that the UVLS entity brings to the attention of the PC or TP. To design an effective Corrective Action Plan, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that Corrective Action Plan.
Florida Municipal Power Agency	Yes	The revised Measures are very rigid and prescriptive which goes against the flexibility afforded by the Requirements themselves. The use of the terms "must include" and "date-stamped" are of particular concern. RESPONSE: The drafting team thanks you for your suggestion. The drafting team drafted the Measures to avoid uncertainty and provide specificity as to the evidence required to demonstrate compliance with those Requirements. Further, the drafting team intentionally limited the measures that identify the particular evidence required to specific cases where there is only a particular item that could reasonably serve as evidence the requirement was met; e.g., for R5 the only evidence a CAP was developed within three months is a date-stamped CAP.

Organization	Yes or No	Question 2 Comment
SPP Standards Review Group	Yes	In the last line of the 1st paragraph following the bullet items on Page 5 (clean copy) in the Background section, insert a hyphen after SPS such that the line reads 'by SPS-or RAS-related Reliability Standards.' Also in the Background section, in the last sentence of the 1st paragraph on Page 6 (clean copy), the SDT indicates that PRC-010-1 uses the proposed term Remedial Action Scheme (RAS) rather than the traditional Special Protection System (SPS). We found this to be the case in the formal sections of the standard but note it apparently doesn't apply to the Rationale Box for the Definition and the Background section of the standard. Wouldn't it be better to do it throughout all the documentation? RESPONSE: The drafting team thanks you for your comments. The drafting team notes that both the term Remedial Action Scheme (RAS) and the term Special Protection System (SPS) are NERC Glossary defined terms, and that there is coordination between drafting teams, and changes will be made as appropriate to account for circumstances that occur during standards development. The term 'protection system' is used in the Background section, the Rationale Box for R3 and the Guidelines and Technical Basis section of the standard; in the FAQ document; and in the RSAW. Shouldn't this be the capitalized version which is defined in the Glossary of Terms? RESPONSE: The drafting team thanks you for your suggestions. The drafting team selected the broader term "protection system" to avoid situations whereby equipment or systems that are not included in the narrower NERC Glossary defined term "Protection System" would be neglected during an event analysis. In Requirement R1 the applicable entity is required to take two (2) actions - evaluate and provide. In order to avoid this multi-action requirement and the associated VSL complexity, shouldn't R1 be split into two separate requirements - one for the evaluation of the UVLS Program and the second for the distribution of the UVLS Program specification and implementation schedule to the UVLS entities? The Severe VSL for R1 confirms this. The assumption in the VSL is that if the applicable entity

Organization	Yes or No	Question 2 Comment
		didn't evaluate the program, then they subsequently didn't distribute the specification and implementation schedule. This may not be the case. How would this VSL be applied if the evaluation was done but the distribution didn't occur? Splitting the requirement makes it much easier to handle situations like this. RESPONSE: The drafting team thanks the commenter for the suggestion, and agrees that the requirement could have been approached in this manner. The drafting team, however, determined that providing program specifications for implementation by UVLS entities is a necessary part of the development of "an effective UVLS Program," and therefore it is prudent to couple development with the natural result of that development. Be consistent with the use of hyphenation in phrases such as 60-calendar days, 12-calendar months, three-calendar months, etc. In some places the SDT uses a hyphen and in others it does not. Please use the hyphen throughout. Sometimes the term Part (when referring to a portion of a requirement) is capitalized and sometimes it is not. It should be capitalized, just like Requirement is when it refers to a specific requirement in the standard. RESPONSE: The drafting team thanks you for your comment. The drafting team implemented the appropriate copy-edit suggestions above as per the NERC Style Guide (August 2014), and made other revisions to conform with the currently adopted standards conventions. In Requirement R6, the Planning Coordinator is charged with maintaining the UVLS database for those UVLS Programs which exist within its Planning Coordinator area. UVLS Programs are local in nature and it is doubtful that impacts from one Transmission Planner's UVLS Program will bleed over into another Transmission Planner's area. In this situation, the Planning Coordinator doesn't need to play a role in either program so why is it charged with maintaining the UVLS database? If indeed the Planning Coordinator does own a UVLS Program, then it would be logical for the Planning Coordinator to maintain the database for that program only. In a similar

Organization	Yes or No	Question 2 Comment
		vein, Requirement R7 requires the UVLS entities to provide data to the Planning Coordinator in order to maintain the UVLS Program database. If a program is owned by a Transmission Planner, there is no way for that program owner to obtain that data short of specifically requesting the data in Requirement R8. This seems awkward and a bit contrived. Shouldn't the Transmission Planner be added to Requirement R7 and the data be provided by the UVLS entities to the applicable owner of the program? We propose the following changes to Requirements R6, R7 and R8 to address these issues.R6 - Each Planning Coordinator or Transmission Planner that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year. R7 - Each UVLS entity shall provide data to the applicable UVLS Program owner according to the format and schedule specified by the UVLS Program owner to support maintenance of a UVLS Program database.R8 - Each applicable UVLS Program owner (Planning Coordinator or Transmission Planner) shall provide its UVLS Program database to other impacted functional entities with a reliability need, within 30-calendar days of receiving a written request. The proposed language for Requirement R8 also resolves another issue with the use of the phrase 'within its Interconnection'. Although this usage is in conjunction with a request for information, it is still too broad and would require the Planning Coordinator to provide information to entities which are not directly impacted by the Planning Coordinator's or Transmission Planner's UVLS Program. Our suggested changes address this issue by narrowing the focus of this requirement. RESPONSE: The drafting team thanks you for your comment. A Planning Coordinator has data for all the programs in its area, as well as access to adjacent area data. Therefore, the Planning Coordinator has the most comprehensive information available. A Transmission Planner may also maintain data, but lacks the visibility of the system available to the Planning Coordinator. Databases maintained by Planning Coordinators ensure Transmission Planners have access to broader system visibility. The interpretation of both parts of the Severe VSL for Requirement R7 is that being more than 90-calendar days late is the same as not providing the data at all. If this is

Organization	Yes or No	Question 2 Comment
		the case, then change the VSL to a simple statement such as 'The applicable entity failed to provide data in accordance with Requirement R7 within 90-calendar days of the specified schedule.' The same logic applies to the Severe VSL for Requirement R8 and a similar fix should be applied. RESPONSE: The drafting team thanks you for your comment. The drafting team agrees that the requirement could have been approached in this manner, yet, ultimately determined that maintaining the structure as written more clearly indicates the drafting team's intention that both conditions, that updating a database or providing data more than 90 days late is to be subject to the same Violation Severity Level as not updating the database or providing data at all. In the 5th line of the 2nd paragraph under Guidelines for UVLS Program Definition on Page 18 (clean copy), delete the 'for' at the end of the line. In the 3rd line of the 3rd paragraph under Guidelines for UVLS Program Definition on Page 18 (clean copy), insert an 'or' between 'one' and 'more'. The term load(s) is used often in the Application Guidelines. Should this term be the capitalized version defined in the Glossary of Terms? In the 2nd line of the 2nd paragraph and in the 3rd line of the 3rd paragraph under Guidelines for Requirement R1 on Page 19 (clean copy), replace 'is' with 'be' in the phrase '...UVLS Program be coordinated with...'.In the 1st line of the 3rd paragraph under Guidelines for Requirement R3 on Page 21 (clean copy), delete the 'and' in 'system and topology'. In the 3rd line of the last paragraph under Guidelines for Requirement R3 on Page 22 (clean copy), replace '60-month' with '60-calendar month'. Make the same change in the 1st line of the 3rd bullet under Guidelines for Requirement R5 on Page 23 (clean copy). RESPONSE: The drafting team thanks you for your comment. The drafting team implemented the appropriate copy-edit suggestions above as per the NERC Style

Organization	Yes or No	Question 2 Comment
		Guide (August 2014), and made other revisions to conform with the currently adopted standards conventions.
Puget Sound Energy	Yes	This Standard enforces sanctions on PC's and TP's in cases where UVLS is designed only as a safety-net for events outside of the scope of the TPL standards. We own such a safety-net that has never operated and maintain it because it may minimize the potential for a wide-area black-out due to a beyond Category D event. The effect of anticipated sanctions has led several area utilities to disable their safety-net UVLS Programs. There is continued concern that utilities will not invest in safety-net programs if they are accompanied by the potential for NERC fines. It is also unclear what metrics are to be used to evaluate the effectiveness of the program. There are no defined metrics to meet for contingencies outside of the scope of the TPL standards. RESPONSE: The drafting team thanks you for your comment. The team drafted the standard with the understanding that, should a PC or TP establish or maintain an existing UVLS Program, such Requirements are necessary, "[t]o establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs)."
Lincoln Electric System	Yes	As currently written PRC-010-1 does not define a role for the Transmission Planner (TP) in the submission of its UVLS Program to the Planning Coordinator's (PC) database. Although Requirement R7 has each UVLS entity providing data to its PC per the format and schedule specified by the PC, the standard fails to account for the TP-developed UVLS Programs. In consideration that the TP is required to provide ongoing assessments to evaluate its effectiveness both on a 60 month cycle (R3) and after a voltage excursion event that triggers operation of the UVLS Program (R4), it seems the TP should have some supporting role in the submission of its UVLS Program to the PC and, at a minimum, be included in the communications between the PC and UVLS entity. Furthermore, the UVLS entity may not be familiar with the

Organization	Yes or No	Question 2 Comment
		power flow and dynamic models being used by both the PC and TP in their assessments. RESPONSE: The drafting team thanks you for your comment. The drafting team notes that a Planning Coordinator will always have data for all the programs in its area regardless of whether or not it developed the program. A Transmission Planner may also maintain data, but there is no requirement to do so as it would be duplicative to what the Planning Coordinator already does.
Texas Reliability Entity, Inc.	Yes	1) Texas Reliability Entity, Inc. (Texas RE) supports the rationale for Requirement R1 to include the phrase “Planning Coordinator or Transmission Planner” to provide flexibility for applicability to the entity that will perform the action. Texas RE recommends applying that rationale to Requirements R6, R7 and R8 as well. Conceivably, TPs may be the only entity to have a UVLS Program. If the TP has the UVLS Program, then the TP should maintain a database containing necessary data to model its UVLS Program and a UVLS entity should provide data to support maintenance of that database to the TP with the UVLS Program. However, it seems burdensome to for the TP to have to request UVLS entity data that it needs to perform assessment of its own UVLS Program from the PC (per Requirement R8). We recognize the importance of the PC having UVLS Program data but assert that the TP needs to obtain this data from UVLS entities for its Program as well. Texas RE recommends adding “or Transmission Planner” after “Planning Coordinator” to Requirements R6, R7 and R8. RESPONSE: The drafting team thanks you for your comment. In response to the addition of the Transmission Planner to Requirement R6-8, the drafting team notes that a Planning Coordinator will always have data for all the programs in its area. A Transmission Planner may also maintain data, but there is no requirement to do so as it would be duplicative to what the Planning Coordinator already does, and the Transmission Planner will have access to the Planning Coordinator’s database.

Organization	Yes or No	Question 2 Comment
		2) Texas RE recommends updating Requirement R3 language to mirror Requirement R1 as follows: "...every 60 calendar months and subsequently provide the UVLS Program's specifications to the UVLS entities responsible for implementing the program..." 3) Texas RE also recommends updating the Requirement R3 VSL to mirror Requirement R1 VSL as follows: "...60 calendar months and subsequently provide the UVLS Program's specifications to the UVLS entities responsible for implementing the program..." RESPONSE: The drafting team thanks you for your comment. Any action that will result from the assessments required by R3 and R4 is covered by the requirements of R5, which requires the distribution of Corrective Action Plans that address identified deficiencies.
Tacoma Power	Yes	Did the SDT consider explicitly including UFLS schemes and controls of shunt capacitors, reactors, and statis Var systems under Requirements R1 and R3 as items to be coordinated with UVLS Programs? In the current draft, these are itemized in the Application Guidelines and Technical Basis. RESPONSE: The drafting team thanks you for your comment. The drafting team drafted the Requirements with the intent that they should not be overly prescriptive, but rather, that specific examples and lists of inclusion are more appropriately addressed in ancillary documents such as the Guidelines and Technical Basis document.
Electric Reliability Council of Texas, Inc.	Yes	The SDT should revisit the assignment of responsibility under the standard with respect to all requirements. This review should be conducted relative to the functional model to ensure the responsibilities under the standard align with the scope of responsibilities under the functional model. Additionally, the SDT should separate the responsibilities of the relevant functions under the standard (e.g. TP and PC) into separate requirements, and, again, the responsibilities under the

Organization	Yes or No	Question 2 Comment
		requirements should be based on the appropriate responsibilities for the functions consistent with the NERC functional model. RESPONSE: The drafting team thanks you for your comment. The drafting team considered various approaches and determined that the currently proposed language and structure of the standard will best address entity variations across the continent. The drafting team notes that the assignment of responsibility is consistent with the NREC Reliability Functional Model and that Requirements R1, R3, R4 and R5 are not applicable to both the Planning Coordinator and Transmission Planner—they are applicable to one or the other. For example, the language of Requirement R1 clearly states that the responsibility is to the entity that developed the UVLS Program.
N/A	Yes	- R2 obligates the UVLS entity to adhere to the UVLS Program and implementation schedule developed by its PC or TP. The standard should include provisions for the UVLS entity to comment and agree with the program and its implementation. RESPONSE: The drafting team thanks you for your comment. Requirement R2 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the design and development of a UVLS program, to include responding appropriately to inconsistencies, erroneous or incomplete information, or misunderstandings that the UVLS entity brings to the attention of the PC or TP. To design an effective UVLS Program, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that UVLS Program. - R4 should contain provisions for the RC or TOP to inform the PC and TP on the occurrence of events resulting in voltage excursions for which the UVLS program was designed to operate. The PC and TP are not directly involved in the operation of the BES thus may not have events information. RESPONSE: The drafting team thanks you for your comment. The Requirements were drafted with the understanding that the PC and TP have a duty to remain informed of events that trigger their compliance responsibilities.

Organization	Yes or No	Question 2 Comment
		- R5: Identification of deficiencies should be done with participation of the corresponding UVLS entity. RESPONSE: The drafting team thanks you for your suggestion. Requirement R5 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the development of a Corrective Action Plan, to include responding appropriately to inconsistencies, erroneous or incomplete information, or misunderstandings that the UVLS entity brings to the attention of the PC or TP. To design an effective Corrective Action Plan, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that Corrective Action Plan.
Xcel Energy		no comment RESPONSE: The drafting team notes that a comment was not presented here, therefore, there is no corresponding response.

3. Do you have any concerns with items not addressed by the previous questions (e.g., the Implementation Plan or the coordination that is occurring with other projects)? If yes, please indicate your concerns in the comment section and provide specific suggested changes.

Summary Consideration: There were recommendations that the drafting team include Transmission Planners as applicable entities to the Requirements that address UVLS Program databases. The drafting team considered this suggestion, but determined that, as Planning Coordinators have data for all the programs in their area, and additionally maintain access to adjacent area data, Planning Coordinators have the most comprehensive information available. While Transmission Planners may also maintain data, they may lack the visibility of the system available to the Planning Coordinator, and may access that data through the Planning Coordinator.

Organization	Yes or No	Question 3 Comment
Arizona Public Service Co	No	RESPONSE: The drafting team thanks you for your support.
Dominion	No	RESPONSE: The drafting team thanks you for your support.
Florida Power & Light	No	RESPONSE: The drafting team thanks you for your support.
Tennessee Valley Authority	No	RESPONSE: The drafting team thanks you for your support.
MRO NERC Standards Review Forum	No	RESPONSE: The drafting team thanks you for your support.
BC Hydro	No	RESPONSE: The drafting team thanks you for your support.
Duke Energy	No	RESPONSE: The drafting team thanks you for your support.
Hydro-Quebec TransEnergie	No	RESPONSE: The drafting team thanks you for your support.
Minnkota Power Cooperative	No	RESPONSE: The drafting team thanks you for your support.

Organization	Yes or No	Question 3 Comment
Flathead Electric Cooperative, Inc.	No	RESPONSE: The drafting team thanks you for your support.
Xcel Energy	No	RESPONSE: The drafting team thanks you for your support.
American Transmission Company LLC	No	RESPONSE: The drafting team thanks you for your support.
Puget Sound Energy	No	RESPONSE: The drafting team thanks you for your support.
Idaho Power Company	No	RESPONSE: The drafting team thanks you for your support.
Independent Electricity System Operator	No	RESPONSE: The drafting team thanks you for your support.
Exelon Companies	No	RESPONSE: The drafting team thanks you for your support.
N/A	No	RESPONSE: The drafting team thanks you for your support.
Northeast Power Coordinating Council	Yes	In the Guidelines for Requirements R6-R8 on page 23, there is a list of specific items to be included in the UVLS Program database. This should be written as items to be considered for database inclusion. If the SDT intends to make these items mandatory then they should be in a Requirement, and be auditable. RESPONSE: The drafting team thanks you for your comment. The drafting team drafted the Requirements with the intent that they should not be overly prescriptive, but rather, that specific examples and lists of inclusion are more appropriately addressed in ancillary documents such as the Guidelines and Technical Basis document. To further clarify this intention, the drafting team has revised the language to which you refer to “the UVLS Program database may include, but is not limited to” before the list of items.

Organization	Yes or No	Question 3 Comment
SERC Protection and Controls Subcommittee	Yes	Is a 'Centrally controlled undervoltage based load shedding system' the same as a 'non-distributed UVLS system' as referred to in PRC-005-2? How does the definition of a UVLS Program impact the maintenance requirements for a Centrally controlled undervoltage based load shedding system? The comments expressed herein represent a consensus of the views of the above-named members of the SERC EC Protection and Control Subcommittee only and should not be construed as the position of SERC Reliability Corporation, its board, or its officers. RESPONSE: The drafting team thanks you for your comment. As indicated in the quoted material below, a "Centrally controlled undervoltage based load shedding system" is the same as a "non-distributed UVLS system" as referred to in PRC-005-2: **What is the difference between a distributed UFLS/UVLS and a non-distributed UFLS/UVLS scheme?** A distributed UFLS or UVLS scheme contains individual relays which make independent Load shed decisions based on applied settings and localized voltage and/or current inputs. A distributed scheme may involve an enable/disable contact in the scheme and still be considered a distributed scheme. A non-distributed UFLS or UVLS scheme involves a system where there is some type of centralized measurement and Load shed decision being made. A non-distributed UFLS/UVLS scheme is considered similar to an SPS scheme and falls under Table 1 for maintenance activities and intervals. PRC-010-1 addresses the attributes of a UVLS Program, and does not address maintenance requirements.
IRC Standards Review Committee	Yes	We recommend a general review to improve clarity and understanding across all the corresponding documentation related to this standard. RESPONSE: The drafting team thanks you for your recommendation. The drafting team performed a general review and made changes for clarity where deemed

Organization	Yes or No	Question 3 Comment
		appropriate, to include implementing the appropriate copy-edit revisions as per the NERC Style Guide (August 2014), and made other revisions to conform with the currently adopted standards conventions.
Florida Municipal Power Agency	Yes	FMPA requests the drafting team consider adding a requirement similar to PRC-006-1 R14 which would require the PC or TP to contemplate comments provided by UVLS entities in development of the UVLS Program. As an example, without the ability to provide input, a PC or TP could obligate a UVLS entity to adhere to a UVLS Program with an implementation schedule that is not feasible. Additionally, it does not appear that centrally controlled undervoltage-based load shedding has been addressed by the Project 2010-05.2 - Special Protection Systems (Phase 2 of Protection Systems) team. RESPONSE: The drafting team thanks you for your comment. The currently proposed PRC-010-1 Requirements were drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the design and development of a UVLS program, to include responding appropriately to inconsistencies, erroneous or incomplete information, or misunderstandings that the UVLS entity brings to the attention of the PC or TP. To design an effective UVLS Program, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that UVLS Program. The drafting team is coordinating with Project 2010-05.2 and will pass this comment along to the Project 2010-05.2 drafting team. The RAS SDT modified the exclusion in the RAS definition to: **Schemes for automatic underfrequency load shedding (UFLS) and automatic undervoltage load shedding (UVLS) comprised of only distributed relays** The existing Glossary of Terms Used in NERC Reliability Standards definition of SPS/RAS excludes UFLS and UVLS because they are protective functions that have

Organization	Yes or No	Question 3 Comment
		unique design and implementation considerations that are covered by NERC Reliability Standards PRC-006-1 and PRC-010-1. This exclusion emphasizes "distributed" UVLS relays to highlight that the exclusion covers UVLS Programs. The SDT accepts this exclusion consistent with industry practice. Centrally controlled undervoltage-based load shedding is a RAS.
ACES Standards Collaborators	Yes	(1) Protection systems should be capitalized throughout the Guidelines and Technical Basis section since it is a NERC defined term. RESPONSE: The drafting team thanks you for your suggestion. The drafting team selected the broader term "protection system" to avoid facilitating a situation whereby equipment or systems that are not included in the narrower NERC Glossary defined term "Protection System" would be neglected during an event analysis (2) The example described in the last paragraph of the Guidelines and Technical Basis section on page 18 should be made consistent with the BES definition. A radial facility serving only load cannot be part of the BES. If the intention is that the loads in the one-line diagram actually are networked sub-transmission systems greater than 50 kV, then the lines are technically not radial per the BES definition. RESPONSE: The drafting team thanks you for your comments. The drafting team agrees with the comments regarding the example on page 18 of the Guidelines and Technical and has modified the example in accordance with your comment. (3) Thank you for the opportunity to comment. RESPONSE: The drafting team thanks you for your comments.
SPP Standards Review Group	Yes	In the FAQ document: In the 3rd question, replace 'potential' with 'potentially'. RESPONSE: The drafting team thanks you for your comments. The drafting team corrected the document as suggested.

Organization	Yes or No	Question 3 Comment
PacifiCorp	Yes	PacifiCorp generally supports the June 24, 2014 version of PRC-010-1, and recommends the Standard Drafting Team add "Transmission Planner" to Requirement R7 to read: "Each UVLS entity and Transmission Planner shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database." Adding the Transmission Planner helps ensure the Planning Coordinator will have the needed information to perform UVLS studies and for event analysis. RESPONSE: The drafting team thanks you for your comment. A Planning Coordinator has data for all the programs in its area, as well as access to adjacent area data. The Planning Coordinator, therefore, has the most comprehensive information available. A Transmission Planner may also maintain data, but lacks the visibility of the system available to the Planning Coordinator. Databases maintained by Planning Coordinators ensure Transmission Planners have access to broader system visibility.
Texas Reliability Entity, Inc.	Yes	Texas RE is concerned that centrally controlled ULVS may be overlooked by entities or even by Regions since it is explicitly excluded from the ULVS definition but is not explicitly included in the proposed definition of Remedial Action Scheme (RAS). The PRC-010-1 FAQ document addresses the issue very well, but after balloting is complete the document may not be reviewed by registered entities again. Texas RE requests the PRC-010-1 SDT work with the RAS SDT to add language in the standard specifying the inclusion of centrally controlled undervoltage-based shedding. RESPONSE: The drafting team thanks you for your suggestion. There is coordination between the teams. The drafting team will pass this comment along to the Project 2010-05.2 drafting team.
ReliabilityFirst	Yes	ReliabilityFirst submits the following comments for consideration: 1. Requirement R1, Part 1.2 - ReliabilityFirst believes the term "coordination" by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration: "The UVLS Program [does not conflict]

Organization	Yes or No	Question 3 Comment
		with generator voltage ride through capabilities and [settings of] other protection and control systems..." RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the wording used, "integrated through coordination", is to be consistent with the FERC order. The drafting team notes that the evaluation required by Requirement R1 as a whole requires the UVLS Program to be validated. The Guidelines and Technical Basis provides sufficient guidance to provide clarity. 2. Requirement 3, Part 3.2 - ReliabilityFirst believes the term "coordination" by itself is ambiguous and needs further clarification to avoid confusion. ReliabilityFirst recommends the following for consideration: "The UVLS Program [does not conflict] with generator voltage ride through capabilities and [settings of] other protection and control systems..." RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the wording used, "integrated through coordination", is to be consistent with the FERC order. 3. Requirement R3 - ReliabilityFirst recommends removing the term "comprehensive" since it adds little or no value to the requirement. ReliabilityFirst recommends the following for consideration: "Each Planning Coordinator or Transmission Planner shall perform [an in depth Protection System coordination] assessment to evaluate the effectiveness..." RESPONSE: The drafting team thanks you for your comment. The drafting team notes that the word "comprehensive" is used to distinguish the UVLS requirement from an annual TPL standard assessment. The UVLS comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. Therefore, the UVLS assessment should include an evaluation of each UVLS Program to ensure continued integration through coordination. The drafting team notes that this intention is supported in the respective Rationale box and Guidelines and Technical Basis.

Organization	Yes or No	Question 3 Comment
Ameren	Yes	(1) We support the SERC PCS comments for Project 2008-02 UVLS and include them by reference. RESPONSE: The drafting team thanks you for your comment. Please see response to SERC Protection and Controls Subcommittee (PCS) comments above. (2) We believe that the Transmission Planner (TP) should develop the program, not the Planning Coordinator (PC). In our opinion the TP is more familiar with the BES in their area. We are concerned that R1, R3, R4, and R5 now say 'TP or PC' therefore it is not clear who leads this effort. We believe that it makes more sense for the TP to decide if UVLS is needed then report up to PC for coordination with neighboring PC and TP. RESPONSE: The drafting team thanks you for your comment. The drafting team notes that Requirements R1, R3, R4 and R5 are not applicable to both the Planning Coordinator and Transmission Planner—they are applicable to one or the other. For example, the language of Requirement R1 clearly states that the responsibility is to the entity that developed the UVLS Program. The drafting team maintains that the flexibility of applicability to either the Planning Coordinator or Transmission Planner is necessary. Depending on agreements, memorandums of understanding, or tariffs, either entity may be responsible for designing and coordinating a UVLS Program.
Oncor Electric Delivery LLC	Yes	The SPS term was replaced with RAS throughout the standard. With the July 24, 2014 ballot for project 2010-5.2, revised definition of SPS/RAS, not receiving sufficient affirmative votes for approval we recommend that the standard be restored to its original verbiage.

Organization	Yes or No	Question 3 Comment
		RESPONSE: The drafting team thanks you for your comment, and notes that changes will be made as appropriate to account for circumstances that occur during standards development.
WECC	Yes	In the last sentence in what I believe is the seventh paragraph of the Background section, it is stated that the drafting team for Project 2010-05.2 is prposing to change the term from SPS to RAS and accordingly PRC-010-1 uses the term RAS instead of SPS. I agree. Howeever, in the rational for the definition of UVLS Program section, SPS is used several times. It is also used in the Background section sveral times ahead of the statement that it is not being used anymore. Should this term (SPS) be removed? RESPONSE: The drafting team thanks you for your comment, and notes that changes will be made as appropriate to account for circumstances that occur during standards development. In Requirement R3 the Rational addresses situations where assessments should be conducted sooner than the 60-month period if there are material changes to system topology or operating conditions. I support this. However, in the language of Requirement R3 the words "or sooner if material changes are made to system topology or operating conditions" were struck. Why were the words removed from the requirement? It seems like they should be there to clarify the requirement identified in the Rational Box. RESPONSE: The term “material changes” was removed from the standard to mitigate any subjective interpretation of the term, and thereby minimize potential compliance issues. The term was included in the Rationale box to convey that, should an entity determine that it would be prudent to conduct an assessment earlier than the 60 calendar month time frame due to changes in topology or system conditions, the standard does not prohibit an earlier assessment. In the Rational for Applicability section it clarifies that PCs or TPs may develop UVLS Programs. In Requirement R1 It says each "PC or TP" that is developing a UVLS Program... In R2 UVLS Entities are required to adhere to implmentation schedules

Organization	Yes or No	Question 3 Comment
		determine by its "PC or TP." Requirement R3 requires each "PC or TP" to perfomr conprehensive assessments to evaluste the effectiveness of each UVLS Program. Requirement R4 requires each "PC or TP" to assess program performance for each event that resultes in a voltage excursion for which its UVLS Program was designed to operate. In Requirement R5 "PCs and TPs" are again referenced. All of this supports the fact that either the PC or TP could develope UVLS Programs, and I suport this. However, in Requirements R6 and R7 only the PC is identified. IN R6 only the PC has to update its database and in R7 UFLS Entities only have to provide data to the PC. The TP has been left out. Is this intentional? Is it becasue only a PC develops and maintains a UVLS database? RESPONSE: The drafting team thanks you for your comment. The reference to the Planning Coordinator only in Requirements R6 and R7 is intentional. A Planning Coordinator has data for all the programs in its area, as well as access to adjacent area data. The Planning Coordinator, therefore, has the most comprehensive information available. A Transmission Planner may also maintain data, but lacks the visibility of the system available to the Planning Coordinator. Databases maintained by Planning Coordinators ensure Transmission Planners have access to broader system visibility.
Tacoma Power	Yes	In the Compliance section, under 1.2 for Evidence Retention, there should be a maximum evidence retention period. In the extreme, as written now, if an entity is not audited on PRC-010-1, it seems like the entity could have to keep the evidence forever. RESPONSE: The drafting team thanks you for your comment, and has adjusted the evidence retention period to which you refer. When developing a CAP, the Transmission Planner or Planning Coordinator should consult, as necessary, with the UVLS entity. Otherwise, the Transmission Planner or Planning Coordinator could specify activities or an implementaiotn schedule that is unreasonable. Rather than modifying the Requirements themselves, this issue

Organization	Yes or No	Question 3 Comment
		should be addressed in the Application Guidelines and Technical Basis. Similarly, in the Application Guideline and Technical Basis, the Guidelines for Requirement R2 discusses "deferrals or other relevant changes to the UVLS Program specifications or CAP..." While changes to a CAP should be an option, a UVLS entity should consult with the Transmission Planner or Planning Coordinator since the Transmission Planner or Planning Coordinator developed (hopefully in consultation with the UVLS entity) the CAP. RESPONSE: The drafting team thanks you for your comment. Requirement R2 was drafted with the understanding that a PC or TP must necessarily engage the UVLS entity in an iterative and collaborative process during the design and development of a UVLS program, to include responding appropriately to inconsistencies, erroneous or incomplete information, or misunderstandings that the UVLS entity brings to the attention of the PC or TP. To design an effective UVLS Program, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that UVLS Program. Similarly, to design an effective Corrective Action Plan, a PC or TP must coordinate and cooperate with a ULVS entity that is to implement that Corrective Action Plan.

END OF REPORT

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. Standard Authorization Request (SAR) posted for comment on January 20, 2010.
2. Revised SAR with supporting draft standard language posted for informal comment on September 10, 2013.
3. Draft standard posted for informal comment on March 17, 2014.
4. Draft standard posted for formal comment and ballot June 24, 2014.

Description of Current Draft

This is the second draft of the proposed Reliability Standard PRC-010-1, and it is being posted for final ballot.

Anticipated Actions	Anticipated Date
10-day Final Ballot	September 2014
Present to NERC Board of Trustees for Approval	November 2014

Effective Dates

See Implementation Plan.

Version History

Version	Date	Action	Change Tracking
1.0	TBD	Revisions made under Project 2008-02: Undervoltage Load Shedding (UVLS) & Underfrequency Load Shedding (UFLS) to address directive issued in FERC Order No. 763. Completed revision, merged and updated PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.	Revision

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Glossary of Terms Used in NERC Reliability Standards (Updated August 20, 2014) are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Centrally controlled undervoltage-based load shedding is not included.

Rationale for Definition: As part of the development of PRC-010-1, the drafting team found it necessary to introduce the term Undervoltage Load Shedding Program (UVLS Program) to establish the applicability of PRC-010-1. The following are critical defining elements of the proposed term:

1) The definition provides latitude for the Planning Coordinator or Transmission Planner to determine if UVLS falls under the defined term based on the impact on the reliability of the BES. (See Guidelines and Technical Basis section for further discussion.)

2) Centrally controlled undervoltage-based load shedding is excluded because its design and characteristics are commensurate with a Special Protection Systems (SPS) or Remedial Action Scheme (RAS) (wherein load shedding is the remedial action). As such, centrally controlled undervoltage-based load shedding should be subject to SPS/RAS-related Reliability Standards. (See Guidelines and Technical Basis section for rationale.)

Consequently, the drafting team has recommended that Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) include centrally controlled undervoltage-based load shedding in the definition of a Special Protection System/Remedial Action Scheme.

3) The definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.

When this standard has received ballot approval, the text boxes will be moved to the Guidelines and Technical Basis section of the Standard.

A. Introduction

1. **Title: Undervoltage Load Shedding**

2. **Number: PRC-010-1**

3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).

Rationale for Applicability: This standard is applicable to Planning Coordinators and Transmission Planners that have or are developing a UVLS Program, and to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as UVLS entities for the purpose of this standard.

The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.

The phrase "Planning Coordinator or Transmission Planner" provides the latitude for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 Undervoltage load shedding (UVLS) entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

5. Background:

PRC-010-1 – Undervoltage Load Shedding is a consolidation and revision of the following Reliability Standards:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

The UVLS Standard Drafting Team (or drafting team) developed the revised PRC-010-1 to meet the following objectives:

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated and coordinated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS systems.
- Create a single results-based standard that addresses current reliability issues associated with UVLS.

B. Requirements and Measures

Rationale for R1: In Paragraph 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability, and that each Planning Coordinator or Transmission Planner that develops a UVLS Program should evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage conditions that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate items, the drafting team recognizes that the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

In addition, Requirement R1 also requires the Planning Coordinator or Transmission Planner to provide the UVLS Program's specifications and implementation schedule to applicable UVLS entities to implement the program. It is noted that studies to evaluate the effectiveness of the program should be completed prior to providing the specifications and schedule.

R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design.

1.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M1. Acceptable evidence may include, but is not limited to, date-stamped studies and analyses, reports, or other documentation detailing the effectiveness of the UVLS Program, and date-stamped communications showing that the UVLS Program specifications and implementation schedule were provided to UVLS entities.

Rationale for R2: UVLS entities must implement a UVLS Program or address any necessary corrective actions for a UVLS Program according to the specifications and schedule provided by the Planning Coordinator or Transmission Planner. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

M2. Acceptable evidence must include date-stamped documentation on the completion of actions and may include, but is not limited to, identifying the equipment armed with UVLS relays, the UVLS relay settings, associated Load summaries, work management program records, work orders, and maintenance records.

Rationale for R3: A periodic comprehensive assessment (detailed analysis) should be conducted to identify and catalogue the accumulated effects of minor changes to the system that have occurred since the last assessment was completed, and should include an evaluation of each UVLS Program to ensure the continued integration through coordination. This comprehensive assessment supplements the NERC Reliability Standard TPL-001-4 annual assessment requirement to evaluate the impact of protection systems.

Based on the drafting team's knowledge and experience, and in keeping with time frames contained in similar requirements from other PRC Reliability Standards, 60 calendar months was determined to be the maximum amount of time allowable between assessments. Assessments will be performed sooner than the end of the 60-calendar month period if the Planning Coordinator or Transmission Planner determines that there are material changes to system topology or operating conditions that affect the performance of a UVLS Program. Note that the 60-calendar-month time frame would reset after each assessment.

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. Each assessment shall include, but is not limited to, studies and analyses that evaluate whether: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M3. Acceptable evidence may include, but is not limited to, date-stamped reports or other documentation detailing the assessment of the UVLS Program.

Rationale for R4: A UVLS Program not functioning as expected during a voltage excursion event for which the UVLS Program was designed to operate presents a critical risk to system reliability. Therefore, a timely assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the applicable event is essential. The 12 calendar months (from the date of the event) provides adequate time to coordinate with other Planning Coordinators, Transmission Planners, Transmission Operators, and UVLS entities, simulate pre- and post-event conditions, and complete the performance assessment.

R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M4. Acceptable evidence may include, but is not limited to, date-stamped event data, event analysis reports, or other documentation detailing the assessment of the UVLS Program.

Rationale for R5: If program deficiencies are identified during an assessment of a UVLS Program performed in either Requirement R3 or R4, the Planning Coordinator or Transmission Planner must develop a Corrective Action Plan (CAP) to address the deficiencies. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and the time needed to consider potential solutions, coordinate resources, develop a CAP and implementation schedule, and provide the CAP and schedule to UVLS entities.

It is noted that the three-month time frame is only to develop the CAP and provide it to UVLS entities and does not encompass the time UVLS entities have to implement the CAP. Requirement R2 requires UVLS entities to execute the CAP according to the schedule provided by the Planning Coordinator or Transmission Planner.

R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities

within three calendar months of completing the assessment. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M5. Acceptable evidence must include a date-stamped Corrective Action Plan that addresses identified deficiencies and may also include date-stamped reports or other documentation supporting the Corrective Action Plan. Evidence should also include date-stamped communications showing that the Corrective Action Plan and an associated implementation schedule were provided to UVLS entities.

Rationale for R6: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R6 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year.

R6. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model the UVLS Program(s) in its area for use in event analyses and assessments of the UVLS Program at least once each calendar year. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M6. Acceptable evidence may include, but is not limited to, date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated.

Rationale for R7: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R7 supports this reliability need by requiring the UVLS entity to provide UVLS Program data in accordance with specified parameters.

R7. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M7. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.

Rationale for R8: Requirement R8 supports the integrated and coordinated approach to UVLS programs directed by Paragraph 1509 of Order No. 693 by requiring that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time period. Requests for the database should also be fulfilled for those functional entities that have a reliability need for the data (such as the Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits).

R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M8. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating that the UVLS Program database was provided within 30 calendar days of receipt of a written request.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The Planning Coordinator, Transmission Planner, Distribution Provider, and Transmission Owner shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The applicable entity shall retain documentation as evidence for six calendar years.

If an applicable entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

"Compliance Monitoring and Assessment Processes" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	High	N/A	N/A	N/A	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in Parts 1.1 and 1.2.

R2	Long-term Planning	High	N/A	N/A	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
R3	Long-term Planning	Medium	N/A	N/A	N/A	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in Parts 3.1 and 3.2.

R4	Operations Planning	Medium	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 calendar months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
R5	Operations Planning	Medium	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.

R6	Operations Planning	Lower	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 30 calendar days but less than or equal to 60 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.
R7	Operations Planning	Lower	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.

R8	Operations Planning	Lower	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

Introduction

PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in its legacy standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard also addresses a FERC directive from Order No. 693, Paragraph 1509. This paragraph directs NERC to develop a modification to PRC-010-0 that requires an integrated and coordinated approach to all protection systems, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Since FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding was developed under a similar construct of combining existing standards and addressing a FERC Order No. 693 directive, the drafting team looked to this standard as a guide. With the understanding that UVLS and UFLS systems have fundamental differences, the drafting team adopted PRC-006-1's industry-vetted reliability principles and language as applicable to UVLS Programs.

The drafting team's established purpose for PRC-010-1 is to clearly define the responsibilities of applicable entities to pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs. Since the need for and design of UVLS Programs is unique to each system preservation footprint, the intent of the standard is to provide a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. The drafting team emphasizes that PRC-010-1 does not require a mandatory UVLS Program, nor does this standard address the need to have a UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The drafting team provides the following discussion to support the approach to the standard. The information is meant to enhance the understanding of the reliability needs and deliverable expectations of each requirement, supported as necessary by technical principles and industry experience.

The design and characteristics of a centrally controlled undervoltage-based load shedding system are commensurate with a Special Protection System (SPS) or Remedial Action Scheme (RAS), therefore, the drafting team maintains that this type of load shedding should be covered by SPS-or-RAS-related Reliability Standards. Therefore, PRC-010-1 introduces a new Glossary of Terms Used in NERC Reliability Standards term, UVLS Program, to establish the applicability of PRC-010-1 to automatic load shedding programs consisting of distributed relays and controls used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Undervoltage-based load shedding that does not have such an impact as determined by the Planning Coordinator or Transmission Planner is not included. It is further noted that this term excludes centrally controlled undervoltage-based load shedding.

Subsequently, since the current Glossary of Terms Used in NERC Reliability Standards definition of Special Protection System excludes UVLS, concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) will adjust the definition to exclude only UVLS Programs as defined above and therefore include centrally controlled undervoltage-

based load shedding. Of note, the drafting team for Project 2010-05.2 is proposing to change the term from Special Protection System to Remedial Action Scheme. Accordingly, PRC-010-1 uses the term Remedial Action Scheme instead of Special Protection System. In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program, which is in NUC-001-2.1. Project 2012-13–Nuclear Plant Interface Coordination has adjusted the language of this reference in proposed NUC-001-3 to eliminate any potential confusion of a lowercase usage of a defined term. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.

Requirements of the revised Reliability Standard PRC-010-1 meet the following objectives:

- Evaluate a UVLS Program's effectiveness prior to implementation, including the program's coordination with other protection systems and generator voltage ride-through capabilities.
- Adhere to UVLS Program specifications and implementation schedule.
- Perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies.
- Maintain and share UVLS Program data.

Also of note, Project 2009-03 – Emergency Operations is proposing EOP-011-1, which, as part of the overall revisions, retires specific requirements from EOP-003-2 – Load Shedding Plans to eliminate identified redundancy between PRC-010-1 and EOP-003-2. In addition, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Programs that are intended to trip one or more BES Elements. A change to make these types of UVLS Programs explicitly applicable to PRC-004 will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

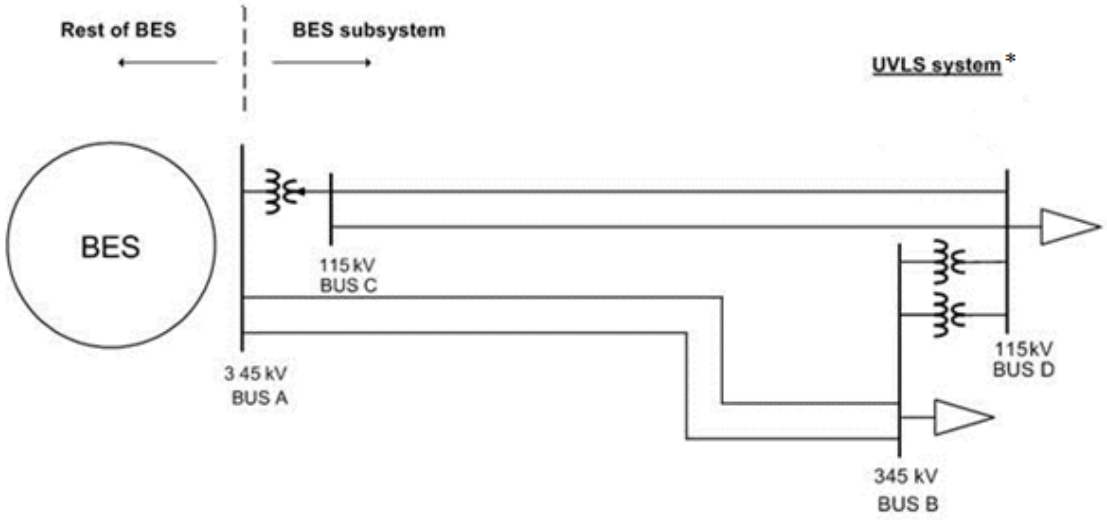
Guidelines for UVLS Program Definition

The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. As such, the failure of a single component is unlikely to affect the reliable operation of the program.

The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a RAS, wherein load shedding is the remedial action. Therefore, just like for a RAS, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding.

To ensure that the applicability of the standard is to only those undervoltage-based load shedding systems whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one or more of the following: voltage instability, voltage collapse, or Cascading impacting the BES. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

Below is an example of a BES subsystem for which UVLS system could be used as a solution to mitigate various issues following the loss of the 345 kV double circuit line between bus A and bus B. If the consequence of this Contingency does not impact the BES by leading to voltage instability, voltage collapse, or Cascading involving the BES, UVLS system (installed at either, or both, bus B and D) used to mitigate this case would not fall under the definition of a UVLS Program. However, if this same UVLS system would be used to mitigate Adverse Reliability Impact outside this contained area, it would be classified as a wide-area undervoltage problem and would fall under the definition of UVLS Program.



*UVLS systems may be installed at either, or both, bus B and D

High Level Requirement Overview

Requirement	Entity	Evaluate Program Effectiveness	Adhere to Program Specifications and Schedule	Perform Program Assessment (Periodic or Performance)	Develop a CAP to Address Program Deficiencies	Update and/or Share Program Data
R1	PC or TP	X				
R2	UVLS entity		X			
R3	PC or TP	X		X		
R4	PC or TP	X		X		
R5	PC or TP				X	
R6	PC					X
R7	UVLS entity					X
R8	PC					X

Guidelines for Requirement R1:

A UVLS Program may be developed and implemented to either serve as a safety net system protection measure against unforeseen extreme Contingencies or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under Transmission Planning (TPL) Reliability Standards. Regardless of the purpose, it is important that the UVLS Program being implemented is effective in terms that it mitigates undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Consideration should be given to voltage set points and time delays, rate of voltage decay or recovery, power flow levels, etc. when designing a UVLS Program.

For the UVLS Program to be effective in achieving its goal, it is also necessary that the UVLS Program is coordinated with generator voltage ride-through capabilities and other protection and control systems that may have an impact on the performance of the UVLS Program. Some of these protection and control systems may include, but are not limited to, transmission line protection, RAS, other undervoltage-based load shedding programs, autoreclosing, and controls of shunt capacitors, reactors, and static var systems (SVSs).

For example, if the purpose of a UVLS Program is to mitigate fault-induced delayed voltage recovery (FIDVR) events in a large load center that also includes local generation, it is important that such a UVLS Program is coordinated with local generators' voltage ride-through capabilities. Generators in the vicinity of a load center are critical to providing dynamic voltage support to the system during FIDVR events. To maximize the benefit of on-line generation, the best practice may be to shed load prior to generation trip. However, occasionally, it may be best to let generation trip prior to load shed. Therefore, the impact of generation tripping should be considered while designing a UVLS Program.

Another example that can be highlighted is the coordination of a UVLS Program with automatic shunt reactor tripping devices if there are any on the system. Most likely, any shunt reactors on the system will trip off automatically after some time delay during low voltage conditions. In such cases, shunt reactors should be tripped before the load is shed to preserve the system. This may require coordination of time delays associated with the UVLS Program with shunt reactor tripping devices.

Examples given above demonstrate that, for a UVLS Program to be effective, proper consideration should be given to coordination of a UVLS Program with generator ride-through capabilities and other protection and control systems.

Guidelines for Requirement R2:

Once a Planning Coordinator or Transmission Planner has identified a need for a UVLS Program, the Planning Coordinator or Transmission Planner will develop a program that includes specifications and an implementation schedule, which are then provided to UVLS entities per Requirement R1. Specifications may include voltage set points, time delays, amount of load to be shed, the location at which load needs to be shed, etc. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal. The UVLS entity must document that all necessary actions were completed to implement the UVLS Program.

Similarly, when a Corrective Action Plan (CAP) to address UVLS Program deficiencies is developed by the Planning Coordinator or Transmission Planner and provided to UVLS entities per Requirement R5, UVLS entities must comply with the CAP and its associated implementation schedule to ensure that the UVLS Program is effective. The UVLS entity is required to complete the actions specified in the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion.

Deferrals or other relevant changes to the UVLS Program specifications or CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence.

For example, documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency:

> CAP Example 1 - Corrective actions for a quick triggering problem; preemptive actions for similar installations:
>
> PC or TP obtains fault records from a UVLS entity that participates in its UVLS Program that indicate a group of UVLS relays triggered at the appropriate undervoltage level but with shorter delays than expected. The PC or TP directed the UVLS entity to schedule on-site inspections within three weeks. The results of the inspection confirmed that the delay-time programmed on the relays was 60 cycles instead of 90 cycles. The PC or TP then directed the

UVLS entity to correct to a 90-cycle time delay setting of the UVLS relays identified to have shorter time delay settings within eight weeks.

Applicability to other UVLS relays: The PC or TP then developed a schedule with the UVLS entity to verify and adjust all remaining UVLS relays time delay settings within a one-year period.

The PC or TP verified completion of verification and adjustment of the time delay settings for all of the UVLS entity's equipment that participates in the PC or TP UVLS Program

CAP Example 2 - Corrective actions for a firmware problem; preemptive actions for similar installations:

PC or TP obtains fault records on 6/4/2014 from a UVLS entity that participates in its UVLS Program. The UVLS entity also provided the fault records to the manufacturer, who responded on 6/11/2014 that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. The PC or TP approved the UVLS entity's plan to schedule Version 3 firmware installation on 6/12/2014.

Applicability to other UVLS relays: The PC or TP then developed a schedule with the UVLS entity to install firmware version 3 at all of the UVLS entity's UVLS relays that are determined to be programmed with version 2 firmware. The completion date was scheduled no-later-than 12/31/2014.

The firmware replacements were completed on 12/4/2014.

Guidelines for Requirement R3:

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments (detailed analyses) are required to ensure its continued effectiveness. This assessment should be completed at least once every 60 calendar months to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed. However, at any point in time, a Planning Coordinator or Transmission Planner may also determine that a material change to system topology or operating conditions affects the performance of the UVLS Program and therefore necessitates the same comprehensive assessment. Regardless of the trigger, each assessment should include an evaluation of each UVLS Program to ensure the continued integration through coordination.

This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. The 60-month period is the same time frame used in TPL-001-4 and in PRC-006-1.

With respect to situations in which a material change to system and topology or operating conditions would necessitate a comprehensive assessment of the UVLS Program, it is understood that the term material change is not transportable on a continent-wide basis. This

determination must be made by the Planning Coordinator or Transmission Planner and should be accompanied by documentation to support the technical rationale for determining material changes.

As specified in Requirement R3, a comprehensive assessment must be performed at least once every 60 calendar months. If a Planning Coordinator or Transmission Planner conducts a comprehensive assessment sooner for the reasons discussed above, the 60-month time period would restart upon completion of this assessment.

Guidelines for Requirement R4:

The goal of the assessment required in Requirement R4 is to evaluate whether the UVLS Program resolved the undervoltage issues for an event that occurred on the system. It is expected that the assessment should include event data analysis, such as the relevant sequence of events leading to the undervoltage conditions (e.g., Contingencies, operation of protection systems, and RAS) and field measurements useful to analyzing the behavior of the system. A comprehensive description of the UVLS Program operation should be presented, including conditions of the trigger (e.g., voltage levels, time delays) and amount of load shed for each affected substation. Assessment of the event shall be performed to evaluate the level of performance of the program for the event of interest and to identify deficiencies to be included in a CAP per Requirement R5.

The studies and analyses showing the effectiveness of the UVLS Program can be similar to what is required in Requirements R1 and R3, but should include a clear link between the evaluation of effectiveness (in studies using simulations) and the analysis of the event (with measurements and event data) that actually occurred. For example, differences between the expected and actual system behavior for the event of interest should be discussed and modeling assumptions should be evaluated. Important discrepancies between the simulations and the actual event should be investigated.

Considering the importance of an event that involves the operation of a UVLS Program, the 12-calendar-month period provides adequate time to analyze the event and perform an assessment while identifying deficiencies within a reasonable time. This time period is also required in PRC-006-1.

Guidelines for Requirement R5:

Requirement R5 promotes the prudent correction of an identified problem during assessment evaluations of each UVLS Program. Per Requirements R3 and R4, an assessment of an active UVLS Program is triggered:

- Within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate.

- At least once every 60 months. The default time frame of 60 months or less between assessments has the intention to assure that the cumulative changes to the network and operating condition affecting the UVLS Program are evaluated.

Since every UVLS is unique, if material changes are made to system topology or operating conditions, the Planning Coordinator or Transmission Planner will decide the degree to which the change in topology or operating condition becomes a material change sufficient to trigger an assessment of the existing UVLS Program.

A CAP is a list of actions and an associated timetable for implementation to remedy a specific problem. It is a proven tool for resolving operational problems. Per Requirement R5, the Planning Coordinator or Transmission Planner is required to develop a CAP and provide it to UVLS entities to accomplish the purpose of this requirement, which is to prevent future deficiencies in the UVLS Program, thereby minimizing risk to the system. Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found.

Based on industry experience and operational coordination timeframes, the drafting team believes that within three calendar months from the date an assessment is completed is a reasonable time frame for development of a CAP, including time to consider alternative solutions and coordination of resources. The "within three calendar months" time frame is solely to develop a CAP, including its implementation schedule, and provide it to UVLS entities. It does not include the time needed for its implementation by UVLS entities. This implementation time frame is dictated within the CAP's associated timetable for implementation, and the execution of the CAP according to its schedule is required in Requirement R2.

Guidelines for Requirements R6–R8

An accurate UVLS Program database is necessary for the Planning Coordinator or Transmission Planner to perform system reliability assessment studies and event analysis studies. Without accurate data, there is a possibility that annual reliability assessment studies that are performed by the Planning Coordinator or Transmission Planner can lead to erroneous results and therefore impact reliability. Also, without the accurate data, it is very difficult for the Planning Coordinator or Transmission Planner to duplicate a UVLS event and determine the root cause of the problem.

To support a UVLS Program database, it is necessary for each UVLS entity to provide accurate data to its Planning Coordinator. Each UVLS entity will provide the data according to the specified format and schedule provided by the Planning Coordinator. This is required in order for the Planning Coordinator to maintain and support a comprehensive UVLS Program database. By having a comprehensive database, the Planning Coordinator can embark on a reliability assessment or event analysis/benchmarking studies, identify the issues with the UVLS Program, and develop remedial action plans.

The UVLS Program database may include, but is not limited to the following:

- Owner and operator of the UVLS Program
- Size and location of customer load, or percent of connected load, to be interrupted
- Corresponding voltage set points and clearing times
- Time delay from initiation to trip signal
- Breaker operating times

- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and RAS.

Additionally, the UVLS Program database should be updated annually (once every calendar year) by the Planning Coordinator. The intent here is for UVLS entities to review the data annually and provide changes to the Planning Coordinators so that Planning Coordinators can keep the databases current and accurate for performing event analysis and other assessments.

Finally, a Planning Coordinator is required to provide information to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of receipt of a written request. Thirty calendar days was selected as the time frame as it is considered to be reasonable and well-accepted by the industry. Also, this requirement of sharing the database with applicable functional entities supports the directive provided by FERC that requires an integrated and coordinated approach to UVLS programs (Paragraph 1509 of FERC Order No. 693).

Standard Development Timeline

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed

1. Standard Authorization Request (SAR) posted for comment on January 20, 2010.
2. Revised SAR with supporting draft standard language posted for informal comment on September 10, 2013.
3. Draft standard posted for informal comment on March 17, 2014.
4. Draft standard posted for formal comment and ballot June 24, 2014.

Description of Current Draft

This is the second draft of the proposed Reliability Standard PRC-010-1, and it is being posted for final ballot.

Anticipated Actions	Anticipated Date
10-day Final Ballot	September 2014
Present to NERC Board of Trustees for Approval	November 2014

Effective Dates

~~The standard shall become effective on the first day of the first calendar quarter that is 12 months after the date that the standard is approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is 12 months after the date the standard is adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.~~See Implementation Plan.

Version History

Version	Date	Action	Change Tracking
1.0	TBD	Revisions made under Project 2008-02: Undervoltage Load Shedding (UVLS) & Underfrequency Load Shedding (UFLS) to address directive issued in FERC Order No. 763. Completed revision, merged and updated PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1.	Revision

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Glossary of Terms Used in NERC Reliability Standards (Updated August 20, 2014) are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading ~~impacting the Bulk Electric System (BES)~~. Centrally controlled undervoltage-based load shedding is not included.

Rationale for Definition: As part of the development of PRC-010-1, the drafting team found it necessary to introduce the term Undervoltage Load Shedding Program (UVLS Program) to establish the applicability of PRC-010-1. The following are critical defining elements of the proposed term:

1) The definition provides latitude for the Planning Coordinator or Transmission Planner to determine if ~~a~~ UVLS ~~system~~ falls under the defined term based on the impact on the reliability of the BES. (See Guidelines and Technical Basis section for further discussion.)

2) Centrally controlled undervoltage-based load shedding is excluded because its design and characteristics are commensurate with a Special Protection Systems (SPS) or Remedial Action Scheme (RAS) (wherein load shedding is the remedial action). As such, centrally controlled undervoltage-based load shedding should be subject to SPS/RAS-related Reliability Standards. (See Guidelines and Technical Basis section for rationale.)

Consequently, the drafting team has recommended that Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) include centrally controlled undervoltage-based load shedding in the definition of a Special Protection System/Remedial Action Scheme.

3) The definition of UVLS Program is independent of whether the undervoltage load shedding relays are armed manually or automatically since the arming is done in anticipation of extreme conditions and not during the events when load shedding needs to occur.

When this standard has received ballot approval, the text boxes will be moved to the Guidelines and Technical Basis section of the Standard.

A. Introduction

1. **Title: Undervoltage Load Shedding**

2. **Number: PRC-010-1**

3. **Purpose:** To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs (UVLS Programs).

Rationale for Applicability: This standard is applicable to Planning Coordinators and Transmission Planners that have or are developing a UVLS Program, and to Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator. These Distribution Providers and Transmission Owners are referred to as UVLS entities for the purpose of this standard.

The applicability includes both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs.

The phrase "Planning Coordinator or Transmission Planner" provides the latitude for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity.

4. **Applicability:**

   4.1. Functional Entities:

   4.1.1 Planning Coordinator

   4.1.2 Transmission Planner

   4.1.3 Undervoltage load shedding (UVLS) entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

5. Background[KS1]:

PRC-010-1 – Undervoltage Load Shedding is a consolidation and revision of the following Reliability Standards:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

The UVLS Standard Drafting Team (or drafting team) developed the revised PRC-010-1 to meet the following objectives:

- Address the FERC directive in Order No. 693, Paragraph 1509 to modify PRC-010-0 to require an integrated and coordinated approach to all protection systems.
- Replace the applicability to and involvement of the Regional Reliability Organization (RRO) in PRC-020-1 and PRC-021-1.
- Consolidate the UVLS-related standards into one comprehensive standard (similar to the construct of FERC-approved PRC-006-1– Automatic Underfrequency Load Shedding).
- Clearly identify and separate centrally controlled undervoltage-based load shedding due to the reliability requirements needed for this type of load shedding as compared to other UVLS systems.
- Create a single results-based standard that addresses current reliability issues associated with UVLS.

B. Requirements and Measures

Rationale for R1: In Paragraph 1509 from Order No. 693, FERC directed NERC to require an integrated and coordinated approach to all protection systems. The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability, and that each Planning Coordinator or Transmission Planner that develops a UVLS Program should evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage conditions that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. Though presented as separate items, the drafting team recognizes that the studies that show coordination considerations and that the program addresses undervoltage issues may be interrelated and presented as one comprehensive analysis.

In addition, Requirement R1 also requires the Planning Coordinator or Transmission Planner to provide the UVLS Program's specifications and implementation schedule to applicable UVLS entities to implement the program. It is noted that studies to evaluate the effectiveness of the program should be completed prior to providing the specifications and schedule.

R1. Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

1.1. The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design.

1.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M1. Acceptable evidence may include, but is not limited to, date-stamped studies and analyses, reports, or other documentation detailing the effectiveness of the UVLS Program, and date-stamped communications showing that the UVLS Program specifications and implementation schedule were provided to UVLS entities.

Rationale for R2: UVLS entities must implement a UVLS Program or address any necessary corrective actions for a UVLS Program according to the specifications and schedule provided by the Planning Coordinator or Transmission Planner. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal.

R2. Each UVLS entity shall adhere to the UVLS Program specifications and implementation schedule determined by its Planning Coordinator or Transmission Planner associated with UVLS Program development per Requirement R1 or with any Corrective Action Plans per Requirement R5. *[Violation Risk Factor: High] [Time Horizon: Long-term Planning]*

M2. Acceptable evidence must include date-stamped documentation on the completion of actions and may include, but is not limited to, identifying the equipment armed with UVLS relays, the UVLS relay settings, associated Load summaries, work management program records, work orders, and maintenance records.

Rationale for R3: A periodic comprehensive assessment (detailed analysis) should be conducted to identify and catalogue the accumulated effects of minor changes to the system that have occurred since the last assessment was completed, and should include an evaluation of each UVLS Program to ensure the continued integration through coordination. This comprehensive assessment supplements the NERC Reliability Standard TPL-001-4 annual assessment requirement to evaluate the impact of protection systems.

Based on the drafting team's knowledge and experience, and in keeping with time frames contained in similar requirements from other PRC Reliability Standards, 60 calendar months was determined to be the maximum amount of time allowable between assessments. Assessments will be performed sooner than the end of the 60-calendar month period if the Planning Coordinator or Transmission Planner determines that there are material changes to system topology or operating conditions that affect the performance of a UVLS Program. Note that the 60-calendar-month time frame would reset after each assessment.

R3. Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. Each assessment shall include, but is not limited to, studies and analyses that evaluate whether: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

3.1. The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed.

3.2. The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, autoreclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

M3. Acceptable evidence may include, but is not limited to, date-stamped reports or other documentation detailing the assessment of the UVLS Program.

Rationale for R4: A UVLS Program not functioning as expected during a voltage excursion event for which the UVLS Program was designed to operate presents a critical risk to system reliability. Therefore, a timely assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with the applicable event is essential. The 12 calendar months (from the date of the event) provides adequate time to coordinate with other Planning Coordinators, Transmission Planners, Transmission Operators, and UVLS entities, simulate pre- and post-event conditions, and complete the performance assessment.

R4. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M4. Acceptable evidence may include, but is not limited to, date-stamped event data, event analysis reports, or other documentation detailing the assessment of the UVLS Program.

Rationale for R5: If program deficiencies are identified during an assessment of a UVLS Program performed in either Requirement R3 or R4, the Planning Coordinator or Transmission Planner must develop a Corrective Action Plan (CAP) to address the deficiencies. Based on the drafting team's knowledge and experience with UVLS studies, three calendar months was determined to provide a judicious balance between the reliability need to address deficiencies expeditiously and the time needed to consider potential solutions, coordinate resources, develop a CAP and implementation schedule, and provide the CAP and schedule to UVLS entities.

It is noted that the three-month time frame is only to develop the CAP and provide it to UVLS entities and does not encompass the time UVLS entities have to implement the CAP. Requirement R2 requires UVLS entities to execute the CAP according to the schedule provided by the Planning Coordinator or Transmission Planner.

R5. Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities

within three calendar months of completing the assessment. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

M5. Acceptable evidence must include a date-stamped Corrective Action Plan that addresses identified deficiencies and may also include date-stamped reports or other documentation supporting the Corrective Action Plan. Evidence should also include date-stamped communications showing that the Corrective Action Plan and an associated implementation schedule were provided to UVLS entities.

Rationale for R6: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R6 supports this reliability need by requiring the Planning Coordinator to update its UVLS Program database at least once each calendar year.

R6. Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model the ~~its~~ UVLS Program(s) in its area for use in event analyses and assessments of the UVLS Program at least once each calendar year. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M6. Acceptable evidence may include, but is not limited to, date-stamped spreadsheets, database reports, or other documentation demonstrating a UVLS Program database was updated.

Rationale for R7: Having accurate and current data is required for the Planning Coordinator to perform undervoltage studies and for use in event analyses. Requirement R7 supports this reliability need by requiring the UVLS entity to provide UVLS Program data in accordance with specified parameters.

R7. Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M7. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating data was provided to the Planning Coordinator as specified.

Rationale for R8: Requirement R8 supports the integrated and coordinated approach to UVLS programs directed by Paragraph 1509 of Order No. 693 by requiring that UVLS Program data be shared with neighboring Planning Coordinators and Transmission Planners within a reasonable time period. Requests for the database should also be fulfilled for those functional entities that have a reliability need for the data (such as the Transmission Operators that develop System Operating Limits and Reliability Coordinators that develop Interconnection Reliability Operating Limits).

R8. Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request. *[Violation Risk Factor: Lower] [Time Horizon: Operations Planning]*

M8. Acceptable evidence may include, but is not limited to, date-stamped emails, letters, or other documentation demonstrating that the UVLS Program database was provided within 30 calendar days of receipt of a written request.

C. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

As defined in the NERC Rules of Procedure, "Compliance Enforcement Authority" means NERC or the Regional Entity in their respective roles of monitoring and enforcing compliance with the NERC Reliability Standards.

1.2. Evidence Retention

The following evidence retention periods identify the period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention period specified below is shorter than the time since the last audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full-time period since the last audit.

The Planning Coordinator, Transmission Planner, Distribution Provider, and Transmission Owner shall keep data or evidence to show compliance as identified below unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation.

The applicable entity shall retain documentation as evidence for six calendar years.

If an applicable entity is found non-compliant, it shall keep information related to the non-compliance until mitigation is complete and approved, or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes:

"Compliance Monitoring and Assessment Processes" refers to the identification of the processes that will be used to evaluate data or information for the purpose of assessing performance or outcomes with the associated reliability standard.

1.4. Additional Compliance Information

None

Table of Compliance Elements

R #	Time Horizon	VRF	Violation Severity Levels			
			Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	Long-term Planning	High	N/A	N/A	N/A	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in Parts 1.1 and 1.2.

R2	Long-term Planning	High	N/A	N/A	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
R3	Long-term Planning	Medium	N/A	N/A	N/A	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in Parts 3.1 and 3.2.

R4	Operations Planning	Medium	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 calendar months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
R5	Operations Planning	Medium	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.

R6	Operations Planning	Lower	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 30 calendar days but less than or equal to 60 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90 calendar days.	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.
R7	Operations Planning	Lower	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.

R8	Operations Planning	Lower	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.

D. Regional Variances

None.

E. Interpretations

None.

F. Associated Documents

None.

Guidelines and Technical Basis

Introduction

PRC-010-1 is a single, comprehensive standard that addresses the same reliability principles outlined in its legacy standards, PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The standard also addresses a FERC directive from Order No. 693, Paragraph 1509. This paragraph directs NERC to develop a modification to PRC-010-0 that requires an integrated and coordinated approach to all protection systems, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency load shedding (UFLS) and UVLS programs.

Since FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding was developed under a similar construct of combining existing standards and addressing a FERC Order No. 693 directive, the drafting team looked to this standard as a guide. With the understanding that UVLS and UFLS systems have fundamental differences, the drafting team adopted PRC-006-1's industry-vetted reliability principles and language as applicable to UVLS Programs.

The drafting team's established purpose for PRC-010-1 is to clearly define the responsibilities of applicable entities to pursue an integrated and coordinated approach to the design, evaluation, and reliable operation of UVLS Programs. Since the need for and design of UVLS Programs is unique to each system preservation footprint, the intent of the standard is to provide a framework of reliability requirements for such programs to which each individual entity can apply its program's specific considerations and characteristics. The drafting team emphasizes that PRC-010-1 does not require a mandatory UVLS Program, nor does this standard address the need to have a UVLS Program. PRC-010-1 applies only after an entity has determined the need for a UVLS Program as a result of its own planning studies.

The drafting team provides the following discussion to support the approach to the standard. The information is meant to enhance the understanding of the reliability needs and deliverable expectations of each requirement, supported as necessary by technical principles and industry experience.

The design and characteristics of a centrally controlled undervoltage-based load shedding system are commensurate with a Special Protection System (SPS) or Remedial Action Scheme (RAS), therefore, the drafting team maintains that this type of load shedding should be covered by SPS or RAS-related Reliability Standards. Therefore, PRC-010-1 introduces a new Glossary of Terms Used in NERC Reliability Standards term, UVLS Program, to establish the applicability of PRC-010-1 to automatic load shedding programs consisting of distributed relays and controls used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading ~~impacting the Bulk Electric System (BES)~~. Undervoltage-based load shedding that does not have such an impact as determined by the Planning Coordinator or Transmission Planner is not included. It is further noted that this term excludes centrally controlled undervoltage-based load shedding.

Subsequently, since the current Glossary of Terms Used in NERC Reliability Standards definition of Special Protection System excludes UVLS, concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) will adjust the definition to exclude only UVLS Programs as defined above and therefore include centrally controlled undervoltage-

based load shedding. Of note, the drafting team for Project 2010-05.2 is proposing to change the term from Special Protection System to Remedial Action Scheme. Accordingly, PRC-010-1 uses the term Remedial Action Scheme instead of Special Protection System. In the current inventory of NERC Reliability Standards, there is one instance of the term undervoltage load shedding program, which is in NUC-001-2.1. Project 2012-13–Nuclear Plant Interface Coordination has adjusted the language of this reference in proposed NUC-001-3 to eliminate any potential confusion of a lowercase usage of a defined term. Likewise, future projects containing standards that feature variations of the term (e.g., undervoltage load shedding system) will also be advised to consider the newly defined term.

Requirements of the revised Reliability Standard PRC-010-1 meet the following objectives:

- Evaluate a UVLS Program's effectiveness prior to implementation, including the program's coordination with other protection systems and generator voltage ride-through capabilities.
- Adhere to UVLS Program specifications and implementation schedule.
- Perform periodic assessment and performance analysis of UVLS Programs and resolve identified deficiencies.
- Maintain and share UVLS Program data.

Also of note, Project 2009-03 – Emergency Operations is proposing EOP-011-1, which, as part of the overall revisions, retires specific requirements from EOP-003-2 – Load Shedding Plans to eliminate identified redundancy between PRC-010-1 and EOP-003-2. In addition, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Programs that are intended to trip one or more BES Elements. A change to make these types of UVLS Programs explicitly applicable to PRC-004 will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

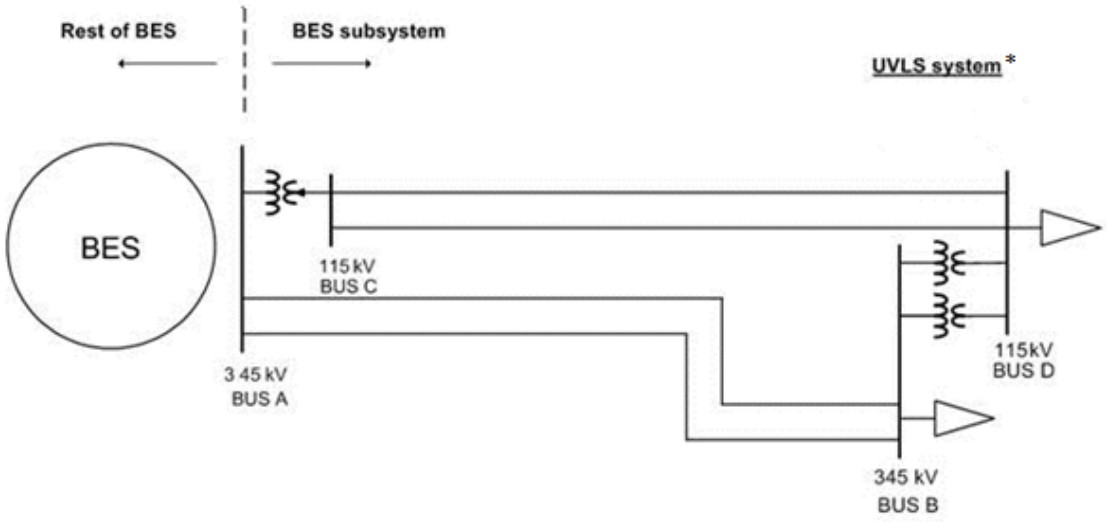
Guidelines for UVLS Program Definition

The definition for the term UVLS Program includes automatic load shedding programs that utilize only voltage inputs at locations where action is taken to shed load. As such, the failure of a single component is unlikely to affect the reliable operation of the program.

The definition for the term UVLS Program excludes centrally controlled undervoltage-based load shedding, which utilizes inputs from multiple locations and may also utilize inputs other than voltages (such as generator reactive reserves, facility loadings, equipment statuses, etc.). The design and characteristics of a centrally controlled undervoltage-based load shedding system are the same as that of a RAS, wherein load shedding is the remedial action. Therefore, just like for a RAS, the failure of a single component can compromise the reliable operation of centrally controlled undervoltage-based load shedding.

To ensure that the applicability of the standard is to only those undervoltage-based load shedding systems whose performance has an impact on system reliability, a UVLS Program must mitigate risk of one or more of the following: voltage instability, voltage collapse, or Cascading impacting the BES. An example of a program that would not fall under this category is undervoltage-based load shedding installed to mitigate damage to equipment or local loads that are directly affected by the low voltage event.

Below is an example of a ~~radial~~ BES subsystem for which UVLS system could be used as a solution to mitigate various issues following the loss of the 345 kV double circuit line between bus A and bus B. If the consequence of this Contingency does not impact the BES by leading to voltage instability, voltage collapse, or Cascading involving the BES~~is limited to undervoltage conditions, loss of load, or overloading of facilities within the contained area formed by buses A to D~~, UVLS system (installed at either, or both, bus B and D) used to mitigate this case would not fall under the definition of a UVLS Program. However, if this same UVLS system would be used to mitigate Adverse Reliability Impact outside this contained area, it would be classified as a wide-area undervoltage problem and would fall under the definition of UVLS Program.



*UVLS systems may be installed at either, or both, bus B and D

High Level Requirement Overview

Requirement	Entity	Evaluate Program Effectiveness	Adhere to Program Specifications and Schedule	Perform Program Assessment (Periodic or Performance)	Develop a CAP to Address Program Deficiencies	Update and/or Share Program Data
R1	PC or TP	X				
R2	UVLS entity		X			
R3	PC or TP	X		X		
R4	PC or TP	X		X		
R5	PC or TP				X	
R6	PC					X
R7	UVLS entity					X
R8	PC					X

Guidelines for Requirement R1:

A UVLS Program may be developed and implemented to either serve as a safety net system protection measure against unforeseen extreme Contingencies or to achieve specific system performance for known transmission Contingencies for which dropping of load is allowed under Transmission Planning (TPL) Reliability Standards. Regardless of the purpose, it is important that the UVLS Program being implemented is effective in terms that it mitigates undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Consideration should be given to voltage set points and time delays, rate of voltage decay or recovery, power flow levels, etc. when designing a UVLS Program.

For the UVLS Program to be effective in achieving its goal, it is also necessary that the UVLS Program is coordinated with generator voltage ride-through capabilities and other protection and control systems that may have an impact on the performance of the UVLS Program. Some of these protection and control systems may include, but are not limited to, transmission line protection, RAS, other undervoltage-based load shedding programs, autoreclosing, and controls of shunt capacitors, reactors, and static var systems (SVSs).

For example, if the purpose of a UVLS Program is to mitigate fault-induced delayed voltage recovery (FIDVR) events in a large load center that also includes local generation, it is important that such a UVLS Program is coordinated with local generators' voltage ride-through capabilities. Generators in the vicinity of a load center are critical to providing dynamic voltage support to the system during FIDVR events. To maximize the benefit of on-line generation, the best practice may be to shed load prior to generation trip. However, occasionally, it may be best to let generation trip prior to load shed. Therefore, the impact of generation tripping should be considered while designing a UVLS Program.

Another example that can be highlighted is the coordination of a UVLS Program with automatic shunt reactor tripping devices if there are any on the system. Most likely, any shunt reactors on the system will trip off automatically after some time delay during low voltage conditions. In such cases, shunt reactors should be tripped before the load is shed to preserve the system. This may require coordination of time delays associated with the UVLS Program with shunt reactor tripping devices.

Examples given above demonstrate that, for a UVLS Program to be effective, proper consideration should be given to coordination of a UVLS Program with generator ride-through capabilities and other protection and control systems.

Guidelines for Requirement R2:

Once a Planning Coordinator or Transmission Planner has identified a need for a UVLS Program, the Planning Coordinator or Transmission Planner will develop a program that includes specifications and an implementation schedule, which are then provided to UVLS entities per Requirement R1. Specifications may include voltage set points, time delays, amount of load to be shed, the location at which load needs to be shed, etc. If UVLS entities do not implement the UVLS Program according to the specifications and schedule provided, the UVLS Program may not be effective and may not achieve its intended goal. The UVLS entity must document that all necessary actions were completed to implement the UVLS Program.

Similarly, when a Corrective Action Plan (CAP) to address UVLS Program deficiencies is developed by the Planning Coordinator or Transmission Planner and provided to UVLS entities per Requirement R5, UVLS entities must comply with the CAP and its associated implementation schedule to ensure that the UVLS Program is effective. The UVLS entity is required to complete the actions specified in the CAP, document the plan implementation, and retain the appropriate evidence to demonstrate implementation and completion.

Deferrals or other relevant changes to the UVLS Program specifications or CAP need to be documented so that the record includes not only what was planned, but what was implemented. Depending on the planning and documentation format used by the responsible entity, evidence of a successful execution could consist of signed-off work orders, printouts from work management systems, spreadsheets of planned versus completed work, timesheets, work inspection reports, paid invoices, photographs, walk-through reports, or other evidence.

For example, documentation of a CAP provides an auditable progress and completion confirmation for the identified UVLS Program deficiency:

> CAP Example 1 - Corrective actions for a quick triggering problem; preemptive actions for similar installations:
>
> PC or TP obtains fault records from a UVLS entity that participates in its UVLS Program that ~~showed that~~indicate a group of UVLS relays ~~did~~ triggered at the ~~right~~ appropriate undervoltage level but with shorter delays than expected. The PC or TP directed the UVLS entity to schedule on-site inspections within three weeks. The results of the inspection~~were completed in three weeks,~~ confirmed that the delay-time programmed on the relays was 60 cycles

instead of 90 cycles. The PC or TP then directed ~~A plan was scheduled for~~ the UVLS entity to ~~next eight weeks to~~ correct to a 90-cycle time delay setting of the UVLS relays identified to have shorter time delay settings within eight weeks.

Applicability to other UVLS relays: The PC or TP then developed a schedule with the UVLS entity ~~Based on our risk assessment, we scheduled~~ to verify and adjust all remaining UVLS relays time delay settings within a one-year period.

The PC or TP verified completion of verification and adjustment of the time delay settings for all of the UVLS entity's equipment that participates in the PC or TP UVLS Program

CAP Example 2 - Corrective actions for a firmware problem; preemptive actions for similar installations:

PC or TP obtains fault records on 6/4/2014 from a UVLS entity that participates in its UVLS Program. The UVLS entity also provided the fault records to the manufacturer, who ~~on 6/4/2014. On 6/11/2014, the manufacturer~~ responded on 6/11/2014 that the misoperation of the UVLS relay was caused by a bug in version 2 firmware, and recommended installing version 3 firmware. The PC or TP approved the UVLS entity's plan to schedule Version 3 firmware ~~was installed~~installation on 6/12/2014.

Applicability to other UVLS relays: The PC or TP then developed a schedule with the UVLS entity ~~Based on our risk assessment, we plan~~ to install firmware version 3 at all of ~~our~~ the UVLS entity's ~~installations~~ UVLS relays that are determined to be programmed with version 2 firmware. The ~~Proposed~~ completion date was scheduled no-later-than~~is~~ 12/31/2014.

The firmware replacements were completed on 12/4/2014.

Guidelines for Requirement R3:

In addition to the initial studies required to develop a UVLS Program, periodic comprehensive assessments (detailed analyses) are required to ensure its continued effectiveness. This assessment should be completed at least once every 60 calendar months to capture the accumulated effects of minor changes to the system that have occurred since the last assessment was completed. However, at any point in time, a Planning Coordinator or Transmission Planner may also determine that a material change to system topology or operating conditions affects the performance of the UVLS Program and therefore necessitates the same comprehensive assessment. Regardless of the trigger, each assessment should include an evaluation of each UVLS Program to ensure the continued integration through coordination.

This comprehensive assessment supplements the TPL-001-4 annual assessment requirement to evaluate the impact of protection systems. The 60-month period is the same time frame used in TPL-001-4 and in PRC-006-1.

With respect to situations in which a material change to system and topology or operating conditions would necessitate a comprehensive assessment of the UVLS Program, it is understood that the term material change is not transportable on a continent-wide basis. This determination must be made by the Planning Coordinator or Transmission Planner and should be accompanied by documentation to support the technical rationale for determining material changes.

As specified in Requirement R3, a comprehensive assessment must be performed at least once every 60 calendar months. If a Planning Coordinator or Transmission Planner conducts a comprehensive assessment sooner for the reasons discussed above, the 60-month time period would restart upon completion of this assessment.

Guidelines for Requirement R4:

The goal of the assessment required in Requirement R4 is to evaluate whether the UVLS Program resolved the undervoltage issues for an event that occurred on the system. It is expected that the assessment should include event data analysis, such as the relevant sequence of events leading to the undervoltage conditions (e.g., Contingencies, operation of protection systems, and RAS) and field measurements useful to analyzing the behavior of the system. A comprehensive description of the UVLS Program operation should be presented, including conditions of the trigger (e.g., voltage levels, time delays) and amount of load shed for each affected substation. ~~Simulations~~ Assessment of the event shall be performed to evaluate the level of performance of the program for the event of interest and to identify deficiencies to be included in a CAP per Requirement R5.

The studies and analyses showing the effectiveness of the UVLS Program can be similar to what is required in Requirements R1 and R3, but should include a clear link between the evaluation of effectiveness (in studies using simulations) and the analysis of the event (with measurements and event data) that actually occurred. For example, differences between the expected and actual system behavior for the event of interest should be discussed and modeling assumptions should be evaluated. Important discrepancies between the simulations and the actual event should be investigated.

Considering the importance of an event that involves the operation of a UVLS Program, the 12-calendar-month period provides adequate time to analyze the event and perform an assessment while identifying deficiencies within a reasonable time. This time period is also required in PRC-006-1.

Guidelines for Requirement R5:

Requirement R5 promotes the prudent correction of an identified problem during assessment evaluations of each UVLS Program. Per Requirements R3 and R4, an assessment of an active UVLS Program is triggered:

- Within 12 calendar months of an event that resulted in a voltage excursion for which the program was designed to operate.
- At least once every 60 months. The default time frame of 60 months or less between

assessments has the intention to assure that the cumulative changes to the network and operating condition affecting the UVLS Program are evaluated.

~~After material changes are made to system topology or operating conditions.~~ Since every UVLS is unique, if material changes are made to system topology or operating conditions, the Planning Coordinator or Transmission Planner will decide the degree to which the change in topology or operating condition becomes a material change sufficient to trigger an assessment of the existing UVLS Program.

A CAP is a list of actions and an associated timetable for implementation to remedy a specific problem. It is a proven tool for resolving operational problems. Per Requirement R5, the Planning Coordinator or Transmission Planner is required to develop a CAP and provide it to UVLS entities to accomplish the purpose of this requirement, which is to prevent future deficiencies in the UVLS Program, thereby minimizing risk to the system. Determining the cause of the deficiency is essential in developing an effective CAP to avoid future re-occurrence of the same problem. A CAP can be revised if additional causes are found.

Based on industry experience and operational coordination timeframes, the drafting team believes that within three calendar months from the date an assessment is completed is a reasonable time frame for development of a CAP, including time to consider alternative solutions and coordination of resources. The "within three calendar months" time frame is solely to develop a CAP, including its implementation schedule, and provide it to UVLS entities. It does not include the time needed for its implementation by UVLS entities. This implementation time frame is dictated within the CAP's associated timetable for implementation, and the execution of the CAP according to its schedule is required in Requirement R2.

Guidelines for Requirements R6–R8

An accurate UVLS Program database is necessary for the Planning Coordinator or Transmission Planner to perform system reliability assessment studies and event analysis studies. Without accurate data, there is a possibility that annual reliability assessment studies that are performed by the Planning Coordinator or Transmission Planner can lead to erroneous results and therefore impact reliability. Also, without the accurate data, it is very difficult for the Planning Coordinator or Transmission Planner to duplicate a UVLS event and determine the root cause of the problem.

To support a UVLS Program database, it is necessary for each UVLS entity to provide accurate data to its Planning Coordinator. Each UVLS entity will provide the data according to the specified format and schedule provided by the Planning Coordinator. This is required in order for the Planning Coordinator to maintain and support a comprehensive UVLS Program database. By having a comprehensive database, the Planning Coordinator can embark on a reliability assessment or event analysis/benchmarking studies, identify the issues with the UVLS Program, and develop remedial action plans.

T~~tems to be included~~he UVLS Program database may include, but is not limited to the ~~are as~~ following:

- Owner and operator of the UVLS Program

- Size and location of customer load, or percent of connected load, to be interrupted
- Corresponding voltage set points and clearing times
- Time delay from initiation to trip signal
- Breaker operating times
- Any other schemes that are part of or impact the UVLS Programs, such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS, and RAS.

Additionally, the UVLS Program database should be updated annually (once every calendar year) by the Planning Coordinator. The intent here is for UVLS entities to review the data annually and provide changes to the Planning Coordinators so that Planning Coordinators can keep the databases current and accurate for performing event analysis and other assessments.

Finally, a Planning Coordinator is required to provide information to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of receipt of a written request. Thirty calendar days was selected as the time frame as it is considered to be reasonable and well-accepted by the industry. Also, this requirement of sharing the database with applicable functional entities supports the directive provided by FERC that requires an integrated and coordinated approach to UVLS programs (Paragraph 1509 of FERC Order No. 693).

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Implementation Plan

PRC-010-1 – Undervoltage Load Shedding

Standards Involved

Approval:

- PRC-010-1 – Undervoltage Load Shedding

Retirements:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

Prerequisite Approvals

- Revised definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems)

  Approval of the proposed definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) is required to align the classification of centrally controlled undervoltage-based load shedding with the proposed definition of "Undervoltage Load Shedding Program (UVLS Program)" below. The term "UVLS Program" excludes centrally controlled undervoltage-based load shedding because the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with Special Protection Systems or Remedial Action Schemes. The proposed definition of "Remedial Action Scheme" excludes "UVLS Programs." As a result, the proposed definition of "Remedial Action Scheme" clarifies that centrally controlled undervoltage-based load shedding is included in its scope.

- EOP-011-1 in Project 2009-03 – Emergency Operations

  Project 2009-03 – Emergency Operations (EOP-011-1) proposes to retire EOP-003-2. Requirements R2, R4, and R7 of EOP-003-2 are not included in EOP-011-1, since these requirements map to PRC-010-1, Requirement R1. As a result, approval of EOP-011-1 is necessary to prevent overlap with Requirement R1 of PRC-010-1.

Revisions to the NERC Glossary of Terms

The following new term is proposed for addition:

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading. Centrally controlled undervoltage-based load shedding is not included.

Applicable Entities

- Planning Coordinator
- Transmission Planner
- UVLS entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

General Considerations

The effective dates of PRC-010-1 and its proposed new NERC Glossary term, EOP-011-1, the revised NERC Glossary definition of "Remedial Action Scheme," and each of the associated retirements are intended to align to accommodate the needed transitions of standard coverage noted above.

The implementation plan for the revised definition of "Remedial Action Scheme" addresses entities that will have newly identified Remedial Action Schemes resulting from the application of the defined term with respect to the inclusion of centrally controlled undervoltage-based load shedding. Please refer to the implementation plan posted with the definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) for more information.

Effective Date

PRC-010-1 and the definition of "Undervoltage Load Shedding Program (UVLS Program)" shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date that the standard and definition are approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard and the definition shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date the standard and definition are adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Retirement of Existing Standards:

PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 shall be retired at midnight of the day immediately prior to the effective date of PRC-010-1 in the particular jurisdiction in which the new standard is becoming effective.

PRC-010-1 is a consolidation of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

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Implementation Plan

PRC-010-1 – Undervoltage Load Shedding

Standards Involved

Approval:

- PRC-010-1 – Undervoltage Load Shedding

Retirements:

- PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program
- PRC-020-1 – Under-Voltage Load Shedding Program Database
- PRC-021-1 – Under-Voltage Load Shedding Program Data
- PRC-022-1 – Under-Voltage Load Shedding Program Performance

Prerequisite Approvals

- Revised definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems)

  Approval of the proposed definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) is required to align the classification of centrally controlled undervoltage-based load shedding with the proposed definition of "Undervoltage Load Shedding Program (UVLS Program)" below. The term "UVLS Program" excludes centrally controlled undervoltage-based load shedding because the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with Special Protection Systems or Remedial Action Schemes. The proposed definition of "Remedial Action Scheme" excludes "UVLS Programs." As a result, the proposed definition of "Remedial Action Scheme" clarifies that centrally controlled undervoltage-based load shedding is included in its scope.

- EOP-011-1 in Project 2009-03 – Emergency Operations

  Project 2009-03 – Emergency Operations (EOP-011-1) proposes to retire EOP-003-2. Requirements R2, R4, and R7 of EOP-003-2 are not included in EOP-011-1, since these requirements map to PRC-010-1, Requirement R1. As a result, approval of EOP-011-1 is necessary to prevent overlap with Requirement R1 of PRC-010-1.

Revisions to the NERC Glossary of Terms

The following new term is proposed for addition:

Undervoltage Load Shedding Program (UVLS Program): An automatic load shedding program, consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading ~~impacting the Bulk Electric System (BES)~~. Centrally controlled undervoltage-based load shedding is not included.

Applicable Entities

- Planning Coordinator
- Transmission Planner
- UVLS entities – Distribution Providers and Transmission Owners responsible for the ownership, operation, or control of UVLS equipment as required by the UVLS Program established by the Transmission Planner or Planning Coordinator.

General Considerations

The effective dates of PRC-010-1 and its proposed new NERC Glossary term, EOP-011-1, the revised NERC Glossary definition of "Remedial Action Scheme," and each of the associated retirements are intended to align to accommodate the needed transitions of standard coverage noted above.

The implementation plan for the revised definition of "Remedial Action Scheme" addresses entities that will have newly identified Remedial Action Schemes resulting from the application of the defined term with respect to the inclusion of centrally controlled undervoltage-based load shedding. Please refer to the implementation plan posted with the definition of "Remedial Action Scheme" in Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) for more information.

Effective Date

PRC-010-1 and the definition of "Undervoltage Load Shedding Program (UVLS Program)" shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date that the standard and definition are approved by an applicable governmental authority or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, the standard and the definition shall become effective on the first day of the first calendar quarter that is twelve (12) months after the date the standard and definition are adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

Retirement of Existing Standards:

PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 shall be retired at midnight of the day immediately prior to the effective date of PRC-010-1 in the particular jurisdiction in which the new standard is becoming effective.

PRC-010-1 is a consolidation of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

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Project 2008-02 Undervoltage Load Shedding

Mapping Document

This mapping document shows translation of the requirements of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, PRC-022-1 – Under-Voltage Load Shedding Program Performance, and specific requirements from EOP-003-2 – Load Shedding Plans to the requirements of PRC-010-1 – Undervoltage Load Shedding.

Project 2008-02 – Undervoltage Load Shedding (PRC-010-1) retires Reliability Standards PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. Project 2009-03 – Emergency Operations (EOP-011-1), which is following a concurrent development timeline with Project 2008-02, retires EOP-003-2, Requirements R2, R4, and R7. The reliability objectives of those three requirements is reflected in PRC-010-1, and the respective translations are illustrated in the mapping documents for both projects.

The drafting team has established the applicability of PRC-010-1 to its proposed new NERC Glossary term "Undervoltage Load Shedding Program (UVLS Program)." This term explicitly excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) with respect to reliability requirement-related needs. As such, centrally controlled undervoltage-based load shedding should be subject to SPS or RAS-related standards. This clarification is being facilitated by way of a conforming revision to the definition of the term "Remedial Action Scheme" by concurrent Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems). This project is also subsequently revising the SPS or RAS-related Reliability Standards.

In addition, the requirements for PRC-010-1 apply to UVLS Program development and assessment and not to equipment. As PRC-022-1 addresses UVLS equipment Misoperations, the UVLS drafting team's intention is for PRC-004 to address Misoperations of UVLS Program equipment. A change to make PRC-004 explicitly applicable to UVLS Program equipment will be addressed once PRC-004-3 – Protection System Misoperation Identification and Correction is completed under Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems).

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall periodically (at least every five years or as required by changes in system conditions) conduct and document an assessment of the effectiveness of the UVLS program. This assessment shall be conducted with the associated Transmission Planner(s) and Planning Authority(ies). **R1.1.** This assessment shall include, but is not limited to: **R1.1.1.** Coordination of the UVLS programs with other protection and control systems in the Region and with other Regional Reliability Organizations, as appropriate. **R1.1.2.** Simulations that demonstrate that the UVLS programs performance is consistent with Reliability Standards TPL-001-0, TPL-002-0, TPL-003-0 and TPL-004-0. **R1.1.3.** A review of the voltage set points and timing.	**PRC-010-0 R1 maps to PRC-010-1 R3**. Applicability changed to Planning Coordinator or Transmission Planner since the Planning Coordinator or Transmission Planner is responsible for the program design. **PRC-010-0 R1.1.1 maps to PRC-010-1 R3, part 3.2**. **PRC-010-0 R1.1.2 and R1.1.3 are inherently embedded in PRC-010-1 R3** (comprehensive assessment). The specific items listed in R1.1.2 and R1.1.3 are described in PRC-010-1's Guidelines and Technical Basis.	**R3.** Each Planning Coordinator or Transmission Planner shall perform a comprehensive assessment to evaluate the effectiveness of each of its UVLS Programs at least once every 60 calendar months. The assessment shall include, but is not limited to, studies and analyses that evaluate whether: **3.1.** The UVLS Program resolves the identified undervoltage issues for which the UVLS Program is designed. **3.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall provide documentation of its current UVLS program assessment to its Regional Reliability Organization and NERC on request (30 calendar days).	FERC-approved retirement of Requirement R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. The Regional Reliability Organization shall establish, maintain and annually update a database for UVLS programs implemented by entities within the region to mitigate the risk of voltage collapse or voltage instability in the BES. This database shall include the following items: **R1.1.** Owner and operator of the UVLS program. **R1.2.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.3.** Corresponding voltage set points and overall scheme clearing times. **R1.4.** Time delay from initiation to trip signal. **R1.5.** Breaker operating times. **R1.6.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	**PRC-020-1 R1 maps to PRC-010-1 R6.** Applicability changed from the Regional Reliability Organization to the Planning Coordinator since the Planning Coordinator is responsible for maintaining information about programs in its area (and requirements can no longer be applicable to Regional Reliability Organizations). **PRC-020-1 R1.1– R1.6 are inherently embedded in PRC-010-1 R6**. The specific items listed in R1.1–R1.6 are described in PRC-010-1's Guidelines and Technical Basis.	**R6.** Each Planning Coordinator that has a UVLS Program in its area shall update a database containing data necessary to model its UVLS Program for use in event analyses and assessments of the UVLS Program at least once each calendar year.

Standard: PRC-020-1 – Under-Voltage Load Shedding Program Database		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. The Regional Reliability Organization shall provide the information in its UVLS database to the Planning Authority, the Transmission Planner, or other Regional Reliability Organizations and to NERC within 30 calendar days of a request.	**PRC-020-1 R2 maps to PRC-010-1 R8**. Applicability changed from the Regional Reliability Organization to the Planning Coordinator since the Planning Coordinator is responsible for maintaining information about programs in its area (and requirements are no longer applicable to Regional Reliability Organizations). Eliminated specificity to the Regional Reliability Organization as a receiving entity by replacing it with "other functional entities with a reliability need." Eliminated NERC as a receiving entity since the ERO Rules of Procedures, Section 401:3. Data Access, provide the ability for NERC to obtain this information.	**R8.** Each Planning Coordinator that has a UVLS Program in its area shall provide its UVLS Program database to other Planning Coordinators and Transmission Planners within its Interconnection, and other functional entities with a reliability need, within 30 calendar days of a written request.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Owner and Distribution Provider that owns a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall annually update its UVLS data to support the Regional UVLS program database. The following data shall be provided to the Regional Reliability Organization for each installed UVLS system: **R1.1.** Size and location of customer load, or percent of connected load, to be interrupted. **R1.2.** Corresponding voltage set points and overall scheme clearing times. **R1.3.** Time delay from initiation to trip signal. **R1.4.** Breaker operating times. **R1.5.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.	**PRC-021-1 R1 maps to PRC-010-1 R7**. Replaced the Regional Reliability Organization with the Planning Coordinator as the receiving entity since the Planning Coordinator is assigned responsibility for maintaining the database. **PRC-021-1 R1.1–R1.5 are inherently embedded in PRC-010-1 R7**. The specific items listed in R1.1–R1.5 are described in PRC-010-1's Guidelines and Technical Basis.	**R7.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.

Standard: PRC-021-1 – Under-Voltage Load Shedding Program Data		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Owner and Distribution Provider that owns a UVLS program shall provide its UVLS program data to the Regional Reliability Organization within 30 calendar days of a request.	**PRC-021-1 R2 maps to PRC-010-1 R7**. Replaced the Regional Reliability Organization with the Planning Coordinator as the receiving entity since the Planning Coordinator is assigned responsibility for maintaining the database.	**R7.** Each UVLS entity shall provide data to its Planning Coordinator according to the format and schedule specified by the Planning Coordinator to support maintenance of a UVLS Program database.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R1. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall analyze and document all UVLS operations and Misoperations. The analysis shall include: **R1.1.** A description of the event including initiating conditions. **R1.2.** A review of UVLS set points and tripping times. **R1.3.** A simulation of the event, if deemed appropriate by the Regional Reliability Organization. For most events, analysis of sequence of events may be sufficient and dynamic simulations may not be needed. **R1.4.** A summary of the findings. **R1.5.** For any Misoperation, a Corrective Action Plan to avoid future Misoperations of a similar nature.	**PRC-022-1 R1 maps to PRC-010-1 R4 and R5.** Applicability changed to Planning Coordinator or Transmission Planner since the Planning Coordinator or Transmission Planner is responsible for the program design. **PRC-022-1 R1.1 and R1.4 are part of the measure for PRC-010-1 R4.** **PRC-022-1 R1.2 and R1.3 are inherently embedded in PRC-010-1 R4**. The specific items listed in R1.2 and R1.3 are described in PRC-010-1's Guidelines and Technical Basis. **PRC-022-1 R1.5 is included as part of PRC-010-1 R5.** Also see last paragraph of the second page of this mapping document.	**R4**. Each Planning Coordinator or Transmission Planner shall, within 12 calendar months of an event that resulted in a voltage excursion for which its UVLS Program was designed to operate, perform an assessment to evaluate whether its UVLS Program resolved the undervoltage issues associated with the event. **R5.** Each Planning Coordinator or Transmission Planner that identifies deficiencies in its UVLS Program during an assessment performed in either Requirement R3 or R4 shall develop a Corrective Action Plan to address the deficiencies and subsequently provide the Corrective Action Plan, including an implementation schedule, to UVLS entities within three calendar months of completing the assessment.

Standard: PRC-022-1 – Under-Voltage Load Shedding Program Performance		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall provide documentation of its analysis of UVLS program performance to its Regional Reliability Organization within 90 calendar days of a request.	FERC-approved retirement of Requirement R2 in Order No. 788 issued November 21, 2013 in FERC Docket No. RM13-8-000.	N/A

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R2. Each Transmission Operator shall establish plans for automatic load shedding for undervoltage conditions if the Transmission Operator or its associated Transmission Planner(s) or Planning Coordinator(s) determine that an under-voltage load shedding scheme is required.	**EOP-003-2 R2 maps to PRC-010-1 R1**. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R4. A Transmission Operator shall consider one or more of these factors in designing an automatic under voltage load shedding scheme: voltage level, rate of voltage decay, or power flow levels.	**EOP-003-2 R4 is inherently embedded in PRC-010-1 R1, part 1.1.** The specific items noted are described in PRC-010-1's Guidelines and Technical Basis. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

Standard: EOP-003-2 – Load Shedding Plans		
Requirement in Approved Standard	**Translation to New Standard or Other Action**	**Proposed Language in PRC-010-1 or Comments**
R7. The Transmission Operator shall coordinate automatic undervoltage load shedding throughout their areas with tripping of shunt capacitors, and other automatic actions that will occur under abnormal voltage, or power flow conditions.	**EOP-003-2 R7 is inherently embedded in PRC-010-1 R1, part 1.2**. The specific items noted are described in PRC-010-1's Guidelines and Technical Basis. Applicability is changed to the Planning Coordinator or Transmission Planner because the Planning Coordinator or Transmission Planner is responsible for the program design.	**R1.** Each Planning Coordinator or Transmission Planner that is developing a UVLS Program shall evaluate its effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to the UVLS entities responsible for implementing the UVLS Program. The evaluation shall include, but is not limited to, studies and analyses that show: **1.1.** The implementation of the UVLS Program resolves the identified undervoltage issues that led to its development and design. **1.2.** The UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems, including, but not limited to, transmission line protection, auto-reclosing, Remedial Action Schemes, and other undervoltage-based load shedding programs.

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Project 2008-02 Undervoltage Load Shedding

Coordination Plan | June 24, 2014

Background

Project 2008-02 Undervoltage Load Shedding ("UVLS Project") proposes to consolidate and retire PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 to create PRC-010-1 – Undervoltage Load Shedding. During development, the drafting team identified the following necessary corresponding changes to meet the design of PRC-010-1:

1) Retire three requirements in EOP-003-2 – Load Shedding Plans whose required performance is reflected in proposed PRC-010-1.

2) Modify the current NERC Glossary definition of the term Special Protection System (SPS), which excludes UVLS, to include a subset of UVLS programs that are more appropriately categorized as SPSs and covered by SPS-related standards.

3) Modify PRC-004-3 – Protection System Misoperation Identification and Correction, which excludes UVLS, to include certain types of UVLS programs as part of its applicable facilities.

In order to make the necessary changes, the UVLS Project needs to coordinate with ongoing development work in three active NERC standard development projects as follows:

- Project 2009-03 – Emergency Operations ("EOP Project")
- Project 2010-05.2 – Special Protection Systems (Phase 2 of Protection Systems) ("SPS Project")
- Project 2010-05.1 – Misoperations (Phase 1 of Protection Systems) ("Misoperations Project")

Current Coordination Plan

NERC has identified a preferred project plan to coordinate the above-mentioned projects to properly align legacy standard retirements and revised standard and definition implementations due to the differences in each project's timing.

1) The EOP and UVLS Projects will progress simultaneously and coordinate necessary changes. Comment periods and ballots for each project will either run concurrently or overlap.

2) The SPS Project is proposing to revise the definition of SPS in advance of revising the SPS standards. The UVLS Project will progress simultaneously with the SPS definition revision in order to properly transfer certain aspects of the legacy UVLS standards into coverage under the SPS standards. Comment periods and ballots for each project will either run concurrently or overlap.

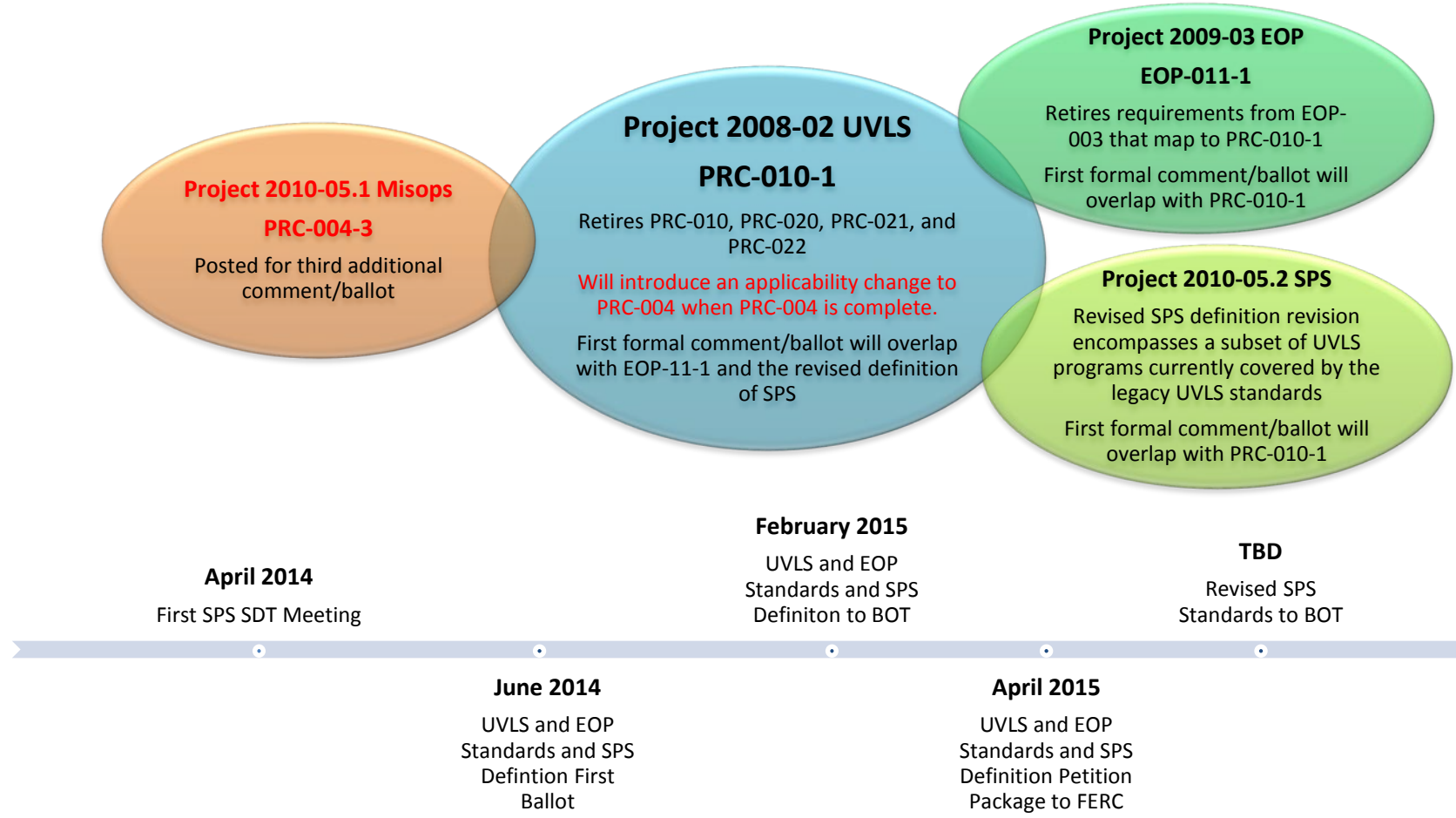
3) The UVLS Project will address the conforming changes needed to PRC-004 after PRC-004-3 is complete. How and when this will occur depends on when PRC-004-3 obtains approval from the ballot body and is adopted by the NERC Board of Trustees.

An illustrative diagram of this coordination appears on the next page. This plan is subject to change as necessary.

General Considerations

The revised definition of SPS, the UVLS Project, and the EOP Project should be presented simultaneously to industry, the NERC Board of Trustees, and applicable regulatory authorities. The associated effective dates and retirements for these projects need to align to accommodate the needed transitions of standard coverage.

The implementation plan for the revised SPS definition will need to address entities that will have newly identified SPSs resulting from the application of the defined term with respect to the inclusion of the subset of UVLS programs that are proposed as more appropriately categorized as SPSs and covered by SPS-related standards.


Project 2010-05.1 Misops
PRC-004-3
Posted for third additional comment/ballot
Project 2008-02 UVLS
PRC-010-1
Retires PRC-010, PRC-020, PRC-021, and PRC-022
Will introduce an applicability change to PRC-004 when PRC-004 is complete.
First formal comment/ballot will overlap with EOP-11-1 and the revised definition of SPS
Project 2009-03 EOP
EOP-011-1
Retires requirements from EOP-003 that map to PRC-010-1
First formal comment/ballot will overlap with PRC-010-1
Project 2010-05.2 SPS
Revised SPS definition revision encompasses a subset of UVLS programs currently covered by the legacy UVLS standards
First formal comment/ballot will overlap with PRC-010-1
April 2014
First SPS SDT Meeting
June 2014
UVLS and EOP Standards and SPS Defintion First Ballot
February 2015
UVLS and EOP Standards and SPS Definiton to BOT
April 2015
UVLS and EOP Standards and SPS Definition Petition Package to FERC
TBD
Revised SPS Standards to BOT

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PRC-010-1 Frequently Asked Questions

Project 2008-02 Undervoltage Load Shedding

September 9, 2014

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3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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Introduction

Over the course of the development of PRC-010-1, the Project 2008-02 Undervoltage Load Shedding (UVLS) Standard Drafting Team (drafting team) conducted two informal comment periods and multiple outreach sessions with industry. In addition to providing individual responses to the second informal comment period that was conducted in March 2014, the drafting team has also developed this Frequently Asked Questions (FAQ) document to succinctly address common comment themes with respect to drafting team approach and intent.

All comments submitted during the two informal comment periods and the responses provided for the March 17–April 16, 2014 informal comment period may be reviewed on the project page.

If you have any further concerns you would like to discuss with the drafting team, you can contact the Standards Developer, Katherine Street, at 404-446-9702 or at katherine.street@nerc.net.

Frequently Asked Questions

To succinctly address common comment themes that require drafting team response on Project 2008-02 UVLS (proposed PRC-010-1), the drafting team provides the following discussion in the construct of an FAQ format.

Purpose of Standard Revision

1) What is the basis for a revision of the existing UVLS standards?

The initial input into a revision of the existing UVLS standards is FERC Order No. 693, Paragraph 1509, which directed the ERO to develop a modification of PRC-010-0 that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs." In addition, *The Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* ("August 14 Blackout Report") showed that proper coordination would have mitigated effects if UVLS was used as a tool.

Additional inputs included 1) recommendations from the NERC System Protection and Control Subcommittee (SPCS) in its December 2010 *Technical Review of UVLS-Related Standards* to combine the four existing UVLS standards, revise the applicability to entities responsible for UVLS program design, implementation, and coordination, specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, and differentiate post-event validation of UVLS program design from verifying correct operation of UVLS equipment; 2) the existing UVLS standards were not in the current results-based format; 3) the preceding revision of the underfrequency load shedding (UFLS) standards had similar types of requirements and had been completed under the construct of a consolidation; and 4) the Independent Expert Review Panel recommendations, which included an evaluation of the existing standards' applicability and level of specificity.

The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability. As part of the revision to address this, the drafting team also agreed that an evaluation and consolidation of the existing UVLS standards was necessary to meet current Reliability Standard development initiatives and to provide clear, comprehensive requirements to address the application and coordination of UVLS.

2) UVLS programs are not mandatory—is compliance for an optional tool necessary?

The drafting team asserts that a key takeaway from the August 14 Blackout Report is that coordination of UVLS with other protection systems could have mitigated the effects if UVLS was used as a tool. Although the use of UVLS is not mandatory, if it is determined that this system preservation measure is necessary to support reliability and a UVLS program is installed, the program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term "UVLS Program," which limits the standard's applicability to only those undervoltage-based load shedding programs whose performance has an impact on system reliability.

Coordination with Project 2009-03 Emergency Operations

3) EOP-003-2 has potentially redundant requirements with proposed PRC-010-1—how is this being addressed?

As part of its five-year review, Project 2009-03 Emergency Operations (EOP) identified EOP-003-2, Requirements R2, R4, and R7 as being more properly covered by Project 2008-02 UVLS. Now that both projects are in formal development, they are strategically coordinating to move in lockstep from a timing perspective to address these requirements. Project 2009-03 EOP, which is proposing to revise and consolidate EOP-001-2.1b, EOP-002-3, and EOP-003-2 to create EOP-011-1, will retire the noted EOP-003-2 requirements (among other revisions), and the Project 2008-02 UVLS Mapping Document will show how PRC-010-1 encompasses the retired content accordingly. Slated to have aligning effective dates, both EOP-011-1 and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition. Please see the posted Project 2008-02 UVLS Project Coordination Plan for more information.

"UVLS Program" Definition

4) Why is the introduction of the new NERC Glossary term "UVLS Program" necessary?

The drafting team found it necessary to introduce the term "UVLS Program" because different types of UVLS systems need to be treated appropriately with respect to reliability requirements. Therefore, the term establishes which UVLS systems PRC-010-1 will apply to: "automatic load shedding program[s], consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading."

The definition is meant to inherently exclude locally-applied relays that are designed to protect a contained area or, in other words, are not designed to mitigate wide-area voltage collapse. This exclusion is not explicit in these terms in the definition's enforceable language since the meaning and measurement of "local" or "wide-area" varies greatly on a continent-wide basis and could potentially be interpreted differently by auditors and the applicable functional entities. Therefore, the definition as written is meant to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to its impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). To further support the intended exclusion, further discussion and an example are provided on page 18 of the standard document in the Guidelines and Technical Basis section.

The definition does explicitly note that the term excludes centrally controlled undervoltage-based load shedding. This type of load shedding is excluded because the drafting team asserts that the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) and should therefore be subject to SPS or RAS-related Reliability Standards. See page 18 of the standard document in the Guidelines and Technical Basis section for further discussion.

5) If the definition excludes certain types of UVLS, does this preclude an "integrated" approach (FERC Order No. 693, Paragraph 1509)?

The defined term "UVLS Program" clarifies which UVLS systems are subject to the requirements in PRC-010-1. The resulting exclusions from PRC-010-1 do not preclude an "integrated" approach because the standard requires that

an entity coordinate with all other protection and control systems as necessary, which may include other types of UVLS (i.e., locally-applied UVLS relays and centrally controlled undervoltage-based load shedding).

6) Where will centrally controlled undervoltage-based load shedding be covered?

As explained immediately above, the requirements of PRC-010-1 are applicable to the proposed new NERC Glossary term "UVLS Program," which excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of an SPS or RAS. However, the current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Special Protection Systems (Phase 2 of Protection Systems), which is currently revising the NERC Glossary definition of "Special Protection System" and proposing the single term "Remedial Action Scheme," will also revise the definition of this term to exclude UVLS Programs, therefore including centrally controlled undervoltage-based shedding.

Consequently, the introduction of the term "UVLS Program" and the conforming revision to the term "Remedial Action Scheme" will explicitly clarify that RAS-related standards are applicable to centrally controlled undervoltage-based load shedding. The implementation plan for the revised definition of "Remedial Action Scheme" will address entities that will have newly identified RAS resulting from the application of the defined term.

Similar to the coordination effort with Project 2009-03 EOP explained above, Project 2008-02 UVLS and Project 2010-05.2 SPS are working together in lockstep from a timing perspective to ensure that the effective dates of the revised definition of "Remedial Action Scheme," the proposed new term "UVLS Program," proposed PRC-010-1, and all associated retirements align. Both the proposed revised definition of "Remedial Action Scheme" and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition.

7) Is the term "UVLS Program" inclusive of a collection of independent UVLS relays?

No; multiple independent relays do not constitute a program. While the definition stipulates that a UVLS Program consists of distributed relays and controls, the definition specifies that it must be an automatic load shedding *program* that mitigates the specified conditions impacting the BES. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose.

Applicability

8) What is meant by the phrase "Planning Coordinator or Transmission Planner"?

PRC-010-1 is applicable to both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs. The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity. In addition, the requirements containing this phrase have specific language to qualify the responsible entity. For example, Requirement R1 states: "Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ." This language provides clarity that the applicable entity would be the one that is developing the program.

9) Why is the Transmission Operator not included?

While the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance for the Transmission Operator that was necessary to capture within PRC-010-1 since the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party.

To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is covered under current EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).

10) What about UVLS schemes owned by Transmission Owners, Distribution Providers, or Transmission Operators that are not required by the planner?

PRC-010-1 is applicable to its proposed defined term "UVLS Program." The drafting team notes that, by its defining attributes, a UVLS Program would be required and developed by a Planning Coordinator or Transmission Planner. The nature of a UVLS scheme developed or required by a Transmission Owner, Distribution Provider, or Transmission Operator would not meet the attributes of the defined term and would therefore not have the design and characteristics necessary to be subject to the requirements of PRC-010-1.

Requirements R1, R3, R4, and R5

11) What is required to evaluate the coordination referenced in Requirement R1, part 1.2?

Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. As such, the requirement is meant to provide flexibility for an entity to make the proper determinations, including the considerations for coordination, with respect to program effectiveness based on system characteristics. For further guidance on and examples of coordination considerations, please see the portion of the Guidelines and Technical Basis section that addresses Requirement R1 on pages 19–20 of the standard document.

12) Requirements R1, R3, and R4 seem to all require evaluations of program effectiveness—how are they different?

Requirements R1, R3, and R4 do all require evaluations of program effectiveness, but they are each at distinct points in time.

Requirement R1 requires evaluation of program effectiveness (by way of the qualifying parts) at the onset of program development, or during the initial planning stage, prior to implementation. Requirement R3 requires the

same objectives of an evaluation of effectiveness, but at the point of a mandatory periodic review (at least once every 60 calendar months). Requirement R4 addresses a UVLS Program's performance after an event (applicable voltage excursion) to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event.

It is noted that, because of the separate activities of each requirement, UVLS Program deficiencies found as a result of the assessments performed in Requirement R3 or R4 would not be violations of Requirement R1.

13) Requirement R4 would require the Planning Coordinator or Transmission Planner to review all voltage excursions—isn't this unduly burdensome?

While Requirement R4 essentially requires the Planning Coordinator or Transmission Planner to review all voltage excursions to see if they fall below the initializing set points of the UVLS Program, the drafting team contends that it will be clearly evident if voltage falls below the UVLS threshold because either a) UVLS devices will operate; or b) the system will experience the adverse conditions the UVLS Program was installed to mitigate.

In addition, the drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have the ability to know when voltage excursions are occurring since they are not operating entities. However, a process for the Transmission Operator, Transmission Owner, or Distribution Provider to notify the Transmission Planner or Planning Coordinator of such voltage excursion events is consistent with standard utility practice.

14) PRC-022-1 required the analysis of UVLS Misoperations. How is this addressed in PRC-010-1?

One of the recommendations in the SPCS report was to clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities addressed in PRC-010-1) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

Relative to a UVLS Program, PRC-010-1 Requirements R4 and R5 require event analysis and a Corrective Action Plan to address any identified program deficiencies. The UVLS drafting team maintains that verifying correct operation of UVLS equipment should be addressed in PRC-004 and is coordinating an applicability change to this standard with respect to the development timeline of Project 2010-05.1 Misoperations (Phase 1 of Protection Systems), which is in the later stages of development of PRC-004-3. Please see the posted PRC-010-1 Mapping Document and Project 2008-02 UVLS Project Coordination Plan for further information.

Requirements R6, R7, and R8

15) Do Requirements R6, R7, and R8 overlap with the requirements of MOD-032-1?

While both MOD-032-1 and Requirements R6, R7, and R8 of PRC-010-1 address data requirements, MOD-032-1 establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas the PRC-010-1 requirements address the need to maintain and share data and databases for the purposes of studies for use in event analyses for UVLS Programs specifically. While Reliability Standards in general may have overlap in this manner, the activities in these requirements remain distinctly different.

16) Requirements R6, R7, and R8 appear to be administrative—doesn't this conflict with Paragraph 81 criteria?

Proper maintenance and timely sharing of UVLS Program data as required by Requirements R6, R7, and R8 is necessary to inform the Planning Coordinator or Transmission Planner's studies and analyses. While administrative tasks are required, the tasks have a core reliability-based need.

In addition, Requirements R6, R7, and R8 were written to emulate FERC-approved PRC-006-1 Automatic Underfrequency Load Shedding data requirements. While some of these analogous requirements in PRC-006-1 are listed as candidates for Phase 2 of the Paragraph 81 project, they are not yet approved as meeting the criteria; furthermore, the Independent Expert Review Panel has recommended that these Paragraph 81 candidates not be included for deletion, citing that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters".

Attachment A – Drafting Team Members

Project 2008-02 UVLS Standard Drafting Team		
	Participant	**Entity**
Chair	Greg Vassallo	Bonneville Power Administration
Member	José Conto	Electric Reliability Council of Texas, Inc.
Member	Bill Harm	PJM Interconnection, LLC
Member	Sharma Kolluri	Entergy Corporation
Member	Charles-Éric Langlois	Hydro-Québec TransÉnergie
Member	Manish Patel	Southern Company Transmission
Member	Fabio Rodriguez	Duke Energy Florida
Member	Hari Singh	Xcel Energy, Inc.
Member	Matthew H. Tackett	MISO

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PRC-010-1 Frequently Asked Questions

Project 2008-02 Undervoltage Load Shedding

September~~June 9~~24,~~ 2014~~2014

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3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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If you have any further concerns you would like to discuss with the drafting team, you can contact the Standards Developer, ~~Erika Chanzes~~Katherine Street, at 404-446-~~9702~~2583 or at ~~erika.chanzes@nerc.net.~~katherine.street@nerc.net.

Frequently Asked Questions

To succinctly address common comment themes that require drafting team response on Project 2008-02 UVLS (proposed PRC-010-1), the drafting team provides the following discussion in the construct of an FAQ format.

Purpose of Standard Revision

1) What is the basis for a revision of the existing UVLS standards?

The initial input into a revision of the existing UVLS standards is FERC Order No. 693, Paragraph 1509, which directed the ERO to develop a modification of PRC-010-0 that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs." In addition, *The Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* ("August 14 Blackout Report") showed that proper coordination would have mitigated effects if UVLS was used as a tool.

Additional inputs included 1) recommendations from the NERC System Protection and Control Subcommittee (SPCS) in its December 2010 *Technical Review of UVLS-Related Standards* to combine the four existing UVLS standards, revise the applicability to entities responsible for UVLS program design, implementation, and coordination, specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, and differentiate post-event validation of UVLS program design from verifying correct operation of UVLS equipment; 2) the existing UVLS standards were not in the current results-based format; 3) the preceding revision of the underfrequency load shedding (UFLS) standards had similar types of requirements and had been completed under the construct of a consolidation; and 4) the Independent Expert Review Panel recommendations, which included an evaluation of the existing standards' applicability and level of specificity.

The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability. As part of the revision to address this, the drafting team also agreed that an evaluation and consolidation of the existing UVLS standards was necessary to meet current Reliability Standard development initiatives and to provide clear, comprehensive requirements to address the application and coordination of UVLS.

2) UVLS programs are not mandatory—is compliance for an optional tool necessary?

The drafting team asserts that a key takeaway from the August 14 Blackout Report is that coordination of UVLS with other protection systems could have mitigated the effects if UVLS was used as a tool. Although the use of UVLS is not mandatory, if it is determined that this system preservation measure is necessary to support reliability and a UVLS program is installed, the program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term "UVLS Program," which limits the standard's applicability to only those undervoltage-based load shedding programs whose performance has an impact on system reliability.

Coordination with Project 2009-03 Emergency Operations

3) EOP-003-2 has potentially redundant requirements with proposed PRC-010-1—how is this being addressed?

As part of its five-year review, Project 2009-03 Emergency Operations (EOP) identified EOP-003-2, Requirements R2, R4, and R7 as being more properly covered by Project 2008-02 UVLS. Now that both projects are in formal development, they are strategically coordinating to move in lockstep from a timing perspective to address these requirements. Project 2009-03 EOP, which is proposing to revise and consolidate EOP-001-2.1b, EOP-002-3, and EOP-003-2 to create EOP-011-1, will retire the noted EOP-003-2 requirements (among other revisions), and the Project 2008-02 UVLS Mapping Document will show how PRC-010-1 encompasses the retired content accordingly. Slated to have aligning effective dates, both EOP-011-1 and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition. Please see the posted Project 2008-02 UVLS Project Coordination Plan for more information.

"UVLS Program" Definition

4) Why is the introduction of the new NERC Glossary term "UVLS Program" necessary?

The drafting team found it necessary to introduce the term "UVLS Program" because different types of UVLS systems need to be treated appropriately with respect to reliability requirements. Therefore, the term establishes which UVLS systems PRC-010-1 will apply to: "automatic load shedding program[s], consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading."

The definition is meant to inherently exclude locally-applied relays that are designed to protect a contained area or, in other words, are not designed to mitigate wide-area voltage collapse. This exclusion is not explicit in these terms in the definition's enforceable language since the meaning and measurement of "local" or "wide-area" varies greatly on a continent-wide basis and could potentially be interpreted differently by auditors and the applicable functional entities. Therefore, the definition as written is meant to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to its impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). To further support the intended exclusion, further discussion and an example are provided on page 18 of the standard document in the Guidelines and Technical Basis section.

The definition does explicitly note that the term excludes centrally controlled undervoltage-based load shedding. This type of load shedding is excluded because the drafting team asserts that the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) and should therefore be subject to SPS or RAS-related Reliability Standards. See page 18 of the standard document in the Guidelines and Technical Basis section for further discussion.

5) If the definition excludes certain types of UVLS, does this preclude an "integrated" approach (FERC Order No. 693, Paragraph 1509)?

The defined term "UVLS Program" clarifies which UVLS systems are subject to the requirements in PRC-010-1. The resulting exclusions from PRC-010-1 do not preclude an "integrated" approach because the standard requires that

an entity coordinate with all other protection and control systems as necessary, which may include other types of UVLS (i.e., locally-applied UVLS relays and centrally controlled undervoltage-based load shedding).

6) Where will centrally controlled undervoltage-based load shedding be covered?

As explained immediately above, the requirements of PRC-010-1 are applicable to the proposed new NERC Glossary term "UVLS Program," which excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of an SPS or RAS. However, the current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Special Protection Systems (Phase 2 of Protection Systems), which is currently revising the NERC Glossary definition of "Special Protection System" and proposing the single term "Remedial Action Scheme," will also revise the definition of this term to exclude UVLS Programs, therefore including centrally controlled undervoltage-based shedding.

Consequently, the introduction of the term "UVLS Program" and the conforming revision to the term "Remedial Action Scheme" will explicitly clarify that RAS-related standards are applicable to centrally controlled undervoltage-based load shedding. The implementation plan for the revised definition of "Remedial Action Scheme" will address entities that will have newly identified RAS resulting from the application of the defined term.

Similar to the coordination effort with Project 2009-03 EOP explained above, Project 2008-02 UVLS and Project 2010-05.2 SPS are working together in lockstep from a timing perspective to ensure that the effective dates of the revised definition of "Remedial Action Scheme," the proposed new term "UVLS Program," proposed PRC-010-1, and all associated retirements align. Both the proposed revised definition of "Remedial Action Scheme" and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition.

7) Is the term "UVLS Program" inclusive of a collection of independent UVLS relays?

No; multiple independent relays do not constitute a program. While the definition stipulates that a UVLS Program consists of distributed relays and controls, the definition specifies that it must be an automatic load shedding *program* that mitigates the specified conditions impacting the BES. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose.

Applicability

8) What is meant by the phrase "Planning Coordinator or Transmission Planner"?

PRC-010-1 is applicable to both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs. The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity. In addition, the requirements containing this phrase have specific language to qualify the responsible entity. For example, Requirement R1 states: "Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ." This language provides clarity that the applicable entity would be the one that is developing the program.

9) Why is the Transmission Operator not included?

While the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance for the Transmission Operator that was necessary to capture within PRC-010-1 since the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party.

To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is covered under current EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).

10) What about UVLS schemes owned by Transmission Owners, Distribution Providers, or Transmission Operators that are not required by the planner?

PRC-010-1 is applicable to its proposed defined term "UVLS Program." The drafting team notes that, by its defining attributes, a UVLS Program would be required and developed by a Planning Coordinator or Transmission Planner. The nature of a UVLS scheme developed or required by a Transmission Owner, Distribution Provider, or Transmission Operator would not meet the attributes of the defined term and would therefore not have the design and characteristics necessary to be subject to the requirements of PRC-010-1.

Requirements R1, R3, R4, and R5

11) What is required to evaluate the coordination referenced in Requirement R1, part 1.2?

Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. As such, the requirement is meant to provide flexibility for an entity to make the proper determinations, including the considerations for coordination, with respect to program effectiveness based on system characteristics. For further guidance on and examples of coordination considerations, please see the portion of the Guidelines and Technical Basis section that addresses Requirement R1 on pages 19–20 of the standard document.

12) Requirements R1, R3, and R4 seem to all require evaluations of program effectiveness—how are they different?

Requirements R1, R3, and R4 do all require evaluations of program effectiveness, but they are each at distinct points in time.

Requirement R1 requires evaluation of program effectiveness (by way of the qualifying parts) at the onset of program development, or during the initial planning stage, prior to implementation. Requirement R3 requires the

same objectives of an evaluation of effectiveness, but at the point of a mandatory periodic review (at least once every 60 calendar months). Requirement R4 addresses a UVLS Program's performance after an event (applicable voltage excursion) to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event.

It is noted that, because of the separate activities of each requirement, UVLS Program deficiencies found as a result of the assessments performed in Requirement R3 or R4 would not be violations of Requirement R1.

13) Requirement R4 would require the Planning Coordinator or Transmission Planner to review all voltage excursions—isn't this unduly burdensome?

While Requirement R4 essentially requires the Planning Coordinator or Transmission Planner to review all voltage excursions to see if they fall below the initializing set points of the UVLS Program, the drafting team contends that it will be clearly evident if voltage falls below the UVLS threshold because either a) UVLS devices will operate; or b) the system will experience the adverse conditions the UVLS Program was installed to mitigate.

In addition, the drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have the ability to know when voltage excursions are occurring since they are not operating entities. However, a process for the Transmission Operator, Transmission Owner, or Distribution Provider to notify the Transmission Planner or Planning Coordinator of such voltage excursion events is consistent with standard utility practice.

14) PRC-022-1 required the analysis of UVLS Misoperations. How is this addressed in PRC-010-1?

One of the recommendations in the SPCS report was to clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities addressed in PRC-010-1) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

Relative to a UVLS Program, PRC-010-1 Requirements R4 and R5 require event analysis and a Corrective Action Plan to address any identified program deficiencies. The UVLS drafting team maintains that verifying correct operation of UVLS equipment should be addressed in PRC-004 and is coordinating an applicability change to this standard with respect to the development timeline of Project 2010-05.1 Misoperations (Phase 1 of Protection Systems), which is in the later stages of development of PRC-004-3. Please see the posted PRC-010-1 Mapping Document and Project 2008-02 UVLS Project Coordination Plan for further information.

Requirements R6, R7, and R8

15) Do Requirements R6, R7, and R8 overlap with the requirements of MOD-032-1?

While both MOD-032-1 and Requirements R6, R7, and R8 of PRC-010-1 address data requirements, MOD-032-1 establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas the PRC-010-1 requirements address the need to maintain and share data and databases for the purposes of studies for use in event analyses for UVLS Programs specifically. While Reliability Standards in general may have overlap in this manner, the activities in these requirements remain distinctly different.

16) Requirements R6, R7, and R8 appear to be administrative—doesn't this conflict with Paragraph 81 criteria?

Proper maintenance and timely sharing of UVLS Program data as required by Requirements R6, R7, and R8 is necessary to inform the Planning Coordinator or Transmission Planner's studies and analyses. While administrative tasks are required, the tasks have a core reliability-based need.

In addition, Requirements R6, R7, and R8 were written to emulate FERC-approved PRC-006-1 Automatic Underfrequency Load Shedding data requirements. While some of these analogous requirements in PRC-006-1 are listed as candidates for Phase 2 of the Paragraph 81 project, they are not yet approved as meeting the criteria; furthermore, the Independent Expert Review Panel has recommended that these Paragraph 81 candidates not be included for deletion, citing that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters".

Attachment A – Drafting Team Members

Project 2008-02 UVLS Standard Drafting Team		
	Participant	**Entity**
Chair	Greg Vassallo	Bonneville Power Administration
Member	José Conto	Electric Reliability Council of Texas, Inc.
Member	Bill Harm	PJM Interconnection, LLC
Member	Sharma Kolluri	Entergy Corporation
Member	Charles-Éric Langlois	Hydro-Québec TransÉnergie
Member	Manish Patel	Southern Company Transmission
Member	Fabio Rodriguez	Duke Energy Florida
Member	Hari Singh	Xcel Energy, Inc.
Member	Matthew H. Tackett	MISO

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NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Project 2008-02 Undervoltage Load Shedding (PRC-010-1)

VRF and VSL Justifications

This document provides the Undervoltage Load Shedding Standard Drafting Team's (drafting team's) justification for assignment of violation risk factors (VRFs) and violation severity levels (VSLs) for each requirement in PRC-010-1 – Undervoltage Load Shedding.

Each primary requirement is assigned a VRF and a set of one or more VSLs. These elements support the determination of an initial value range for the Base Penalty Amount regarding violations of requirements in FERC-approved Reliability Standards, as defined in the ERO Sanction Guidelines.

The drafting team applied the following NERC criteria and FERC Guidelines when proposing VRFs and VSLs for the requirements under this project:

NERC Criteria - Violation Risk Factors

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, place the Bulk Electric System at an unacceptable risk of instability, separation, or Cascading failures, or hinder restoration to a normal condition.

Medium Risk Requirement

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 is administrative in nature and 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; or, a requirement that is administrative in nature and 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.

FERC Violation Risk Factor Guidelines

Guideline (1) — Consistency with the Conclusions of the Final Blackout Report

The Commission seeks to ensure that Violation Risk Factors assigned to requirements of reliability standards in these identified areas appropriately reflect their historical critical impact on the reliability of the Bulk Power System.

In the VSL Order, FERC listed critical areas (from the Final Blackout Report) where violations could severely affect the reliability of the Bulk-Power System:

- Emergency operations
- Vegetation management
- Operator personnel training
- Protection systems and their coordination
- Operating tools and backup facilities
- Reactive power and voltage control
- System modeling and data exchange
- Communication protocol and facilities
- Requirements to determine equipment ratings
- Synchronized data recorders
- Clearer criteria for operationally critical facilities
- Appropriate use of transmission loading relief

Guideline (2) — Consistency within a Reliability Standard

The Commission expects a rational connection between the sub-Requirement Violation Risk Factor assignments and the main Requirement Violation Risk Factor assignment.

Guideline (3) — Consistency among Reliability Standards

The Commission expects the assignment of Violation Risk Factors corresponding to Requirements that address similar reliability goals in different Reliability Standards would be treated comparably.

Guideline (4) — Consistency with NERC's Definition of the Violation Risk Factor Level

Guideline (4) was developed to evaluate whether the assignment of a particular Violation Risk Factor level conforms to NERC's definition of that risk level.

Guideline (5) — Treatment of Requirements that Co-mingle More Than One Obligation

Where a single Requirement co-mingles a higher risk reliability objective and a lesser risk reliability objective, the VRF assignment for such requirements must not be watered down to reflect the lower risk level associated with the less important objective of the reliability standard.

The following discussion addresses how the drafting team considered FERC's VRF Guidelines 2 through 5. The team did not address Guideline 1 directly because of an apparent conflict between Guidelines 1 and 4. Whereas Guideline 1 identifies a list of topics that encompass nearly all topics within NERC's Reliability Standards and implies that these requirements should be assigned a "High" VRF, Guideline 4 directs assignment of VRFs based on the impact of a specific requirement to the reliability of the system. The drafting team believes that Guideline 4 is reflective of the intent of VRFs in the first instance and, therefore, concentrated its approach on the reliability impact of the requirements.

PRC-010-1 – Undervoltage Load Shedding is a standard revision with the stated purpose: *To establish an integrated and coordinated approach to the design, evaluation, and reliable operation of Undervoltage Load Shedding Programs.* FERC Order No. 693 requested that PRC-010-0 be modified to require that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and underfrequency loading shedding (UFLS) and undervoltage load shedding (UVLS) programs. PRC-010-1 addresses this directive in addition to consolidating and revising PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program with three (3) other existing UVLS standards: PRC-020-1 – Under-Voltage Load Shedding Program Database, PRC-021-1 – Under-Voltage Load Shedding Program Data, and PRC-022-1 – Under-Voltage Load Shedding Program Performance.

PRC-010-1 has eight (8) requirements that incorporate and enhance the intent of the requirements of PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1. The revised standard requires that entities developing an Undervoltage Load Shedding Program (UVLS Program) evaluate the program's effectiveness prior to providing the program specifications and schedule to applicable entities. Applicable entities are then required to adhere to the UVLS Program specifications and implementation schedule, including those specifications and schedules associated with Corrective Action Plans (CAPs) for existing programs. The standard also requires an assessment of a UVLS Program at least once every 60 months, and an assessment to evaluate program performance within 12 months of an applicable event. If program deficiencies are identified as a result of either of these assessments, entities are required to develop and provide a CAP to applicable entities within three (3) months. In addition, there are requirements to update, provide data for, and share a UVLS Program database containing information necessary to model the program for use in event analyses and assessments.

The requirements of PRC-010-1 do not map, one-to-one, with the requirements of the legacy standards. The new requirements comingle various reliability attributes of the legacy standards with new reliability objectives, thus a requirement-to-requirement comparison of VRFs is not always possible. In developing the new VRFs for the requirements of PRC-010-1, the drafting team carefully considered the NERC criteria for developing VRFs, as well as the FERC VRF guidelines. The VRFs of FERC-approved PRC-006-1 – Automatic Underfrequency Load Shedding influenced the drafting team's VRF decisions (citing FERC VRF Guideline 3), as the drafting team used PRC-006-1 as a model with respect to PRC-010-1's language and construct.

NERC Criteria - Violation Severity Levels

VSLs define the degree to which compliance with a requirement was not achieved. Each requirement must have at least one VSL. While it is preferable to have four VSLs for each requirement, some requirements do not have multiple "degrees" of noncompliant performance, and may have only one, two, or three VSLs.

VSLs should be based on the guidelines shown in the table below:

Lower	Moderate	High	Severe
Missing a minor element (or a small percentage) of the required performance. The performance or product measured has significant value as it almost meets the full intent of the requirement.	Missing at least one significant element (or moderate percentage) of the required performance. The performance or product measured still has significant value in meeting the intent of the requirement.	Missing more than one significant element (or missing a high percentage) of the required performance or is missing a single vital component. The performance or product has limited value in meeting the intent of the requirement.	Missing most or all of the significant elements (or a significant percentage) of the required performance. The performance measured does not meet the intent of the requirement or the product delivered cannot be used in meeting the intent of the requirement.

FERC Order on Violation Severity Levels

In its June 19, 2008 Order on Violation Severity Levels, FERC indicated it would use the following four guidelines for determining whether to approve VSLs:

Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance

Compare the VSLs to any prior Levels of Non-compliance and avoid significant changes that may encourage a lower level of compliance than was required when Levels of Non-compliance were used.

Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties

Guideline 2a: A violation of a "binary" type requirement must be a "Severe" VSL.

Guideline 2b: Do not use ambiguous terms such as "minor" and "significant" to describe noncompliant performance.

Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement

VSLs should not expand on what is required in the requirement.

Guideline 4: Violation Severity Level Assignment Should Be Based on a Single Violation, Not on a Cumulative Number of Violations

. . . unless otherwise stated in the requirement, each instance of non-compliance with a requirement is a separate violation. Section 4 of the Sanction Guidelines states that assessing penalties on a per violation per day basis is the "default" for penalty calculations.

VRF and VSL Justifications – PRC-010-1 Requirement R1	
Proposed VRF	High
NERC VRF Discussion	PRC-010-1 Requirement R1 meets the NERC criterion for a High VRF. Failure to evaluate a UVLS Program to show that it resolves the undervoltage issue it was designed for, and that it is coordinated with generator voltage ride-through capabilities and other protection and control systems, could lead to implementation of an ineffective or counterproductive program. In addition, failure to subsequently provide the UVLS Program specifications and implementation schedule to applicable entities would negate proper program implementation. Both these implications could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to Bulk Electric System (BES) instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R1 has parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R1 is similar to EOP-003-2, Requirements R3, R4, and R7, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R1 meets the NERC criterion for a High VRF. Failure to evaluate a UVLS Program to show that it resolves the undervoltage issue it was designed for, and that it is coordinated with generator voltage ride-through capabilities and other protection and control systems, could lead to implementation of an ineffective or counterproductive program. In addition, failure to subsequently provide the UVLS Program specifications and implementation schedule to applicable entities would negate proper program implementation. Both these implications could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligations in PRC-010-1 Requirement R1, which are to evaluate the effectiveness of a UVLS Program according to the criteria specified in the two parts and subsequently provide the program specifications and implementation schedule to applicable entities, are all equally critical elements that failure to meet could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or

VRF and VSL Justifications – PRC-010-1 Requirement R1	
	Cascading failures. Therefore, the assigned VRF of High is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity that developed the UVLS Program failed to evaluate the program's effectiveness and subsequently provide the UVLS Program's specifications and implementation schedule to UVLS entities in accordance with Requirement R1, including the items specified in parts 1.1 and 1.2.
NERC VSL Guidelines Discussion	The proposed VSL for PRC-010-1 Requirement R1 meets NERC's VSL Guidelines in that there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two parts.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** The basis for the current level of compliance in relation to PRC-010-1 Requirement R1 is EOP-003-2 Requirements R3, R4, and R7, as these requirements are being retired because they map to PRC-010-1 Requirement R1. Since the VSL for PRC-010-1 Requirement R1 is binary, the current level of compliance is met or exceeded when compared to the VSLs for EOP-003-2 Requirements R3, R4, and R7.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** The proposed VSL for PRC-010-1 Requirement R1 is binary and is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL for PRC-010-1 Requirement R1 uses the term "effectiveness" from the associated requirement, which could be considered ambiguous terminology; however, Requirement R1 does qualify the term "effectiveness" by indicating that the applicable entity must include what is listed in the requirement's parts in its evaluation of effectiveness. The VSL subsequently notes that the items specified in the parts must be included. This thereby supports uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1 Requirement R1	
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSL for PRC-010-1 Requirement R1 uses similar terminology to that used in the requirement and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSL for PRC-010-1 Requirement R1 is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R2	
Proposed VRF	High
NERC VRF Discussion	PRC-010-1 Requirement R2 meets the NERC criterion for a High VRF. Failure to implement a UVLS Program by adhering to the program specifications and implementation schedule increases the risk that the program will not perform properly. Under anticipated Emergency, abnormal, or restorative conditions, this could directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R2 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R2 is similar to PRC-006-1 Requirement R9 and EOP-003-2 Requirement R5, which have approved VRFs of High.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R2 meets the NERC criterion for a High VRF. Failure to implement a UVLS Program by adhering to the program specifications and implementation schedule increases the risk that the program will not perform properly. Under anticipated Emergency, abnormal, or restorative conditions, this could directly contribute to BES instability, separation, or Cascading failures.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligations required in PRC-010-1 Requirement R2 are to adhere to the UVLS Program specifications and implementation schedule associated with program development (per Requirement R1) and corrective action (per Requirement R5). The requirement to develop a CAP in Requirement R5 is assigned a Medium VRF; therefore, execution of the corrective actions required by Requirement R2 has a commensurate VRF of Medium. However, since the obligations related to the development of a UVLS Program in Requirement R1 are assigned a High VRF, the failure to implement the program per Requirement R2 could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures. Therefore, Requirement R2 is assigned a High VRF to reflect the higher risk level associated with the more critical objective.
Proposed Lower VSL	N/A

VRF and VSL Justifications – PRC-010-1 Requirement R2	
Proposed Moderate VSL	N/A
Proposed High VSL	The applicable entity failed to adhere to the UVLS Program specifications in accordance with Requirement R2. OR The applicable entity failed to adhere to the implementation schedule in accordance with Requirement R2.
Proposed Severe VSL	The applicable entity failed to adhere to the UVLS Program specifications and implementation schedule in accordance with Requirement R2.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R2 meets NERC's VSL Guidelines in that the VSLs cover aspects of the requirement that are equal in importance.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R2 is a new requirement; therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R2 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R2 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R2 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R3	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R3 meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of a UVLS Program at least once every 60 calendar months could lead to failure to identify and address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly and adversely affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to do a periodic comprehensive assessment of the program, which supplements the annual Transmission Planning (TPL) assessment required by NERC Reliability Standards, would have implications on the BES. Therefore, a violation of Requirement R3 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R3 has parts that all support the reliability objective so only one VRF was assigned; therefore no conflict(s) exist.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R3 is consistent with the current requirement it is replacing (PRC-010-0 Requirement R1), which has an approved VRF of Medium. Similar performance exists in PRC-006-1 Requirement R4, which has an approved VRF of High. This discrepancy is justified due to the differing nature of the programs these standards are addressing, as PRC-006-1 addresses mandatory UFLS programs and PRC-010-1 covers optional UVLS Programs. A UFLS program inherently has a more likely overall impact on the BES.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R3 meets NERC's criterion for a Medium VRF. Failure to perform a comprehensive assessment to evaluate the effectiveness of a UVLS Program at least once every 60 calendar months could lead to failure to identify and address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly and

VRF and VSL Justifications – PRC-010-1 Requirement R3	
	adversely affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to do a periodic comprehensive assessment of the program, which supplements the annual TPL assessment required by NERC Reliability Standards, would have implications on the BES. Therefore, a violation of Requirement R3 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** The obligation required in PRC-010-1 Requirement R3 is to periodically evaluate the effectiveness of a UVLS Program according to the criteria specified in the two parts; the parts are equally critical elements that failure to meet could, under anticipated Emergency, abnormal, or restorative conditions, directly contribute to BES instability, separation, or Cascading failures. However, violation of these commensurate elements is unlikely to lead to BES instability, separation, or Cascading failures. Therefore, the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	N/A
Proposed Moderate VSL	N/A
Proposed High VSL	N/A
Proposed Severe VSL	The applicable entity failed to perform an assessment at least once during the 60 calendar months in accordance with Requirement R3, including the items specified in parts 3.1 and 3.2.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R3 meets NERC's VSL Guidelines in that there is a binary aspect for failure; the VSL addresses the degrees of compliance with respect to equal importance of the two parts.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** The proposed VSL for PRC-010-1 Requirement R3 is consistent in nature with the VSL for the requirement it is replacing (PRC-010-0 Requirement R1) and therefore does not lower the current level of compliance.

VRF and VSL Justifications – PRC-010-1 Requirement R3	
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** The proposed VSL for PRC-010-1 Requirement R3 for this binary requirement is consistent with the guideline in that it is classified as a severe VSL. **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSL for PRC-010-1 Requirement R3 does not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSL for PRC-010-1 Requirement R3 uses similar terminology to that used in the requirement and is therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSL for PRC-010-1 Requirement R3 is based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R4	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R4 meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event in a timely manner could lead to failure to identify and address a necessary program modification. This could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or counterproductive program if the criteria is not met, it is less likely that failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event would have implications on the BES, as these are infrequent and would be done in addition to the annual TPL assessment required by NERC Reliability Standards. Therefore, a violation of Requirement R4 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R4 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R4 is similar to PRC-022-1 Requirement 1 and PRC-006-1 Requirement R11, which have approved VRFs of Medium.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R4 meets NERC's criterion for a Medium VRF. Failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event in a timely manner could lead to failure to identify and address a necessary program modification. This could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, while the performance that must be met when initially developing a UVLS Program is assigned a High VRF in Requirement R1 due to the likely implications of developing and subsequently implementing an ineffective or

VRF and VSL Justifications – PRC-010-1 Requirement R4	
	counterproductive program if the criteria is not met, it is less likely that failure to perform an assessment to evaluate whether the UVLS Program resolved the undervoltage issues associated with a qualifying event would have implications on the BES, as these are infrequent and would be done in addition to the annual TPL assessment required by NERC Reliability Standards. Therefore, a violation of Requirement R4 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R4 does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 12 calendar months but less than or equal to 13 calendar months after an applicable event.
Proposed Moderate VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 13 calendar months but less than or equal to 14 calendar months after an applicable event.
Proposed High VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 14 calendar months but less than or equal to 15 calendar months after an applicable event.
Proposed Severe VSL	The applicable entity performed an assessment in accordance with Requirement R4 within a time period greater than 15 months after an applicable event. OR The applicable entity failed to perform an assessment in accordance with Requirement R4.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R4 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R4 is different in construct from the requirement it is replacing (PRC-022-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.

VRF and VSL Justifications – PRC-010-1 Requirement R4	
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R4 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R4 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R4 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
Proposed VRF	Medium
NERC VRF Discussion	PRC-010-1 Requirement R5 meets NERC's criterion for a Medium VRF. Failure to develop and subsequently provide a CAP to address the deficiencies identified as a result of a UVLS Program assessment in a timely manner could lead to failure to address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, since the development of a CAP in Requirement R5 is dependent on the outcomes of Requirement R3 or R4, the likelihood of implications on the BES is commensurate with those of Requirements R3 and R4, which are assigned Medium VRFs. Therefore, a violation of Requirement R5 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R5 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R5 is similar to PRC-022-1 Requirement R1.5, which has an approved VRF of Medium.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R5 meets NERC's criterion for a Medium VRF. Failure to develop and subsequently provide a CAP to address the deficiencies identified as a result of a UVLS Program assessment in a timely manner could lead to failure to address a necessary program modification, which could, under anticipated Emergency, abnormal, or restorative conditions, directly affect the electrical state or the capability of the BES, or the ability to effectively monitor and control the BES. However, since the development of a CAP in Requirement R5 is dependent on the outcomes of Requirement R3 or R4, the likelihood of implications on the BES is commensurate with those of Requirements R3 and R4, which are assigned Medium VRFs. Therefore, a violation of Requirement R5 is unlikely to lead to BES instability, separation, or Cascading failures. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R5 does not co-mingle reliability objectives of differing risk; the assigned VRF of Medium is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 15 calendar days but less than or equal to 30 calendar days.
Proposed High VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity developed a Corrective Action Plan and provided it to UVLS entities in accordance with Requirement R5 but was late by more than 45 calendar days. OR The responsible entity failed to develop a Corrective Action Plan or provide it to UVLS entities in accordance with Requirement R5.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R5 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R5 is different in construct from the requirement it is replacing (PRC-022-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R5 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.

VRF and VSL Justifications – PRC-010-1 Requirement R5	
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R5 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R5 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R6	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R6 meets NERC's criterion for a Lower VRF. Though having a current UVLS Program database is necessary to properly inform accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to annually update a UVLS Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** The requirement has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R6 similar to PRC-006-1 Requirement R6, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R6 meets NERC's criterion for a Lower VRF. Though having a current UVLS Program database is necessary to properly inform accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to annually update a UVLS Program database would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R6 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.
Proposed Moderate VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by less than or equal to 30 calendar days.
Proposed High VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 60 calendar days but less than or equal to 90

VRF and VSL Justifications – PRC-010-1 Requirement R6	
	calendar days.
Proposed Severe VSL	The applicable entity updated the database in accordance with Requirement R6 but was late by more than 90 calendar days. OR The applicable entity failed to update the database in accordance with Requirement R6.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R6 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R6 is replacing PRC-020-1 Requirement R1, which is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R6 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R6 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R6 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R7	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R7 meets NERC's criterion for a Lower VRF. Though providing current and formatted data is necessary to properly support a UVLS Program database, which subsequently informs accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to provide the data according to the format and schedule specified would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** PRC-010-1 Requirement R7 has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3 Consistency among Reliability Standards:** PRC-010-1 Requirement R7 is similar to PRC-006-1 Requirement R8, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R7 meets NERC's criterion for a Lower VRF. Though providing current and formatted data is necessary to properly support a UVLS Program database, which subsequently informs accurate undervoltage studies and event analyses, this is a planning requirement that is administrative in nature; failure to provide the data according to the format and schedule specified would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R7 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided data in accordance with Requirement R7 but was late by less than or equal to 30 calendar days per the specified schedule. OR

VRF and VSL Justifications – PRC-010-1 Requirement R7	
	The applicable entity provided data in accordance with Requirement R7 but the data was not provided according to the specified format.
Proposed Moderate VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 30 calendar days but less than or equal to 60 calendar days per the specified schedule.
Proposed High VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 60 calendar days but less than or equal to 90 calendar days per the specified schedule.
Proposed Severe VSL	The applicable entity provided data in accordance with Requirement R7 but was late by more than 90 calendar days per the specified schedule. OR The applicable entity failed to provide data in accordance with Requirement R7.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R7 meets NERC's VSL Guidelines in that the VSLs cover aspects of the requirement that are not equal in importance; there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R7 is different in construct from the requirement it is replacing (PRC-021-1 Requirement R1) and, therefore, the VSLs cannot be compared. However, both sets of VSLs have incremental aspects and a binary aspect for failure.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R7 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R7 use similar terminology to that used in the requirement and are therefore consistent with the requirement.

VRF and VSL Justifications – PRC-010-1 Requirement R7	
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R7 are based on a single violation and not cumulative violations.

VRF and VSL Justifications – PRC-010-1 Requirement R8	
Proposed VRF	Lower
NERC VRF Discussion	PRC-010-1 Requirement R8 meets NERC's criterion for a Lower VRF. Though sharing a UVLS Program database with applicable entities in a timely manner supports an integrated and coordinated approach to UVLS programs, this is a planning requirement that is administrative in nature; failure to share the database within 30 calendar days of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G1 Discussion	**Guideline 1: Consistency w/ Blackout Report** N/A
FERC VRF G2 Discussion	**Guideline 2: Consistency within a Reliability Standard** The requirement has no parts so only one VRF was assigned.
FERC VRF G3 Discussion	**Guideline 3: Consistency among Reliability Standards** PRC-010-1 Requirement R8 is similar to PRC-006-1 Requirement R7, which has an approved VRF of Lower.
FERC VRF G4 Discussion	**Guideline 4: Consistency with NERC Definitions of VRFs** PRC-010-1 Requirement R8 meets NERC's criterion for a Lower VRF. Though sharing a UVLS Program database with applicable entities in a timely manner supports an integrated and coordinated approach to UVLS programs, this is a planning requirement that is administrative in nature; failure to share the database within 30 calendar days of a request would not, under the anticipated Emergency, abnormal, or restorative conditions, be expected to adversely affect the electrical state or capability of the BES, or the ability to effectively monitor, control, or restore the BES. The applicable entities are always responsible for maintaining the reliability of the BES regardless of the situation.
FERC VRF G5 Discussion	**Guideline 5: Treatment of Requirements that Co-mingle More than One Obligation** PRC-010-1 Requirement R8 does not co-mingle reliability objectives of differing risk; the assigned VRF of Lower is consistent throughout the requirement.
Proposed Lower VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by less than or equal to 15 calendar days.
Proposed Moderate VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 15 calendar days but less than or equal to 30 calendar days.

VRF and VSL Justifications – PRC-010-1 Requirement R8	
Proposed High VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 30 calendar days but less than or equal to 45 calendar days.
Proposed Severe VSL	The applicable entity provided its UVLS Program database in accordance with Requirement R8 but was late by more than 45 calendar days. OR The applicable entity failed to provide its UVLS Program database in accordance with Requirement R8.
NERC VSL Guidelines Discussion	PRC-010-1 Requirement R8 meets NERC's VSL Guidelines in that there is an incremental aspect to the VSLs for tardiness and a binary aspect for failure.
FERC VSL G1 Discussion	**Guideline 1: Violation Severity Level Assignments Should Not Have the Unintended Consequence of Lowering the Current Level of Compliance** PRC-010-1 Requirement R8 is replacing PRC-020-1 Requirement R2, which is applicable to the Regional Reliability Organization and has no associated VSLs. Therefore, there is no prior level of compliance.
FERC VSL G2 Discussion	**Guideline 2: Violation Severity Level Assignments Should Ensure Uniformity and Consistency in the Determination of Penalties** **Guideline 2a: The Single Violation Severity Level Assignment Category for "Binary" Requirements Is Not Consistent** N/A **Guideline 2b: Violation Severity Level Assignments that Contain Ambiguous Language** The proposed VSLs for PRC-010-1 Requirement R8 do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations.
FERC VSL G3	**Guideline 3: Violation Severity Level Assignment Should Be Consistent with the Corresponding Requirement** The proposed VSLs for PRC-010-1 Requirement R8 use similar terminology to that used in the requirement and are therefore consistent with the requirement.
FERC VSL G4	**Guideline 4: Violation Severity Level Assignment Should Be Based on A Single Violation, Not on A Cumulative Number of Violations** The proposed VSLs for PRC-010-1 Requirement R8 are based on a single violation and not cumulative violations.

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2008-02 Undervoltage Load Shedding (UVLS) – PRC-010-1

Final Ballot Now Open through September 18, 2014

Now Available

A final ballot for **PRC-010-1 - Undervoltage Load Shedding (UVLS)** is open through **8 p.m. Eastern on Thursday, September 18, 2014.**

Background information for this project can be found on the project page.

Instructions for Balloting
In the final ballot, votes are counted by exception. Only members of the ballot pool may cast a ballot; all ballot pool members may change their previously cast votes. A ballot pool member who failed to cast a vote during the last ballot window may cast a vote in the final ballot window. If a ballot pool member cast a vote in the previous ballot and does not participate in the final ballot, that member's vote will be carried over in the final ballot.

Members of the ballot pool associated with this project may log in and submit their vote for the standard by clicking here.

Next Steps
Voting results for the standard will be posted and announced after the ballot window closes. If approved, it will be submitted to the Board of Trustees for adoption and then filed with the appropriate regulatory authorities**.**

For information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Katherine Street, Standards Developer, or at 404-446-9702.

North American Electric Reliability Corporation
3353 Peachtree Rd, NE
Suite 600, North Tower

Atlanta, GA 30326
404-446-2560 | www.nerc.com

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Standards Announcement

Project 2008-02 Undervoltage Load Shedding
PRC-010-1

Final Ballot Results

Now Available

A final ballot for **PRC-010-1 – Undervoltage Load Shedding** concluded at **8 p.m. Eastern on Thursday, September 18, 2014**.

The standard achieved a quorum and sufficient affirmative votes for approval. Voting statistics are listed below, and the Ballot Results page provides a link to the detailed results for the ballot.

Ballot
Quorum / Approval
83.24% / 80.69%

Background information for this project can be found on the project page.

Next Steps

The standard will be submitted to the NERC Board of Trustees for adoption and then filed with the appropriate regulatory authorities.

For more information on the **Standards Development Process**, please refer to the Standard Processes Manual.

For more information or assistance, please contact Wendy Muller, Standards Development Administrator, or at 404-446-2560.

North American Electric Reliability Corporation
3353 Peachtree Rd, NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

Ballot Results	
Ballot Name:	Project 2008-02 UVLS PRC-010-1
Ballot Period:	9/9/2014 - 9/18/2014
Ballot Type:	Final
Total # Votes:	303
Total Ballot Pool:	364
Quorum:	**83.24 % The Quorum has been reached**
Weighted Segment Vote:	80.69 %
Ballot Results:	**A quorum was reached and there were sufficient affirmative votes for approval.**

Summary of Ballot Results

Segment	Ballot Pool	Segment Weight	Affirmative # Votes	Affirmative Fraction	Negative # Votes	Negative Fraction	Negative Vote without a Comment	Abstain	No Vote
1 - Segment 1	101	1	46	0.836	9	0.164	0	28	18
2 - Segment 2	8	0.8	2	0.2	6	0.6	0	0	0
3 - Segment 3	81	1	42	0.84	8	0.16	0	22	9
4 - Segment 4	27	1	16	0.941	1	0.059	0	5	5
5 - Segment 5	77	1	38	0.864	6	0.136	0	17	16
6 - Segment 6	55	1	26	0.867	4	0.133	0	14	11
7 - Segment 7	1	0	0	0	0	0	0	0	1
8 - Segment 8	4	0.3	2	0.2	1	0.1	0	0	1
9 - Segment 9	2	0.2	2	0.2	0	0	0	0	0

10 - Segment 10	8	0.7	7	0.7	0	0	0	1	0
Totals	**364**	**7**	**181**	**5.648**	**35**	**1.352**	**0**	**87**	**61**

Individual Ballot Pool Results

Segment	Organization	Member	Ballot	NERC Notes
1	Ameren Services	Eric Scott	Negative	SUPPORTS THIRD PARTY COMMENTS
1	American Electric Power	Paul B Johnson	Affirmative	
1	American Transmission Company, LLC	Andrew Z Pusztai	Affirmative	
1	Arizona Public Service Co.	Brian Cole	Affirmative	
1	Associated Electric Cooperative, Inc.	John Bussman	Abstain	
1	Austin Energy	James Armke	Affirmative	
1	Avista Utilities	Heather Rosentrater		
1	Balancing Authority of Northern California	Kevin Smith	Affirmative	
1	Baltimore Gas & Electric Company	Christopher J Scanlon	Affirmative	
1	Basin Electric Power Cooperative	David Rudolph		
1	BC Hydro and Power Authority	Patricia Robertson	Abstain	
1	Beaches Energy Services	Don Cuevas	Affirmative	
1	Black Hills Corp	Wes Wingen	Abstain	
1	Bonneville Power Administration	Donald S. Watkins	Affirmative	
1	Bryan Texas Utilities	John C Fontenot	Affirmative	
1	CenterPoint Energy Houston Electric, LLC	John Brockhan	Affirmative	
1	Central Iowa Power Cooperative	Kevin J Lyons	Negative	SUPPORTS THIRD PARTY COMMENTS
1	Clark Public Utilities	Jack Stamper	Affirmative	
1	Cleco Corporation	John Lindsey	Abstain	
1	Colorado Springs Utilities	Shawna Speer		
1	Consolidated Edison Co. of New York	Christopher L de Graffenried	Negative	SUPPORTS THIRD PARTY COMMENTS
1	CPS Energy	Glenn Pressler	Affirmative	
1	Dairyland Power Coop.	Robert W. Roddy	Affirmative	
1	Dayton Power & Light Co.	Hertzel Shamash	Affirmative	
1	Dominion Virginia Power	Larry Nash	Negative	
1	Duke Energy Carolina	Doug E Hils	Negative	SUPPORTS THIRD PARTY COMMENTS
1	Encari	Steven E Hamburg		
1	Entergy Transmission	Oliver A Burke	Affirmative	
1	FirstEnergy Corp.	William J Smith	Affirmative	
1	Florida Keys Electric Cooperative Assoc.	Dennis Minton	Affirmative	
1	Florida Power & Light Co.	Mike O'Neil	Affirmative	
1	Gainesville Regional Utilities	Richard Bachmeier	Affirmative	
1	Georgia Transmission Corporation	Jason Snodgrass	Affirmative	
1	Great River Energy	Gordon Pietsch		
1	Hydro One Networks, Inc.	Muhammed Ali	Affirmative	
1	Hydro-Quebec TransEnergie	Martin Boisvert	Affirmative	
1	Idaho Power Company	Molly Devine	Affirmative	
1	International Transmission Company Holdings Corp	Michael Moltane	Affirmative	
1	JDRJC Associates	Jim D Cyrulewski	Abstain	
1	KAMO Electric Cooperative	Walter Kenyon	Abstain	
1	Kansas City Power & Light Co.	Daniel Gibson	Affirmative	
1	Keys Energy Services	Stanley T Rzad		
1	Lakeland Electric	Larry E Watt	Affirmative	
1	Lincoln Electric System	Doug Bantam	Affirmative	
1	Long Island Power Authority	Robert Ganley	Affirmative	
1	Los Angeles Department of Water & Power	faranak sarbaz	Abstain	

1	Lower Colorado River Authority	Martyn Turner	Abstain	
1	M & A Electric Power Cooperative	William Price	Abstain	
1	MEAG Power	Danny Dees	Affirmative	
1	MidAmerican Energy Co.	Terry Harbour	Affirmative	
1	Minnkota Power Coop. Inc.	Daniel L Inman	Affirmative	
1	Muscatine Power & Water	Andrew J Kurriger		
1	N.W. Electric Power Cooperative, Inc.	Mark Ramsey	Abstain	
1	National Grid USA	Michael Jones	Negative	
1	NB Power Corporation	Alan MacNaughton	Abstain	
1	Nebraska Public Power District	Jamison Cawley	Affirmative	
1	New York Power Authority	Bruce Metruck	Abstain	
1	Northeast Missouri Electric Power Cooperative	Kevin White	Abstain	
1	Northeast Utilities	William Temple	Abstain	
1	Northern Indiana Public Service Co.	Julaine Dyke	Abstain	
1	Oklahoma Gas and Electric Co.	Terri Pyle	Abstain	
1	Omaha Public Power District	Doug Peterchuck	Abstain	
1	Oncor Electric Delivery	Jen Fiegel	Affirmative	
1	Orlando Utilities Commission	Brad Chase		
1	Otter Tail Power Company	Daryl Hanson		
1	Pacific Gas and Electric Company	Bangalore Vijayraghavan	Affirmative	
1	Platte River Power Authority	John C. Collins	Affirmative	
1	Portland General Electric Co.	John T Walker	Abstain	
1	Potomac Electric Power Co.	David Thorne	Abstain	
1	PPL Electric Utilities Corp.	Brenda L Truhe	Abstain	
1	Public Service Company of New Mexico	Laurie Williams	Affirmative	
1	Public Service Electric and Gas Co.	Kenneth D. Brown	Affirmative	
1	Public Utility District No. 1 of Okanogan County	Dale Dunckel	Abstain	
1	Puget Sound Energy, Inc.	Denise M Lietz	Negative	
1	Rochester Gas and Electric Corp.	John C. Allen	Abstain	
1	Sacramento Municipal Utility District	Tim Kelley	Affirmative	
1	Salt River Project	Robert Kondziolka		
1	San Diego Gas & Electric	Will Speer		
1	SaskPower	Wayne Guttormson		
1	Seattle City Light	Pawel Krupa	Affirmative	
1	Seminole Electric Cooperative, Inc.	Glenn Spurlock	Abstain	
1	Snohomish County PUD No. 1	Long T Duong	Affirmative	
1	South Carolina Electric & Gas Co.	Tom Hanzlik	Abstain	
1	South Carolina Public Service Authority	Shawn T Abrams	Abstain	
1	Southern California Edison Company	Steven Mavis	Affirmative	
1	Southern Company Services, Inc.	Robert A. Schaffeld	Affirmative	
1	Southern Illinois Power Coop.	William Hutchison		
1	Southwest Transmission Cooperative, Inc.	John Shaver	Negative	
1	Sunflower Electric Power Corporation	Noman Lee Williams	Negative	SUPPORTS THIRD PARTY COMMENTS
1	Tacoma Power	John Merrell	Abstain	
1	Tampa Electric Co.	Beth Young		
1	Tennessee Valley Authority	Howell D Scott	Affirmative	
1	Trans Bay Cable LLC	Steven Powell		
1	Tri-State Generation & Transmission Association, Inc.	Tracy Sliman	Affirmative	
1	Tucson Electric Power Co.	John Tolo		
1	U.S. Bureau of Reclamation	Richard T Jackson		
1	United Illuminating Co.	Jonathan Appelbaum	Affirmative	
1	Westar Energy	Allen Klassen	Abstain	
1	Western Area Power Administration	Lloyd A Linke		
1	Wolverine Power Supply Coop., Inc.	Michelle Clements	Abstain	
1	Xcel Energy, Inc.	Gregory L Pieper	Affirmative	
2	California ISO	Rich Vine	Negative	
2	Electric Reliability Council of Texas, Inc.	Cheryl Moseley	Negative	COMMENT RECEIVED
2	Independent Electricity System Operator	Leonard Kula	Affirmative	
2	ISO New England, Inc.	Matthew F Goldberg	Negative	COMMENT RECEIVED
2	MISO	Marie Knox	Negative	
				SUPPORTS THIRD

2	New York Independent System Operator	Gregory Campoli	Negative	PARTY COMMENTS
2	PJM Interconnection, L.L.C.	stephanie monzon	Affirmative	
2	Southwest Power Pool, Inc.	Charles H. Yeung	Negative	
3	AEP	Michael E Deloach	Affirmative	
3	Alabama Power Company	Robert S Moore	Affirmative	
3	Ameren Corp.	David J Jendras	Negative	COMMENT RECEIVED
3	APS	Sarah Kist	Affirmative	
3	Associated Electric Cooperative, Inc.	Todd Bennett	Abstain	
3	Atlantic City Electric Company	NICOLE BUCKMAN	Abstain	
3	Avista Corp.	Scott J Kinney	Affirmative	
3	Basin Electric Power Cooperative	Jeremy Voll	Affirmative	
3	BC Hydro and Power Authority	Pat G. Harrington	Abstain	
3	Bonneville Power Administration	Rebecca Berdahl	Affirmative	
3	Central Electric Power Cooperative	Adam M Weber	Abstain	
3	City of Austin dba Austin Energy	Andrew Gallo	Affirmative	
3	City of Bartow, Florida	Matt Culverhouse	Affirmative	
3	City of Clewiston	Lynne Mila	Affirmative	
3	City of Farmington	Linda R Jacobson		
3	City of Green Cove Springs	Mark Schultz	Affirmative	
3	City of Homestead	Orestes J Garcia	Affirmative	
3	City of Redding	Bill Hughes	Affirmative	
3	City of Tallahassee	Bill R Fowler	Abstain	
3	Cleco Corporation	Michelle A Corley	Abstain	
3	Colorado Springs Utilities	Jean Mueller	Affirmative	
3	ComEd	John Bee	Affirmative	
3	Consolidated Edison Co. of New York	Peter T Yost	Negative	SUPPORTS THIRD PARTY COMMENTS
3	Consumers Energy Company	Gerald G Farringer	Affirmative	
3	Cowlitz County PUD	Russell A Noble		
3	Delmarva Power & Light Co.	Michael R. Mayer	Abstain	
3	Dominion Resources, Inc.	Connie B Lowe	Negative	
3	DTE Electric	Kent Kujala	Affirmative	
3	FirstEnergy Corp.	Cindy E Stewart	Affirmative	
3	Florida Keys Electric Cooperative	Tom B Anthony		
3	Florida Municipal Power Agency	Joe McKinney	Affirmative	
3	Florida Power Corporation	Lee Schuster	Negative	SUPPORTS THIRD PARTY COMMENTS
3	Gainesville Regional Utilities	Kenneth Simmons	Affirmative	
3	Georgia System Operations Corporation	Scott McGough	Affirmative	
3	Great River Energy	Brian Glover	Negative	SUPPORTS THIRD PARTY COMMENTS
3	Hydro One Networks, Inc.	Ayesha Sabouba	Affirmative	
3	JEA	Garry Baker		
3	Kansas City Power & Light Co.	Joshua D Bach	Affirmative	
3	Kissimmee Utility Authority	Gregory D Woessner	Affirmative	
3	Lakeland Electric	Mace D Hunter	Affirmative	
3	Lincoln Electric System	Jason Fortik		
3	Los Angeles Department of Water & Power	Mike Anctil	Abstain	
3	Louisville Gas and Electric Co.	Charles A. Freibert	Abstain	
3	M & A Electric Power Cooperative	Stephen D Pogue	Abstain	
3	MEAG Power	Roger Brand	Affirmative	
3	MidAmerican Energy Co.	Thomas C. Mielnik	Affirmative	
3	Modesto Irrigation District	Jack W Savage	Affirmative	
3	Muscatine Power & Water	Jenn Stover	Affirmative	
3	National Grid USA	Brian E Shanahan	Negative	
3	Nebraska Public Power District	Tony Eddleman	Affirmative	
3	New York Power Authority	David R Rivera	Abstain	
3	Northern Indiana Public Service Co.	Ramon J Barany	Abstain	
3	NW Electric Power Cooperative, Inc.	David McDowell	Abstain	
3	Ocala Utility Services	Randy Hahn	Affirmative	
3	Oklahoma Gas and Electric Co.	Donald Hargrove	Abstain	

3	Omaha Public Power District	Blaine R. Dinwiddie	Abstain	
3	Orlando Utilities Commission	Ballard K Mutters	Affirmative	
3	Owensboro Municipal Utilities	Thomas T Lyons	Negative	
3	Pacific Gas and Electric Company	John H Hagen	Affirmative	
3	Platte River Power Authority	Terry L Baker	Affirmative	
3	PNM Resources	Michael Mertz		
3	Portland General Electric Co.	Thomas G Ward	Abstain	
3	Potomac Electric Power Co.	Mark Yerger	Abstain	
3	Public Service Electric and Gas Co.	Jeffrey Mueller	Affirmative	
3	Puget Sound Energy, Inc.	Mariah R Kennedy	Negative	COMMENT RECEIVED
3	Sacramento Municipal Utility District	James Leigh-Kendall	Affirmative	
3	Salt River Project	John T. Underhill		
3	Santee Cooper	James M Poston	Abstain	
3	Seattle City Light	Dana Wheelock	Affirmative	
3	Seminole Electric Cooperative, Inc.	James R Frauen	Abstain	
3	Sho-Me Power Electric Cooperative	Jeff L Neas		
3	Snohomish County PUD No. 1	Mark Oens	Affirmative	
3	South Carolina Electric & Gas Co.	Hubert C Young	Abstain	
3	Southern California Edison Company	Lujuanna Medina	Affirmative	
3	Tacoma Power	Marc Donaldson	Abstain	
3	Tampa Electric Co.	Ronald L. Donahey		
3	Tennessee Valley Authority	Ian S Grant	Affirmative	
3	Tri-State Generation & Transmission Association, Inc.	Janelle Marriott	Affirmative	
3	Westar Energy	Bo Jones	Abstain	
3	Wisconsin Electric Power Marketing	James R Keller	Affirmative	
3	Xcel Energy, Inc.	Michael Ibold	Affirmative	
4	Alliant Energy Corp. Services, Inc.	Kenneth Goldsmith	Affirmative	
4	Blue Ridge Power Agency	Duane S Dahlquist	Abstain	
4	City of Austin dba Austin Energy	Reza Ebrahimian		
4	City of New Smyrna Beach Utilities Commission	Tim Beyrle	Affirmative	
4	City of Redding	Nicholas Zettel	Affirmative	
4	City Utilities of Springfield, Missouri	John Allen	Abstain	
4	Consumers Energy Company	Tracy Goble	Affirmative	
4	Cowlitz County PUD	Rick Syring		
4	DTE Electric	Daniel Herring	Affirmative	
4	Flathead Electric Cooperative	Russ Schneider	Abstain	
4	Florida Municipal Power Agency	Carol Chinn	Affirmative	
4	Fort Pierce Utilities Authority	Cairo Vanegas	Affirmative	
4	Georgia System Operations Corporation	Guy Andrews	Affirmative	
4	Herb Schrayshuen	Herb Schrayshuen	Affirmative	
4	Illinois Municipal Electric Agency	Bob C. Thomas	Affirmative	
4	Madison Gas and Electric Co.	Joseph DePoorter	Affirmative	
4	Modesto Irrigation District	Spencer Tacke		
4	Ohio Edison Company	Douglas Hohlbaugh	Affirmative	
4	Old Dominion Electric Coop.	Mark Ringhausen		
4	Public Utility District No. 1 of Snohomish County	John D Martinsen	Affirmative	
4	Sacramento Municipal Utility District	Mike Ramirez	Affirmative	
4	Seattle City Light	Hao Li	Affirmative	
4	Seminole Electric Cooperative, Inc.	Steven R Wallace	Abstain	
4	South Mississippi Electric Power Association	Steve McElhaney		
4	Tacoma Public Utilities	Keith Morisette	Abstain	
4	Utility Services, Inc.	Brian Evans-Mongeon	Negative	SUPPORTS THIRD PARTY COMMENTS
4	Wisconsin Energy Corp.	Anthony P Jankowski	Affirmative	
5	Amerenue	Sam Dwyer	Negative	SUPPORTS THIRD PARTY COMMENTS
5	American Electric Power	Thomas Foltz	Affirmative	
5	Arizona Public Service Co.	Scott Takinen	Affirmative	
5	Associated Electric Cooperative, Inc.	Matthew Pacobit		
5	Avista Corp.	Steve Wenke		
5	Basin Electric Power Cooperative	Mike Kraft	Affirmative	

5	Boise-Kuna Irrigation District/dba Lucky peak power plant project	Mike D Kukla		
5	Bonneville Power Administration	Francis J. Halpin	Affirmative	
5	Brazos Electric Power Cooperative, Inc.	Shari Heino		
5	Calpine Corporation	Hamid Zakery	Abstain	
5	City and County of San Francisco	Daniel Mason	Affirmative	
5	City of Austin dba Austin Energy	Jeanie Doty	Affirmative	
5	City of Redding	Paul A. Cummings	Affirmative	
5	City of Tallahassee	Karen Webb	Abstain	
5	City Water, Light & Power of Springfield	Steve Rose		
5	Cleco Power	Stephanie Huffman	Abstain	
5	Cogentrix Energy Power Management, LLC	Mike D Hirst	Abstain	
5	Colorado Springs Utilities	Kaleb Brimhall	Affirmative	
5	Con Edison Company of New York	Brian O'Boyle	Negative	SUPPORTS THIRD PARTY COMMENTS
5	Consumers Energy Company	David C Greyerbiehl	Affirmative	
5	Cowlitz County PUD	Bob Essex		
5	Dominion Resources, Inc.	Mike Garton	Negative	
5	DTE Electric	Mark Stefaniak	Affirmative	
5	Duke Energy	Dale Q Goodwine	Negative	SUPPORTS THIRD PARTY COMMENTS
5	Dynegy Inc.	Dan Roethemeyer	Abstain	
5	E.ON Climate & Renewables North America, LLC	Dana Showalter		
5	Entergy Services, Inc.	Tracey Stubbs	Affirmative	
5	Exelon Nuclear	Mark F Draper	Affirmative	
5	First Wind	John Robertson		
5	FirstEnergy Solutions	Kenneth Dresner	Affirmative	
5	Florida Municipal Power Agency	David Schumann	Affirmative	
5	Great River Energy	Preston L Walsh	Negative	SUPPORTS THIRD PARTY COMMENTS
5	Independence Power & Light Dept.	James Nail	Affirmative	
5	Kansas City Power & Light Co.	Brett Holland	Affirmative	
5	Kissimmee Utility Authority	Mike Blough	Affirmative	
5	Lakeland Electric	James M Howard	Affirmative	
5	Liberty Electric Power LLC	Daniel Duff		
5	Lincoln Electric System	Dennis Florom	Affirmative	
5	Los Angeles Department of Water & Power	Kenneth Silver	Affirmative	
5	Lower Colorado River Authority	Dixie Wells	Abstain	
5	Luminant Generation Company LLC	Rick Terrill	Affirmative	
5	Massachusetts Municipal Wholesale Electric Company	David Gordon	Abstain	
5	MEAG Power	Steven Grego	Affirmative	
5	Muscatine Power & Water	Mike Avesing	Abstain	
5	Nebraska Public Power District	Don Schmit	Affirmative	
5	Nevada Power Co.	Richard Salgo	Affirmative	
5	New York Power Authority	Wayne Sipperly	Abstain	
5	NextEra Energy	Allen D Schriver	Affirmative	
5	Northern Indiana Public Service Co.	Michael D Melvin	Abstain	
5	Oglethorpe Power Corporation	Bernard Johnson	Affirmative	
5	Oklahoma Gas and Electric Co.	Henry L Staples	Abstain	
5	Omaha Public Power District	Mahmood Z. Safi	Affirmative	
5	Pacific Gas and Electric Company	Alex Chua		
5	Platte River Power Authority	Christopher R Wood		
5	Portland General Electric Co.	Matt E. Jastram		
5	PPL Generation LLC	Annette M Bannon	Abstain	
5	PSEG Fossil LLC	Tim Kucey	Affirmative	
5	Public Utility District No. 2 of Grant County, Washington	Michiko Sell	Affirmative	
5	Puget Sound Energy, Inc.	Lynda Kupfer	Negative	
5	Sacramento Municipal Utility District	Susan Gill-Zobitz	Affirmative	
5	Salt River Project	William Alkema		
5	Santee Cooper	Lewis P Pierce	Abstain	
5	Seattle City Light	Michael J. Haynes	Affirmative	

5	Seminole Electric Cooperative, Inc.	Brenda K. Atkins	Abstain	
5	Snohomish County PUD No. 1	Sam Nietfeld	Affirmative	
5	South Carolina Electric & Gas Co.	Edward Magic		
5	Southern California Edison Company	Denise Yaffe	Affirmative	
5	Southern Company Generation	William D Shultz	Affirmative	
5	Tacoma Power	Chris Mattson	Abstain	
5	Tampa Electric Co.	RJames Rocha	Affirmative	
5	Tri-State Generation & Transmission Association, Inc.	Mark Stein	Abstain	
5	TVA Power System Operations (PSO)	Brandy B Spraker	Affirmative	
5	U.S. Army Corps of Engineers	Melissa Kurtz		
5	USDI Bureau of Reclamation	Erika Doot		
5	Westar Energy	Bryan Taggart	Abstain	
5	Wisconsin Electric Power Co.	Linda Horn	Affirmative	
5	Xcel Energy, Inc.	Mark A Castagneri	Affirmative	
6	AEP Marketing	Edward P. Cox		
6	Ameren Missouri	Robert Quinlivan	Negative	SUPPORTS THIRD PARTY COMMENTS
6	APS	Randy A. Young	Affirmative	
6	Associated Electric Cooperative, Inc.	Brian Ackermann		
6	Basin Electric Power Cooperative	Stephen Farnsworth		
6	Bonneville Power Administration	Brenda S. Anderson	Affirmative	
6	Calpine Energy Services	Agus Bintoro		
6	City of Austin dba Austin Energy	Lisa Martin	Affirmative	
6	City of Redding	Marvin Briggs	Affirmative	
6	Cleco Power LLC	Robert Hirchak	Abstain	
6	Colorado Springs Utilities	Shannon Fair	Negative	
6	Con Edison Company of New York	David Balban	Negative	SUPPORTS THIRD PARTY COMMENTS
6	Constellation Energy Commodities Group	David J Carlson	Affirmative	
6	Dominion Resources, Inc.	Louis S. Slade	Negative	
6	Duke Energy	Greg Cecil		
6	FirstEnergy Solutions	Kevin Querry	Affirmative	
6	Florida Municipal Power Agency	Richard L. Montgomery	Affirmative	
6	Florida Municipal Power Pool	Thomas Reedy	Affirmative	
6	Florida Power & Light Co.	Silvia P Mitchell	Affirmative	
6	Kansas City Power & Light Co.	Jessica L Klinghoffer	Affirmative	
6	Lakeland Electric	Paul Shipps	Affirmative	
6	Lincoln Electric System	Eric Ruskamp	Affirmative	
6	Los Angeles Department of Water & Power	Brad Packer	Abstain	
6	Lower Colorado River Authority	Michael Shaw	Abstain	
6	Luminant Energy	Brenda Hampton	Affirmative	
6	Modesto Irrigation District	James McFall	Affirmative	
6	Muscatine Power & Water	John Stolley	Abstain	
6	New York Power Authority	Shivaz Chopra	Abstain	
6	New York State Electric & Gas Corp.	Julie S King		
6	Northern Indiana Public Service Co.	Joseph O'Brien	Abstain	
6	Oglethorpe Power Corporation	Donna Johnson	Affirmative	
6	Oklahoma Gas and Electric Co.	Jerry Nottnagel	Abstain	
6	Omaha Public Power District	Douglas Collins	Abstain	
6	PacifiCorp	Sandra L Shaffer	Affirmative	
6	Platte River Power Authority	Carol Ballantine	Affirmative	
6	Portland General Electric Co.	Shawn P Davis	Abstain	
6	Powerex Corp.	Gordon Dobson-Mack	Abstain	
6	PPL EnergyPlus LLC	Elizabeth Davis		
6	PSEG Energy Resources & Trade LLC	Peter Dolan	Affirmative	
6	Public Utility District No. 1 of Chelan County	Hugh A. Owen	Abstain	
6	Sacramento Municipal Utility District	Diane Enderby	Affirmative	
6	Salt River Project	William Abraham		
6	Santee Cooper	Michael Brown	Abstain	
6	Seattle City Light	Dennis Sismaet	Affirmative	
6	Seminole Electric Cooperative, Inc.	Trudy S. Novak	Abstain	
6	Snohomish County PUD No. 1	Kenn Backholm	Affirmative	
6	South Carolina Electric & Gas Co.	Matt H Bullard		

6	Southern California Edison Company	Joseph T Marone	Affirmative	
6	Southern Company Generation and Energy Marketing	John J. Ciza	Affirmative	
6	Tacoma Public Utilities	Michael C Hill		
6	Tampa Electric Co.	Benjamin F Smith II		
6	Tennessee Valley Authority	Marjorie S. Parsons	Affirmative	
6	Westar Energy	Grant L Wilkerson	Abstain	
6	Western Area Power Administration - UGP Marketing	Mark Messerli	Affirmative	
6	Xcel Energy, Inc.	Peter Colussy	Affirmative	
7	Luminant Mining Company LLC	Stewart Rake		
8		Roger C Zaklukiewicz	Affirmative	
8		David L Kiguel	Negative	
8	Massachusetts Attorney General	Frederick R Plett	Affirmative	
8	Volkmann Consulting, Inc.	Terry Volkmann		
9	Commonwealth of Massachusetts Department of Public Utilities	Donald Nelson	Affirmative	
9	New York State Public Service Commission	Diane J Barney	Affirmative	
10	Florida Reliability Coordinating Council	Linda C Campbell	Affirmative	
10	Midwest Reliability Organization	Russel Mountjoy	Affirmative	
10	New York State Reliability Council	Alan Adamson	Affirmative	
10	Northeast Power Coordinating Council	Guy V. Zito	Affirmative	
10	ReliabilityFirst	Anthony E Jablonski	Abstain	
10	SERC Reliability Corporation	Joseph W Spencer	Affirmative	
10	Texas Reliability Entity, Inc.	Karin Schweitzer	Affirmative	
10	Western Electricity Coordinating Council	Steven L. Rueckert	Affirmative	

Legal and Privacy : 404.446.2560 voice : 404.467.0474 fax : 3353 Peachtree Road, N.E. : Suite 600, North Tower : Atlanta, GA 30326
Washington Office: 1325 G Street, N.W. : Suite 600 : Washington, DC 20005-3801

Account Log-In/Register

Exhibit G

PRC-010-1 Frequently Asked Questions

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

PRC-010-1 Frequently Asked Questions

Project 2008-02 Undervoltage Load Shedding

September 9, 2014

RELIABILITY | ACCOUNTABILITY




3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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Introduction

Over the course of the development of PRC-010-1, the Project 2008-02 Undervoltage Load Shedding (UVLS) Standard Drafting Team (drafting team) conducted two informal comment periods and multiple outreach sessions with industry. In addition to providing individual responses to the second informal comment period that was conducted in March 2014, the drafting team has also developed this Frequently Asked Questions (FAQ) document to succinctly address common comment themes with respect to drafting team approach and intent.

All comments submitted during the two informal comment periods and the responses provided for the March 17–April 16, 2014 informal comment period may be reviewed on the project page.

If you have any further concerns you would like to discuss with the drafting team, you can contact the Standards Developer, Katherine Street, at 404-446-9702 or at katherine.street@nerc.net.

Frequently Asked Questions

To succinctly address common comment themes that require drafting team response on Project 2008-02 UVLS (proposed PRC-010-1), the drafting team provides the following discussion in the construct of an FAQ format.

Purpose of Standard Revision

1) What is the basis for a revision of the existing UVLS standards?

The initial input into a revision of the existing UVLS standards is FERC Order No. 693, Paragraph 1509, which directed the ERO to develop a modification of PRC-010-0 that "requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride through capabilities, and UFLS and UVLS programs." In addition, *The Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* ("August 14 Blackout Report") showed that proper coordination would have mitigated effects if UVLS was used as a tool.

Additional inputs included 1) recommendations from the NERC System Protection and Control Subcommittee (SPCS) in its December 2010 *Technical Review of UVLS-Related Standards* to combine the four existing UVLS standards, revise the applicability to entities responsible for UVLS program design, implementation, and coordination, specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, and differentiate post-event validation of UVLS program design from verifying correct operation of UVLS equipment; 2) the existing UVLS standards were not in the current results-based format; 3) the preceding revision of the underfrequency load shedding (UFLS) standards had similar types of requirements and had been completed under the construct of a consolidation; and 4) the Independent Expert Review Panel recommendations, which included an evaluation of the existing standards' applicability and level of specificity.

The drafting team agrees that a lack of coordination among protection systems is a key risk to reliability. As part of the revision to address this, the drafting team also agreed that an evaluation and consolidation of the existing UVLS standards was necessary to meet current Reliability Standard development initiatives and to provide clear, comprehensive requirements to address the application and coordination of UVLS.

2) UVLS programs are not mandatory—is compliance for an optional tool necessary?

The drafting team asserts that a key takeaway from the August 14 Blackout Report is that coordination of UVLS with other protection systems could have mitigated the effects if UVLS was used as a tool. Although the use of UVLS is not mandatory, if it is determined that this system preservation measure is necessary to support reliability and a UVLS program is installed, the program needs to be properly coordinated, implemented, and assessed due to the inherent associated reliability risks. As such, there needs to be a level of performance required to properly protect system reliability. Of note, PRC-010-1 applies only to the proposed defined term "UVLS Program," which limits the standard's applicability to only those undervoltage-based load shedding programs whose performance has an impact on system reliability.

Coordination with Project 2009-03 Emergency Operations

3) EOP-003-2 has potentially redundant requirements with proposed PRC-010-1—how is this being addressed?

As part of its five-year review, Project 2009-03 Emergency Operations (EOP) identified EOP-003-2, Requirements R2, R4, and R7 as being more properly covered by Project 2008-02 UVLS. Now that both projects are in formal development, they are strategically coordinating to move in lockstep from a timing perspective to address these requirements. Project 2009-03 EOP, which is proposing to revise and consolidate EOP-001-2.1b, EOP-002-3, and EOP-003-2 to create EOP-011-1, will retire the noted EOP-003-2 requirements (among other revisions), and the Project 2008-02 UVLS Mapping Document will show how PRC-010-1 encompasses the retired content accordingly. Slated to have aligning effective dates, both EOP-011-1 and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition. Please see the posted Project 2008-02 UVLS Project Coordination Plan for more information.

"UVLS Program" Definition

4) Why is the introduction of the new NERC Glossary term "UVLS Program" necessary?

The drafting team found it necessary to introduce the term "UVLS Program" because different types of UVLS systems need to be treated appropriately with respect to reliability requirements. Therefore, the term establishes which UVLS systems PRC-010-1 will apply to: "automatic load shedding program[s], consisting of distributed relays and controls, used to mitigate undervoltage conditions impacting the Bulk Electric System (BES), leading to voltage instability, voltage collapse, or Cascading."

The definition is meant to inherently exclude locally-applied relays that are designed to protect a contained area or, in other words, are not designed to mitigate wide-area voltage collapse. This exclusion is not explicit in these terms in the definition's enforceable language since the meaning and measurement of "local" or "wide-area" varies greatly on a continent-wide basis and could potentially be interpreted differently by auditors and the applicable functional entities. Therefore, the definition as written is meant to provide flexibility for the Planning Coordinator or Transmission Planner to determine if a UVLS system falls under the defined term with respect to its impact on the reliability of the BES (voltage instability, voltage collapse, or Cascading). To further support the intended exclusion, further discussion and an example are provided on page 18 of the standard document in the Guidelines and Technical Basis section.

The definition does explicitly note that the term excludes centrally controlled undervoltage-based load shedding. This type of load shedding is excluded because the drafting team asserts that the design and characteristics of centrally controlled undervoltage-based load shedding are commensurate with those of a Special Protection System (SPS) or Remedial Action Scheme (RAS) and should therefore be subject to SPS or RAS-related Reliability Standards. See page 18 of the standard document in the Guidelines and Technical Basis section for further discussion.

5) If the definition excludes certain types of UVLS, does this preclude an "integrated" approach (FERC Order No. 693, Paragraph 1509)?

The defined term "UVLS Program" clarifies which UVLS systems are subject to the requirements in PRC-010-1. The resulting exclusions from PRC-010-1 do not preclude an "integrated" approach because the standard requires that

an entity coordinate with all other protection and control systems as necessary, which may include other types of UVLS (i.e., locally-applied UVLS relays and centrally controlled undervoltage-based load shedding).

6) Where will centrally controlled undervoltage-based load shedding be covered?

As explained immediately above, the requirements of PRC-010-1 are applicable to the proposed new NERC Glossary term "UVLS Program," which excludes centrally controlled undervoltage-based load shedding because its design and characteristics are commensurate with those of an SPS or RAS. However, the current NERC Glossary definition of "Special Protection System" excludes UVLS. Therefore, Project 2010-05.2 Special Protection Systems (Phase 2 of Protection Systems), which is currently revising the NERC Glossary definition of "Special Protection System" and proposing the single term "Remedial Action Scheme," will also revise the definition of this term to exclude UVLS Programs, therefore including centrally controlled undervoltage-based shedding.

Consequently, the introduction of the term "UVLS Program" and the conforming revision to the term "Remedial Action Scheme" will explicitly clarify that RAS-related standards are applicable to centrally controlled undervoltage-based load shedding. The implementation plan for the revised definition of "Remedial Action Scheme" will address entities that will have newly identified RAS resulting from the application of the defined term.

Similar to the coordination effort with Project 2009-03 EOP explained above, Project 2008-02 UVLS and Project 2010-05.2 SPS are working together in lockstep from a timing perspective to ensure that the effective dates of the revised definition of "Remedial Action Scheme," the proposed new term "UVLS Program," proposed PRC-010-1, and all associated retirements align. Both the proposed revised definition of "Remedial Action Scheme" and PRC-010-1 will be posted and balloted separately but concurrently, so that industry stakeholders will be able to clearly evaluate the transition.

7) Is the term "UVLS Program" inclusive of a collection of independent UVLS relays?

No; multiple independent relays do not constitute a program. While the definition stipulates that a UVLS Program consists of distributed relays and controls, the definition specifies that it must be an automatic load shedding *program* that mitigates the specified conditions impacting the BES. By nature of this definition, this would include relays that are coordinated and act in concert for this purpose.

Applicability

8) What is meant by the phrase "Planning Coordinator or Transmission Planner"?

PRC-010-1 is applicable to both the Planning Coordinator and Transmission Planner because either may be responsible for designing and coordinating the program based on agreements, memorandums of understanding, or tariffs. The phrase "Planning Coordinator or Transmission Planner" provides the flexibility for applicability to the entity that will perform the action. The expectation is not that both parties will perform the action, but rather that the Planning Coordinator and Transmission Planner will engage in discussion to determine the appropriate responsible entity. In addition, the requirements containing this phrase have specific language to qualify the responsible entity. For example, Requirement R1 states: "Each Planning Coordinator or Transmission Planner *that is developing* a UVLS Program shall . . ." This language provides clarity that the applicable entity would be the one that is developing the program.

9) Why is the Transmission Operator not included?

While the Transmission Operator may be involved with UVLS Program activities, the drafting team did not identify any required performance for the Transmission Operator that was necessary to capture within PRC-010-1 since the Transmission Operator does not have the resources necessary to implement program specifications. If responsibilities are delegated to the Transmission Operator by the Transmission Owner, the Transmission Owner is still the accountable party.

To the extent that the Transmission Operator is required to have knowledge of system relays and protection systems, the drafting team notes that this requirement is covered under PRC-001. It is also noted that manual load shedding, for which the Transmission Operator is responsible, is not in the purview of PRC-010-1, as it is covered under current EOP-003-2 and will subsequently be covered by proposed EOP-011-1 (see Project 2009-03 Emergency Operations).

10) What about UVLS schemes owned by Transmission Owners, Distribution Providers, or Transmission Operators that are not required by the planner?

PRC-010-1 is applicable to its proposed defined term "UVLS Program." The drafting team notes that, by its defining attributes, a UVLS Program would be required and developed by a Planning Coordinator or Transmission Planner. The nature of a UVLS scheme developed or required by a Transmission Owner, Distribution Provider, or Transmission Operator would not meet the attributes of the defined term and would therefore not have the design and characteristics necessary to be subject to the requirements of PRC-010-1.

Requirements R1, R3, R4, and R5

11) What is required to evaluate the coordination referenced in Requirement R1, part 1.2?

Requirement R1 requires each Planning Coordinator or Transmission Planner that develops a UVLS Program to evaluate the program's viability and effectiveness prior to implementation. This evaluation should include studies and analyses used when developing the program that show implementation of the program resolves the identified undervoltage issues that led to its design. These studies and analyses should also show that the UVLS Program is integrated through coordination with generator voltage ride-through capabilities and other protection and control systems. As such, the requirement is meant to provide flexibility for an entity to make the proper determinations, including the considerations for coordination, with respect to program effectiveness based on system characteristics. For further guidance on and examples of coordination considerations, please see the portion of the Guidelines and Technical Basis section that addresses Requirement R1 on pages 19–20 of the standard document.

12) Requirements R1, R3, and R4 seem to all require evaluations of program effectiveness—how are they different?

Requirements R1, R3, and R4 do all require evaluations of program effectiveness, but they are each at distinct points in time.

Requirement R1 requires evaluation of program effectiveness (by way of the qualifying parts) at the onset of program development, or during the initial planning stage, prior to implementation. Requirement R3 requires the

same objectives of an evaluation of effectiveness, but at the point of a mandatory periodic review (at least once every 60 calendar months). Requirement R4 addresses a UVLS Program's performance after an event (applicable voltage excursion) to evaluate whether the UVLS Program resolved the undervoltage issues associated with the event.

It is noted that, because of the separate activities of each requirement, UVLS Program deficiencies found as a result of the assessments performed in Requirement R3 or R4 would not be violations of Requirement R1.

13) Requirement R4 would require the Planning Coordinator or Transmission Planner to review all voltage excursions—isn't this unduly burdensome?

While Requirement R4 essentially requires the Planning Coordinator or Transmission Planner to review all voltage excursions to see if they fall below the initializing set points of the UVLS Program, the drafting team contends that it will be clearly evident if voltage falls below the UVLS threshold because either a) UVLS devices will operate; or b) the system will experience the adverse conditions the UVLS Program was installed to mitigate.

In addition, the drafting team acknowledges that the Planning Coordinator or Transmission Planner may not have the ability to know when voltage excursions are occurring since they are not operating entities. However, a process for the Transmission Operator, Transmission Owner, or Distribution Provider to notify the Transmission Planner or Planning Coordinator of such voltage excursion events is consistent with standard utility practice.

14) PRC-022-1 required the analysis of UVLS Misoperations. How is this addressed in PRC-010-1?

One of the recommendations in the SPCS report was to clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities addressed in PRC-010-1) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

Relative to a UVLS Program, PRC-010-1 Requirements R4 and R5 require event analysis and a Corrective Action Plan to address any identified program deficiencies. The UVLS drafting team maintains that verifying correct operation of UVLS equipment should be addressed in PRC-004 and is coordinating an applicability change to this standard with respect to the development timeline of Project 2010-05.1 Misoperations (Phase 1 of Protection Systems), which is in the later stages of development of PRC-004-3. Please see the posted PRC-010-1 Mapping Document and Project 2008-02 UVLS Project Coordination Plan for further information.

Requirements R6, R7, and R8

15) Do Requirements R6, R7, and R8 overlap with the requirements of MOD-032-1?

While both MOD-032-1 and Requirements R6, R7, and R8 of PRC-010-1 address data requirements, MOD-032-1 establishes overarching modeling data requirements with respect to consistency in format and reporting procedures, whereas the PRC-010-1 requirements address the need to maintain and share data and databases for the purposes of studies for use in event analyses for UVLS Programs specifically. While Reliability Standards in general may have overlap in this manner, the activities in these requirements remain distinctly different.

16) Requirements R6, R7, and R8 appear to be administrative—doesn't this conflict with Paragraph 81 criteria?

Proper maintenance and timely sharing of UVLS Program data as required by Requirements R6, R7, and R8 is necessary to inform the Planning Coordinator or Transmission Planner's studies and analyses. While administrative tasks are required, the tasks have a core reliability-based need.

In addition, Requirements R6, R7, and R8 were written to emulate FERC-approved PRC-006-1 Automatic Underfrequency Load Shedding data requirements. While some of these analogous requirements in PRC-006-1 are listed as candidates for Phase 2 of the Paragraph 81 project, they are not yet approved as meeting the criteria; furthermore, the Independent Expert Review Panel has recommended that these Paragraph 81 candidates not be included for deletion, citing that "there should be a clear expectation for Planning Coordinators to share data necessary to determine their UFLS program parameters".

Attachment A – Drafting Team Members

Project 2008-02 UVLS Standard Drafting Team		
	Participant	**Entity**
Chair	Greg Vassallo	Bonneville Power Administration
Member	José Conto	Electric Reliability Council of Texas, Inc.
Member	Bill Harm	PJM Interconnection, LLC
Member	Sharma Kolluri	Entergy Corporation
Member	Charles-Éric Langlois	Hydro-Québec TransÉnergie
Member	Manish Patel	Southern Company Transmission
Member	Fabio Rodriguez	Duke Energy Florida
Member	Hari Singh	Xcel Energy, Inc.
Member	Matthew H. Tackett	MISO

Exhibit H

Standard Drafting Team

NERC
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Team Roster

Project 2008-02 Undervoltage Load Shedding

	Participant	Contact Information
Chair	Greg Vassallo Electrical Engineer	Bonneville Power Administration 86000 Highway 99 South Eugene, OR 97405 (541) 988-7422 (O) (541) 510-5654 (C) glvassallo@bpa.gov
Member	José Conto Principal, Dynamic Studies	Electric Reliability Council of Texas, Inc. 2705 West Lake Dr. Taylor, TX 76574 (512) 248-3141 (O) jconto@ercot.com
Member	Bill Harm Sr. Consultant	PJM Interconnection, LLC Valley Forge Corporate Center 955 Jefferson Ave Norristown PA, 19043 (610) 666-8868 (O) (484) 614-2129 (C) HARM@pjm.com

Member	Venkat (Sharma) Kolluri Manager, Transmission Planning	Entergy Corporation L-ENT-17A 639 Loyola Avenue New Orleans, LA 70113 (504) 576-4045 (O) vkollur@entergy.com
Member	Charles-Eric Langlois Engineer	Hydro-Quebec TransEnergie 9e étage, Complexe Desjardins, Tour Est Montreal, Quebec H5B 1H7 (514) 879-4100 ext. 5441 (O) langlois.charles-eric@hydro.qc.ca
Member	Manish Patel Sr. Engineer	Southern Company Transmission 62 Lake Mirror Road Forest Park, GA 30297 (404) 608-5889 (O) mpatel@southernco.com
Member	Fabio Rodriguez Principal Engineer	Duke Energy Florida 6565 38th Ave N. Saint Petersburg, FL 33710 (727) 384-7544 (O) fabio.rodriguez@duke-energy.com
Member	Hari Singh Principal Engineer, Transmission Planning	Xcel Energy, Inc. 1800 Larimer Street Denver, CO 80202 (303) 571-7095 (O) (262) 347-8450 (C) hari.singh@xcelenergy.com
Member	Matthew H. Tackett Senior Advisor – Transmission Expansion Planning	MISO PO Box 4202 Carmel, Indiana 46082 (317) 249-5455 (O) mtackett@misoenergy.org

FERC Observer	Juan Villar	Federal Energy Regulatory Commission 888 1st Street NE Washington, DC 20426 (202) 536-2930 (O) (202) 577-9973 (C) juan.villar@ferc.gov
NERC Staff	Scott Barfield-McGinnis Standards Developer (Supporting)	North American Electric Reliability Corporation 3353 Peachtree Road NE Suite 600, North Tower Atlanta, GA 30326 (404) 446-9689 (O) (404) 772-1211 (C) scott.barfield@nerc.net
NERC Staff	Neil Burbure Engineer of Reliability Initiatives and System Analysis (Supporting)	North American Electric Reliability Corporation 3353 Peachtree Road NE Suite 600, North Tower Atlanta, GA 30326 (404) 446-9677 (O) (404) 904-5034 (C) neil.burbure@nerc.net
NERC Staff	Erika Chanzes Standards Development Specialist (Supporting)	North American Electric Reliability Corporation 3353 Peachtree Road NE Suite 600, North Tower Atlanta, GA 30326 (404) 446-2583 (O) (404) 823-1132 (C) erika.chanzes@nerc.net
NERC Staff	Katherine Street Standards Developer (Primary)	North American Electric Reliability Corporation 3353 Peachtree Road NE Suite 600, North Tower Atlanta, GA 30326 (404) 446-9702 (O) (404) 823-1132 (C) katherine.street@nerc.net

NERC Staff	Bill Edwards Attorney	North American Electric Reliability Corporation 1325 G Street NW, Suite 600 Washington, DC 20005 (202) 644-8037 (O) (202) 495-9017 (C) william.edwards@nerc.net
NERC Staff	Howard Gugel Associate Director of Standards Development	North American Electric Reliability Corporation 3353 Peachtree Road NE Suite 600, North Tower Atlanta, GA 30326 (609) 651-2269 (C) howard.gugel@nerc.net
NERC Staff	Philip Tatro Senior Performance and Analysis Engineer (Primary)	North American Electric Reliability Corporation 3353 Peachtree Road NE Suite 600, North Tower Atlanta, GA 30326 (508) 612-1158 (C) phil.tatro@nerc.net

Exhibit I

NERC SPCS Technical Review of UVLS-Related Standards:
PRC-010-0, PRC 020-1, PRC-021-1, and PRC-022-1

NERC

NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION

Report to the Planning Committee

NERC SPCS Technical Review of UVLS-Related Standards: PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1

NERC System Protection and Control Subcommittee

December 2010

116-390 Village Blvd., Princeton, NJ 08540
609.452.8060 | 609.452.9550 fax

NERC
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This Technical Reference Paper was approved by the NERC Planning Committee on December 9, 2009.

1. Executive Summary

The System Protection and Control Subcommittee (SPCS) scope includes an assignment to review all existing PRC-series Reliability Standards, to advise the Planning Committee of our assessment, and to develop Standards Authorization Requests, as appropriate, to address any perceived deficiencies. The 2010 SPCS Work Plan includes assessment of two standards related to Undervoltage Load Shedding: PRC-010-0 and PRC-022-1.

This report presents the SPCS assessment of these two PRC standards pertaining to design and performance assessment of Undervoltage Load Shedding (UVLS) programs, as well as two additional standards relating to UVLS program data: PRC-020-1 and PRC-021-1. Collectively, these standards address all aspects associated with developing, documenting, and evaluating performance of UVLS programs.

A Standard Authorization Request (SAR) was posted in February 2010 under Project 2008-02 to address consolidation of standards PRC-010-0 and PRC-022-1. The SAR includes addressing concepts presented in the NERC SPCTF Technical Review of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program; an assessment of PRC-010-0 approved by the Planning Committee in May 2007. This report expands upon recommendations made in the May 2007 report and in some cases provides modified recommendations based on developments within the industry and the standards development process that have occurred subsequent to May 2007.

The SPCS recommends that the SAR for Project 2008-02 – Undervoltage Load Shedding, should be modified to include addressing the recommendations presented in this report. Project 2008-02 is not one of the 17 High Priority Projects Under Development (it is on the list of Additional Projects to be Initiated in Order of Priority). Since work on this project has not commenced, there is adequate time to amend the SAR for this project.

The SPCS recommendations related to the subject Reliability Standards focus on the following subjects:

- Combine PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 into one standard, and classify this new standard as a Transmission Planning (TPL) standard.
- Revise the Applicability to eliminate references to Regional Reliability Organizations and specifically include Functional Model entities responsible for UVLS program design, implementation, and coordination.

- Include in the standard a definitive list of requirements that must be fulfilled in a valid UVLS program assessment to ensure consistent application and enforcement and to address any fill-in-the-blank concerns.
- Specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems.
- Clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities that should be covered in this standard) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

The SPCS notes that these recommendations are valid regardless of whether these four standards remain independent or are combined into one or more Reliability Standards.

In preparing this report SPCS discussed issues related to coordination of UVLS programs with transmission system protection, generator protection and control, UFLS programs, and other UVLS programs. The SPCS notes that the issue of coordinating Protection Systems that respond to different quantities such as voltage, frequency, apparent impedance, and excitation, is not traditional relay-to-relay coordination. Coordination must be addressed in assessments of system performance to compare the response of protections responding to different quantities, and to account for time-based and location-based variations in these quantities.

The SPCS recommends that the NERC Transmission Issues Subcommittee, with support from the SPCS and other groups as necessary, develop a paper on the subject of coordinating the design and operation of these Protection Systems to support the Project 2008-02 Standard Drafting Team. This paper should include consideration of modifications to the Modeling (MOD) Reliability Standards to ensure that data is provided and proper modeling is included as necessary to support coordination through assessments of system performance.

2. Introduction

The System Protection and Control Subcommittee (SPCS) scope includes an assignment to review all existing PRC-series Reliability Standards, to advise the Planning Committee of

our assessment, and to develop Standards Authorization Requests, as appropriate, to address any perceived deficiencies. The 2010 SPCS Work Plan includes assessment of two standards related to Undervoltage Load Shedding: PRC-010-0 and PRC-022-1.

This report presents the SPCS assessment of these two PRC standards pertaining to design and performance assessment of Undervoltage Load Shedding (UVLS) programs. In addition, the SPCS has decided to include in this assessment two additional standards relating to UVLS program data: PRC-020-1 and PRC-021-1. Collectively, these standards address all aspects associated with developing, documenting, and evaluating performance of UVLS programs.

A Standard Authorization Request (SAR) was posted in February 2010 under Project 2008-02[1] to address consolidation of standards PRC-010-0 and PRC-022-1. Work on Project 2008-02 has not yet commenced as it is not one of the 17 High Priority Projects Under Development; it is on the list of Additional Projects to be Initiated in Order of Priority.[2] The SAR includes addressing concepts presented in the NERC SPCTF Technical Review of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program[3]; an assessment of PRC-010-0 approved by the Planning Committee in May 2007. This report expands upon recommendations made in the May 2007 report and in some cases provides modified recommendations based on developments within the industry and the standards development process that have occurred subsequent to May 2007. This report also addresses issues of concern identified by FERC in Order No. 693.

The SPCS comments are divided into six sections. The first section contains the rationale for combing these four standards into one reliability standard that addresses all Transmission Planning aspects associated with UVLS. The next four sections contain comments that are specific to each standard. These comments are applicable regardless of whether these four standards remain independent or are combined into one or more Reliability Standards. The last section contains an assessment of how modifications to these four standards relate to the Federal Energy Regulatory Commission Order No. 693.[4]

[1] Standard Authorization Request for Project 2008-02: Undervoltage Load Shedding, January 15, 2010.
[2] NERC Reliability Standards Development Plan: 2011–2013, October 14, 2010
[3] NERC SPCTF Technical Review of PRC-010-0 – Assessment of the Design and Effectiveness of UVLS Program, May 17. 2007.
[4] Docket No. RM06-16-000; Order No. 693 – Mandatory Reliability Standards for the Bulk-Power System, Issued March 16, 2007.

3. Recommendation to Combine These Four Reliability Standards

The four UVLS standards that are the subject of this report relate to the Transmission Planning aspects associated with developing, documenting, and evaluating performance of UVLS programs. These aspects of the UVLS program typically are addressed by the Transmission Planning function within the NERC Functional Model. These standards should be reclassified as a Transmission Planning (TPL) standard and consideration should be given to combining all of the Transmission Planning related aspects into one standard.

The SPCS has provided for consideration a draft Purpose for a combined standard addressing all of the Transmission Planning related aspects of UVLS programs.

> Provide requirements for development and documentation of UVLS programs coordinated between regions within an interconnection, ensuring UVLS programs are implemented consistent with UVLS program design, and ensuring assessment and evaluation of UVLS programs following system events.

It should be noted that while Project 2008-02 appropriately includes consolidation of standards PRC-010-0 and PRC-022-1, the SPCS believes it is appropriate to expand the scope to also include standards PRC-020-1 and PRC-021-1. Combining all aspects associated with developing, documenting, and evaluating performance of UVLS programs in one standard is consistent with the approach taken in PRC-006-1, approved by the NERC Board of Trustees on November 4, 2010.

4. Assessment of PRC-010-0

Within this section of the report the SPCS offers comments specific to PRC-010-0. These comments are valid independent of whether the four subject standards are combined into one or more Reliability Standards.

4.1. Applicability

4.1	Load-Serving Entity that operates a UVLS program
4.2	Transmission Owner that owns a UVLS program
4.3	Transmission Operator that operates a UVLS program
4.4	Distribution Provider that owns or operates a UVLS program

The SPCS believes that the applicability for this standard should be modified to include the entities responsible for designing the UVLS program, the entities that implement and own the UVLS program equipment, and the entities responsible for coordinating the UVLS program with other protection systems.

UVLS Program Design: The design of the UVLS program and assessment of its effectiveness requires modeling the UVLS program in various types of planning study simulations. These simulations model the response of the system to various operating conditions and system contingencies. Such studies are performed by the Planning Coordinator[5] and/or Transmission Planner. Requirements associated with design of the UVLS program should be assigned to either or both of these entities. If responsibility is assigned to both, it is necessary that the responsibilities of each are clearly defined, or that a requirement be included for the Planning Coordinator and Transmission Planner to agree upon and document the division of responsibility to ensure that the reliability objective of this standard is met.

UVLS Program Implementation: Requirements associated with ownership of the UVLS equipment should be assigned only to the Functional Model entities that own UVLS equipment. The owner is the entity with the direct responsibility and ability to ensure that the equipment it owns meets the requirements of the UVLS program design. Owners of UVLS equipment typically are Transmission Owners or Distribution Providers depending on where on the power system the equipment is installed.

UVLS Program Coordination: UVLS systems must be designed to be coordinated with all other protection systems, generator protection and controls systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems. Requirements must be placed on the owners of these protection and control systems to ensure coordination. To the extent that requirements for generator protection contained in other NERC Reliability Standards are not sufficient to ensure coordination, it would be appropriate to assign requirements to Generator Owners and/or Generator Operators and to include Generator Owners and/or Generator Operators in the Applicability section of this standard.

[5] The term Planning Coordinator in the NERC Glossary of Terms has the same meaning as the term Planning Authority. Within the NERC Functional Model, the term Planning Coordinator replaced Planning Authority in Version 3.

4.2. Requirements

R1. The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall periodically (at least every five years or as required by changes in system conditions) conduct and document an assessment of the effectiveness of the UVLS program. This assessment shall be conducted with the associated Transmission Planner(s) and Planning Authority(ies). Each Regional Reliability Organization shall develop, coordinate, and document an UFLS program, which shall include the following:

R1.1. This assessment shall include, but is not limited to:

R.1.1.1 Coordination of the UVLS programs with other protection and control systems in the Region and with other Regional Reliability Organizations, as appropriate. Requirements for coordination of UFLS programs within subregions, Regional Reliability Organization and, where appropriate, among Regional Reliability Organizations.

R1.1.2. Simulations that demonstrate that the UVLS programs performance is consistent with Reliability Standards TPL-001-0, TPL-002-0, TPL-003-0 and TPL-004-0.

R1.1.3. A review of the voltage set points and timing.

1. As noted in the Applicability discussion above, the responsibility for this requirement should be assigned to the Planning Coordinator and/or Transmission Planner.
2. In order to ensure consistent application and enforcement of this standard, and to avoid any concerns with fill-in-the-blank aspects of this requirement, a definitive list of requirements to be fulfilled through this assessment must be included in the standard.
3. Coordination of UVLS programs is a critical tenet of this standard. While UVLS programs have traditionally been applied on a local-area basis, this standard should consider the need for coordinating UVLS programs across Transmission Planner, Planning Coordinator, and Regional Entity boundaries within an interconnection.
4. As noted in the 2007 SPCTF report, the SPCS agrees with Order No. 693 that a coordinated approach to protection for generators, transmission lines and UFLS and UVLS is necessary, and must be included in the assessment required in this standard. As such, it is necessary to ensure that generator undervoltage relay set points and time delays are assessed with respect to UVLS program coordination. It is important that generator protections are not miscoordinated, which could result in tripping

generators or critical balance of plant auxiliaries before an UVLS can operate to improve system voltage within the affected area.

The issue of coordinating Protection Systems that respond to different quantities such as voltage, frequency, apparent impedance, and excitation, is not traditional relay-to-relay coordination. Coordination must be addressed in assessments of system performance to compare the response of protections responding to different quantities, and to account for time-based and location-based variations in these quantities. The SPCS recommends that the NERC Transmission Issues Subcommittee, with support from the SPCS and other groups as necessary, develop a paper on the subject of coordinating the design and operation of these Protection Systems to support the Project 2008-02 Standard Drafting Team. This paper should include consideration of modifications to the Modeling (MOD) Reliability Standards to ensure that data is provided and proper modeling is included as necessary to support coordination through assessments of system performance.

R2.	The Load-Serving Entity, Transmission Owner, Transmission Operator, and Distribution Provider that owns or operates a UVLS program shall provide documentation of its current UVLS program assessment to its Regional Reliability Organization and NERC on request (30 calendar days).

1. While the SPCS supports the need for entities to maintain a database documenting their UVLS programs (see assessment of PRC-020-1 and PRC-021-1) and to make this data available, this requirement is administrative and does not serve a specific reliability objective; as such it should be deleted from the standard. This requirement is covered in the ERO Rules of Procedures, Section 401.[6] The SPCS notes that this position differs from the May 2007 SPCTF assessment of this standard. The reason for this difference is related to similar decisions made in other standards subsequent to May 2007.
2. In the event this requirement is retained, the SPCS recommends replacement of "Regional Reliability Organization" with "Regional Entity."

[6] Data Access — All bulk power system owners, operators, and users shall provide to NERC and the applicable regional entity such information as is necessary to monitor compliance with the reliability standards. NERC and the applicable regional entity will define the data retention and reporting requirements in the reliability standards and compliance reporting procedures.

4.3. Measures

The measures should be modified consistent with the recommended modifications to the requirements above.

5. Assessment of PRC-020-1

Within this section of the report the SPCS offers comments specific to PRC-020-1. These comments are valid independent of whether the four subject standards are combined into one or more Reliability Standards.

5.1. Applicability

4.1	Regional Reliability Organization with entities that own or operate a UVLS program.

Responsibility for maintenance of a UVLS database should be assigned to a Functional Model entity that is a user, owner, or operator of the Bulk Electric System. The Planning Coordinator is the appropriate entity with the wide-area view and need for this data.

5.2. Requirements

R1. The Regional Reliability Organization shall establish, maintain and annually update a database for UVLS programs implemented by entities within the region to mitigate the risk of voltage collapse or voltage instability in the BES. This database shall include the following items:

- **R1.1.** Owner and operator of the UVLS program.
- **R1.2.** Size and location of customer load, or percent of connected load, to be interrupted.
- **R1.3.** Corresponding voltage set points and overall scheme clearing times.
- **R1.4.** Time delay from initiation to trip signal.
- **R1.5.** Breaker operating times.
- **R1.6.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.

1. As noted above, a Functional Model entity that is a user, owner, or operator of the Bulk Electric System, such as the Planning Coordinator should be assigned responsibility for this requirement.
2. The SPCS believes that requiring documentation of the owner of the UVLS program is sufficient in Requirement R1.1. There is no entity that operates the UVLS program, per se. Operation of the UVLS program is automatic. To the extent that a UVLS program requires arming and disarming, the hierarchy for implementing operating instructions already is defined and should not be duplicated in this standard.
3. Requirement R1.6 should be limited to data associated with the UVLS program. It should not duplicate requirements such as the UFLS program database. To the extent R1.6 is intended to document a list of schemes with which the UVLS must be coordinated, this should be stated clearly in the standard.
4. As noted in the May 2007 SPCTF report, the need for UVLS can be for local or Bulk Electric System reliability. Requirement R1 of PRC-020 should include a requirement for documentation that states whether the UVLS program is for local or Bulk Electric System reliability.

R2. The Regional Reliability Organization shall provide the information in its UVLS database to the Planning Authority, the Transmission Planner, or other Regional Reliability Organizations and to NERC within 30 calendar days of a request.

1. As noted above, a Functional Model entity that is a user, owner, or operator of the Bulk Electric System, such as the Planning Coordinator should be assigned responsibility for this requirement.
2. As noted above in the assessment of PRC-010-0, NERC and the Regional Entities already have the ability to obtain this data. However, it is important that this information is provided to entities that require this information to plan or operate the Bulk Electric System. As such, this requirement should be retained, and the entity responsible for maintaining this data should be required to provide this data to neighboring Reliability Coordinators, Planning Coordinators, Transmission Operators, and Transmission Planners within a specified time whenever the database is updated.

5.3. Measures

The measures should be modified consistent with the recommended modifications to the requirements above.

6. Assessment of PRC-021-1

Within this section of the report the SPCS offers comments specific to PRC-021-1. These comments are valid independent of whether the four subject standards are combined into one or more Reliability Standards.

6.1. Applicability

4.1	Transmission Owner that owns a UVLS program.
4.2	Distribution Provider that owns a UVLS program.

The responsibility for providing data for the UVLS database should be limited to the entities that implement the UVLS program and own the UVLS equipment. As discussed above under the Applicability for PRC-010-0, owners of UVLS programs typically are Transmission Owners or Distribution Providers depending on where on the power system the equipment is installed.

6.2. Requirements

R1. Each Transmission Owner and Distribution Provider that owns a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall annually update its UVLS data to support the Regional UVLS program database. The following data shall be provided to the Regional Reliability Organization for each installed UVLS system:

- **R1.1.** Size and location of customer load, or percent of connected load, to be interrupted.
- **R1.2.** Corresponding voltage set points and overall scheme clearing times.
- **R1.3.** Time delay from initiation to trip signal.
- **R1.4.** Breaker operating times.
- **R1.5.** Any other schemes that are part of or impact the UVLS programs such as related generation protection, islanding schemes, automatic load restoration schemes, UFLS and Special Protection Systems.

1. The requirement for providing data in PRC-021 should be conformed to the revised requirement for maintaining the database in PRC-020, as described above in the assessment of PRC-020-1. This includes the data to be provided and the entity to which the data is provided.

> **R2.** Each Transmission Owner and Distribution Provider that owns a UVLS program shall provide its UVLS program data to the Regional Reliability Organization within 30 calendar days of a request.

1. The Regional Reliability Organization should be replaced with the entity that maintains the database in PRC-020.
2. Data should be provided either on a regular schedule determined by the entity responsible for maintaining the database (e.g., annually), or whenever modifications are made to the UVLS program, or both.

6.3. Measures

The measures should be modified consistent with the recommended modifications to the requirements above.

7. Assessment of PRC-022-1

Within this section of the report the SPCS offers comments specific to PRC-022-1. These comments are valid independent of whether the four subject standards are combined into one or more Reliability Standards.

7.1. Applicability

4.1	Transmission Operator that operates a UVLS program
4.2	Distribution Provider that operates a UVLS program
4.3	Load-Serving Entity that owns a UVLS program

When considering post-event assessments, the SPCS believes it is necessary to differentiate between the process of verifying correct operation of UVLS equipment that should be assigned to the entities that own the equipment (typically Transmission Owners and Distribution Providers) and the process of assessing the effectiveness of the UVLS program

design, its coordination with other protection and control systems, and the potential need to modify the program design.

The SPCS believes this standard addresses the latter aspects of post-event assessments and recommends that the applicability for this standard should be assigned to the Planning Coordinator and/or Transmission Planner as the Functional Model entity that has the wide-area view and the capability to perform simulations of events involving potential for voltage collapse or voltage instability in the Bulk Electric System. As noted above for PRC-010-0, if responsibility is assigned to both entities it is necessary that the responsibilities of each are clearly defined or that a requirement be included for the Planning Coordinator and Transmission Planner to agree upon and document the division of responsibility to ensure that the reliability objective of this standard is met.

Other aspects of post-event assessments related to verifying correct operation of UVLS equipment should be included in PRC-004, Analysis and Mitigation of Transmission and Generation Protection System Misoperations, consistent with previous recommendations by the SPCS.[7]

7.2. Requirements

R1. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program to mitigate the risk of voltage collapse or voltage instability in the BES shall analyze and document all UVLS operations and Misoperations. The analysis shall include:

- **R1.1.** A description of the event including initiating conditions.
- **R1.2.** A review of the UVLS set points and tripping times.
- **R1.3.** A simulation of the event, if deemed appropriate by the Regional Reliability Organization. For most events, analysis of sequence of events may be sufficient and dynamic simulations may not be needed.
- **R1.4.** A summary of the findings.
- **R1.5.** For any Misoperation, a Corrective Action Plan to avoid future Misoperations of a similar nature.

1. As noted in the Applicability discussion above, the responsibility for this requirement should be assigned to the Planning Coordinator and/or Transmission Planner. The parts of Requirement R1 should be specific to the design of the program – e.g., R1.2

[7] NERC SPCS Assessment of Standards: PRC-003-1 – Regional Procedure for Analysis of Misoperations of Transmission and Generation Protection Systems; PRC--004-1 – Analysis and Mitigation of Transmission and Generation Protection Misoperations; PRC-016-1 – Special Protection System Misoperations.

should pertain to whether the UVLS setpoints and tripping times specified in the program design are appropriate and R1.5 should be deleted from this standard and specifically included in PRC-004.

2. This requirement should include a time-frame within which the assessment should be completed; e.g., 90 days after the event.
3. The Regional Reliability Organization should be removed from this requirement and specific guidance should be included as to when dynamic simulations are required.
4. To the extent it is necessary to obtain information from the UVLS program owner on actual operating performance of the UVLS equipment during the event, such as whether the relays operated at the correct setpoints and tripping times as specified in the UVLS program design, this should be included as a separate requirement assigned to the Transmission Owner and Distribution Provider. This requirement could specify that the Transmission Owner and Distribution Provider must verify that all UVLS relays operated in accordance with the specified program design when requested by the Planning Coordinator or Transmission Planner to support their post event-analysis.

R2. Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall provide documentation of its analysis of UVLS program performance to its Regional Reliability Organization within 90 calendar days of a request.

This requirement is administrative and does not serve a specific reliability objective: as such it should be deleted from the standard. This requirement is covered in the ERO Rules of Procedures, Section 401.[8]

7.3. Measures

The measures should be modified consistent with the recommended modifications to the requirements above.

[8] Data Access — All bulk power system owners, operators, and users shall provide to NERC and the applicable regional entity such information as is necessary to monitor compliance with the reliability standards. NERC and the applicable regional entity will define the data retention and reporting requirements in the reliability standards and compliance reporting procedures.

8. FERC Assessment of PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1

8.1. PRC-010-0

8.1.1. Commission Discussion and Determination

1509. We appreciate MEAG's feedback to our response in the NOPR. For the reasons discussed in the NOPR, ¶395 as well as our explanation above, the Commission approves Reliability Standard PRC-010-0 as mandatory and enforceable. In addition, the Commission directs the ERO to develop a modification to PRC-010-0 through the Reliability Standards development process that requires that an integrated and coordinated approach be included in all protection systems on the Bulk-Power System, including generators and transmission lines, generators' low voltage ride-through capabilities, and UFLS and UVLS programs.

8.1.2. SPCS Discussion

The SPCS agrees that UVLS systems must be designed to be coordinated with all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems. As noted above, the standard should require assessment of these protection systems with respect to UVLS program coordination in assessments of UVLS systems.

8.2. PRC-020-1

8.2.1. Commission Discussion and Determination

1555. APPA is correct that the reason for not approving or remanding this Reliability Standard is because it applies solely to the regional reliability organization, and not because it is a fill-in-the-blank standard. For this reason, the Commission will not approve or remand PRC-020-1.

8.2.2. SPCS Discussion

The SPCS recommendation that appropriate Functional Model entities are included in the standard in place of the Regional Reliability Organization is consistent with addressing the Commission's concern.

8.3. PRC-021-1

8.3.1. Commission Discussion and Determination

1560. For the reasons stated in the NOPR and above, the Commission approves PRC-021-1 as mandatory and enforceable. The referenced information will be provided pursuant to the data gathering provisions of the ERO's rules of procedure and the Commission's ability to obtain information pursuant to section 215 of the FPA and Part 39 of the Commission's regulations. As stated in the Common Issues section, a reference to an unapproved Reliability Standard may be considered in an enforcement action, but is not a reason to delay approving and enforcing this Reliability Standard.

8.3.2. SPCS Discussion

The SPCS believes the proposed modifications to these standards are consistent with the Commission's determination.

8.4. PRC-022-1

8.4.1. Commission Discussion and Determination

1564. FirstEnergy comments that Requirement R1.3 requires "a simulation of the event, if deemed appropriate by the RRO" and believes that the applicable entities such as transmission operators may not be able to simulate large system events. FirstEnergy suggests that Requirement R1.3 be revised to state that "a simulation of the event, if deemed appropriate, and assisted by the [regional reliability organization]."

1565. For the reasons discussed in the NOPR, the Commission concludes that Reliability Standard PRC-022-1 is just, reasonable, not unduly discriminatory or preferential, and in the public interest and approves it as mandatory and enforceable.

1566. The Commission directs the ERO to consider FirstEnergy's suggestion in the Reliability Standards development process.

8.4.2. SPCS Discussion

The SPCS believes the proposed modifications to these standards address the concerns raised by FirstEnergy and are consistent with the Commission's determination.

9. Conclusions and Recommendations

The SPCS recommends that the SAR for Project 2008-02 – Undervoltage Load Shedding, should be modified to include addressing the recommendations presented in this report. Project 2008-02 is not one of the 17 High Priority Projects Under Development (it is on the list of Additional Projects to be Initiated in Order of Priority). Since work on this project has not commenced, there is adequate time to amend the SAR for this project.

The SPCS recommendations related to the subject Reliability Standards focus on the following subjects:

- Combine PRC-010-0, PRC-020-1, PRC-021-1, and PRC-022-1 into one standard, and classify this new standard as a Transmission Planning (TPL) standard.
- Revise the Applicability to eliminate reference to Regional Reliability Organizations and specifically include Functional Model entities responsible for UVLS program design, implementation, and coordination.
- Include in the standard a definitive list of requirements that must be fulfilled in a valid UVLS program assessment to ensure consistent application and enforcement and to address any fill-in-the-blank concerns.
- Specifically include a requirement for assessment of coordination between UVLS programs and all other protection systems, generator protection and control systems (including generator low voltage ride-through performance), UFLS systems, and other UVLS systems.
- Clearly differentiate between the post-event process of validating the effectiveness of the UVLS program design, its coordination with other protection and control systems, and the potential need to modify the program design (activities that should be covered in this standard) and the process of verifying correct operation of UVLS equipment (which should be covered in PRC-004).

The SPCS notes that these recommendations are valid regardless of whether these four standards remain independent or are combined into one or more Reliability Standards.

In preparing this report SPCS discussed issues related to coordination of UVLS programs with transmission system protection, generator protection and control, UFLS programs, and other UVLS programs. The SPCS notes that the issue of coordinating Protection Systems that respond to different quantities such as voltage, frequency, apparent impedance, and excitation, is not traditional relay-to-relay coordination. Coordination must be addressed in

assessments of system performance to compare the response of protections responding to different quantities, and to account for time-based and location-based variations in these quantities.

The SPCS recommends that the NERC Transmission Issues Subcommittee, with support from the SPCS and other groups as necessary, develop a paper on the subject of coordinating the design and operation of these Protection Systems to support the Project 2008-02 Standard Drafting Team. This paper should include consideration of modifications to the Modeling (MOD) Reliability Standards to ensure that data is provided and proper modeling is included as necessary to support coordination through assessments of system performance.

APPENDIX A – System Protection and Control Subcommittee Roster

Jonathan Sykes
Chairman
Manager of System Protection
Pacific Gas and Electric Company

William J. Miller
Vice-Chairman
Principal Engineer
Exelon Corporation

John Mulhausen
RE – FRCC
Manager, Design and Standards
Florida Power & Light Co.

Richard Quest
RE – MRO
Engineer
Xcel Energy, Inc.

Daniel Jesberg
RE – MRO – Alternate
Engineer
Midwest Reliability Organization

Bryan J. Gwyn
RE – NPCC
Manager, Protection Standards and Support
National Grid USA

Jeff Iler
RE – RFC
Senior Engineer
American Electric Power

Philip B. Winston
RE – SERC
Chief Engineer, Protection and Control
Southern Company

Lynn Schroeder
RE – SPP
Manager – Substation Protection and Control
Westar Energy

Samuel Francis
RE – TRE
System Protection Specialist
Oncor Electric Delivery

Baj Agrawal
RE – WECC
Principal Engineer
Arizona Public Service Company

John L. Ciufo
Canada Provincial
Manager, P&C Strategies and Standards
Hydro One, Inc.

Sungsoo Kim
Canada Provincial
Section Manager – Protections and Technical Compliance
Ontario Power Generation Inc.

Michael J. McDonald
Investor-Owned Utility
Principal Engineer, System Protection
Ameren Services Company

Charles W. Rogers
Transmission Dependent Utility
Principal Engineer
Consumers Energy Co.

Joe T. Uchiyama
U.S. Federal
Senior Electrical Engineer
U.S. Bureau of Reclamation

Joshua L. Wooten
U.S. Federal
Manager of System Protection and Analysis
Tennessee Valley Authority

Daniel McNeely
U.S. Federal – Alternate
Engineer - System Protection and Analysis
Tennessee Valley Authority

Philip J. Tatro
NERC Staff Coordinator
Senior Performance and Analysis Engineer
NERC

Robert W. Cummings
NERC Staff
Director of System Analysis and Reliability Initiatives
NERC

Jonathan D. Gardell
Subject Matter Expert – NERC Consultant
Associate Consultant – Quanta Technology
President – Gardell Power Consulting, Inc.

Jim Ingleson
Subject Matter Expert
RLC Engineering

Eric A Udren
Subject Matter Expert
Executive Advisor
Quanta Technology

Tom Wiedman
Subject Matter Expert – NERC Consultant
President
Wiedman Power System Consulting, Ltd.

Murty Yalla
Subject Matter Expert
President
Beckwith Electric Company Inc.

W. O. (Bill) Kennedy
Subject Matter Expert
Principal
b7kennedy & Associates Inc.

Forrest Brock
Observer
Transmission Compliance Specialist
Western Farmers Electric Coop.

Mark Fidrych
Observer
Manager of Performance Reviews and Metrics
North American Transmission Forum

Joe Spencer
Observer
Manager of Planning and Engineering
SERC Reliability Corporation

David Angell
Correspondent
T&D Planning Engineering Leader
Idaho Power Company

Hasnain Ashrafi
Correspondent
Engineer
Sargent & Lundy

Deven Bhan
Correspondent
Electrical Engineer
Western Area Power Administration

Larry Brusseau
Correspondent
Standards Manager
Midwest Reliability Organization

Dac-Phuoc Bui
Correspondent
Engineer, System Protection
Hydro-Québec TransÉnergie

Sara Filling
Correspondent
Director, System Protection & Automation
Baltimore Gas & Electric Company

Jeanne Harshbarger
Correspondent
System Protection Engineer
Puget Sound Energy, Inc.

Fred Ipock
Correspondent
Senior Engineer - Substations & Protection
City Utilities of Springfield, Missouri

Lorissa Jones
Correspondent
Bonneville Power Administration

Mark Lauby
Correspondent
Director, Reliability Assessment and Performance Analysis
NERC

Lynn Oelker
Correspondent
EON-US

James Roberts
Correspondent
Transmission Planning
Tennessee Valley Authority

Mahmood Safi
Correspondent
Omaha Public Power District

Saurabh Sauksena
Correspondent
National Grid

Dean Sikes
Correspondent
Manager, Transmission Protection, Apparatus, and Metering
Cleco Power, LLC

Evan T. Sage
Correspondent
Consulting Engineer
Potomac Electric Power Company

Bob Stuart
Correspondent
Senior Director – Transmission
BrightSource Energy, Inc.

Guy Zito
Correspondent
Assistant Vice President of Standards
NPCC