

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 Transmission 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.

Application Guidelines

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: