

### Standard Development Roadmap

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This proposed standard is the Version 0 PRC-002 modified to include a translation of planning measure I.F.M3, which was not included in the approval Version 0 reliability standards because it required further work.

#### Development Steps Completed:

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7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

**Definitions of Terms Used in Standard**

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No new definitions are proposed for this standard.

**A. Introduction**

- 1. Title:** Verification of Generator Gross and Net Real Power Capability
- 2. Number:** MOD-024-1
- 3. Purpose:** To ensure accurate information on generator gross and net Real Power capability are available for steady-state models used to assess Bulk Electric System reliability.
- 4. Applicability**
  - 4.1.** Regional Reliability Organization.
  - 4.2.** Generation Owner.
- 5. Proposed Effective Dates:**

Requirements 1 and 2 -April 1, 2006.  
Requirement 3 - July 1, 2006.

**B. Requirements**

- R1.** The Regional Reliability Organization shall establish and maintain procedures to address verification of generator gross and net Real Power capability. These procedures shall include the following:
  - R1.1.** Generating unit exemption criteria including documentation of those units that are exempt from a portion or all of these procedures.
  - R1.2.** Criteria for reporting generating unit auxiliary loads.
  - R1.3.** Acceptable methods for model and data verification, including any applicable conditions under which the data should be verified. Such methods can include use of manufacturer data, commissioning data, performance tracking, and testing, etc.
  - R1.4.** Periodicity and schedule of model and data verification and reporting.
  - R1.5.** Information to be verified and reported:
    - R1.5.1.** Seasonal gross and net Real Power generating capabilities.
    - R1.5.2.** Real power requirements of auxiliary loads.
    - R1.5.3.** Method of verification, including date and conditions.
- R2.** The Regional Reliability Organization shall provide its generator gross and net Real Power capability verification and reporting procedures, and any changes to those procedures, to the Generator Owners, Generator Operators, Transmission Operators, Planning Authorities, and Transmission Planners affected by the procedure within 30 calendar days of the approval.
- R3.** The Generator Owner shall follow its Regional Reliability Organization's procedures for verifying and reporting its gross and net Real power generating capability per Requirement 1.

**C. Measures**

- M1.** The Regional Reliability Organization shall have available for inspection the procedures for the verification and reporting of generator gross and net Real Power capability in accordance with Requirement 1.
- M2.** The Regional Reliability Organization shall have evidence that its procedures, and any revisions to those procedures, for verification and reporting of generator gross and net Real Power capability were provided to affected Generator Owners, Generator Operators,

Transmission Operators, Planning Authorities, and Transmission Planners within 30 calendar days of approval.

- M3.** The Generator Owner shall have evidence it provided the Regional Reliability Organization and appropriate Transmission Planner and Planning Authority with verified information of its generator gross and net Real Power capability, consistent with that Regional Reliability Organization's procedures.

**D. Compliance**

**1. Compliance Monitoring Process**

**1.1. Compliance Monitoring Responsibility**

For Regional Reliability Organization: NERC

For Generator Owner: Regional Reliability Organization.

**1.2. Compliance Monitoring Period and Reset Timeframe**

One calendar year.

**1.3. Data Retention**

The Regional Reliability Organization shall retain both the current and previous versions of the procedures.

The Generator Owner shall retain information from the most current and prior verification.

The Compliance Monitor shall retain any audit data for three years.

**1.4. Additional Compliance Information**

The Regional Reliability Organization and Generator Owner shall each demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

**2. Levels of Non-Compliance for Regional Reliability Organization:**

- 2.1. Level 1:** Procedures did not meet one of the following requirements: 1.1, 1.2, 1.4, or 2.
- 2.2. Level 2:** Procedures did not meet two of the following requirements: 1.1, 1.2, 1.4 and 2.
- 2.3. Level 3:** Procedures did not meet Requirement 1.3.
- 2.4. Level 4:** Procedures did not meet Requirement 1.5.1, 1.5.2 or 1.5.3

**3. Levels of Non-Compliance for Generator Owner:**

- 3.1. Level 1:** Verified generator data was provided but but did not include all the information required in the method of verification required in Requirement 1.5.3.
- 3.2. Level 2:** Verified generator data was provided but did not include the Real Power requirements of all the auxiliary loads s required in Requirement 1.5.2..
- 3.3. Level 3:** Not applicable.
- 3.4. Level 4:** There shall be a level four non-compliance if either of the following conditions are present:

**Standard MOD-024-1 — Verification of Generator Gross and Net Real Power Capability**

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- 3.4.1 Verified generator data was not provided.
- 3.4.2 Verified generator data was provided but was missing one or more values for seasonal gross or net Real Power capability required in Requirement 1.5.1.

**E. Regional Differences**

None identified.

**Version History**

Version	Date	Action	Change Tracking

## Standard MOD-025-1 — Verification of Generator Gross and Net Reactive Power Capability

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No new definitions are proposed for this standard.

## Standard MOD-025-1 — Verification of Generator Gross and Net Reactive Power Capability

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### A. Introduction

1. **Title:** Verification of Generator Gross and Net Reactive Power Capability
2. **Number:** MOD-025-1
3. **Purpose:** To ensure accurate information on generator gross and net Reactive Power capability is available for steady-state models used to assess Bulk Electric System reliability.
4. **Applicability**
  - 4.1. Regional Reliability Organization.
  - 4.2. Generator Owner.
5. **Proposed Effective Dates:**

Requirements 1 and 2 – January 1, 2007

Requirement 3 – January 1, 2008

### B. Requirements

- R1. The Regional Reliability Organization shall establish and maintain procedures to address verification of generator gross and net Reactive Power capability. These procedures shall include the following:
  - R1.1. Generating unit exemption criteria including documentation of those units that are exempt from a portion or all of these procedures.
  - R1.2. Criteria for reporting generating unit auxiliary loads.
  - R1.3. Acceptable methods for model and data verification, including any applicable conditions under which the data should be verified. Such methods can include use of commissioning data, performance tracking, engineering analysis, testing, etc.
  - R1.4. Periodicity and schedule of model and data verification and reporting.
  - R1.5. Information to be reported:
    - R1.5.1. Verified maximum Reactive Power capability (both lagging and leading) at Seasonal gross and net Real Power generating capabilities as reported in accordance with Reliability Standard MOD-024 Requirement 1.5.1.
    - R1.5.2. Verified Reactive Power limitations, such as generator terminal voltage limitations and descriptions, shorted rotor turns, etc.
    - R1.5.3. Verified Reactive Power of auxiliary loads.
    - R1.5.4. Method of verification, including date and conditions.
- R2. The Regional Reliability Organization shall provide its generator gross and net Reactive Power capability verification and reporting procedures, and any changes to those procedures, to the Generator Owners, Generator Operators, Transmission Operators, Planning Authorities, and Transmission Planners affected by the procedure within 30 calendar days of the approval.
- R3. The Generator Owner shall follow its Regional Reliability Organization's procedures for verifying and reporting its gross and net Reactive Power capability per Requirement 1.

### C. Measures

## Standard MOD-025-1 — Verification of Generator Gross and Net Reactive Power Capability

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- M1.** The Regional Reliability Organization shall have available for inspection the procedures for the verification and reporting of generator gross and net Reactive Power capability in accordance with Requirement 1.
- M2.** The Regional Reliability Organization shall have evidence that its procedures, and any revisions to these procedures, for verification and reporting of generator gross and net Reactive Power capability were provided to affected Generator Owners, Generator Operators, Transmission Operators, Planning Authorities, and Transmission Planners within 30 calendar days of approval.
- M3.** The Generator Owner shall have evidence it provided the Regional Reliability Organization and appropriate Transmission Planner and Planning Authority with verification of its generator gross and net Reactive Power capability, consistent with the Regional Reliability Organization's procedures.

### D. Compliance

#### 1. Compliance Monitoring Process

##### 1.1. Compliance Monitoring Responsibility

For Regional Reliability Organization: NERC.

For Generator Owner: Regional Reliability Organization.

##### 1.2. Compliance Monitoring Period and Reset Timeframe

One calendar year.

##### 1.3. Data Retention

The Regional Reliability Organization shall retain both the current and previous version of the procedures.

The Generator Owner shall retain information from the most current and prior verification.

The Compliance Monitor shall retain any audit data for three years.

##### 1.4. Additional Compliance Information

The Regional Reliability Organization and Generator Owner shall each demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

#### 2. Levels of Non-Compliance for Regional Reliability Organization:

- 2.1. Level 1:** Procedures did not meet one of the following requirements: 1.1, 1.2, or 1.4.
- 2.2. Level 2:** Procedures did not meet two or three of the following requirements: 1.1, 1.2, or 1.4.
- 2.3. Level 3:** Procedures did not meet Requirement 1.3.
- 2.4. Level 4:** Procedures did not meet Requirement 1.5.1, 1.5.2, 1.5.3, or 1.5.4.

#### 3. Levels of Non-Compliance for Generator Owner:

- 3.1. Level 1:** Verified generator data was provided but did not include all details of the method of verification required in Requirement 1.5.4.

## Standard MOD-025-1 — Verification of Generator Gross and Net Reactive Power Capability

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- 3.2. **Level 2:** Verified generator data was provided but did not include Reactive Power for all the auxiliary loads as required in Requirement 1.5.3.
- 3.3. **Level 3:** Verification and description of Reactive Power limitations was provided but was did not include all the information required in Requirement 1.5.2.
- 3.4. **Level 4:** There shall be a level four non-compliance if either of the following conditions is present:
  - 3.4.1 Verified generator data was not provided.
  - 3.4.2 Verified generator data was provided but was missing one or more values for gross or net Reactive Power capability required in Requirement 1.5.1.

### E. Regional Differences

None identified.

### Version History

Version	Date	Action	Change Tracking

## Standard PRC-002-1 — Define Regional Disturbance Monitoring and Reporting Requirements

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**Disturbance Monitoring Equipment (DME):** Devices capable of recording system data pertaining to a Disturbance. Such equipment includes the following categories of recorders:

- Sequence of event recorders, which record equipment response to the event
- Fault recorders, which record actual waveform data replicating the system primary voltages and currents. This may include protective relays.
- Dynamic Disturbance recorders, which continuously record incidents that portray power system behavior during dynamic events such as low-frequency (0.1 Hz – 3 Hz) oscillations and abnormal frequency or voltage excursions

**Protection System:** Protective relays, associated communication systems, voltage and current sensing devices, power circuit breakers, station batteries and DC control circuitry.

## Standard PRC-002-1 — Define Regional Disturbance Monitoring and Reporting Requirements

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### A. Introduction

1. **Title:** Define Regional Disturbance Monitoring and Reporting Requirements
2. **Number:** PRC-002-1
3. **Purpose:** Ensure that Regional Reliability Organizations establish requirements for installation of Disturbance Monitoring Equipment and reporting of Disturbance data to facilitate analyses of events.
4. **Applicability**
  - 4.1. Regional Reliability Organization.
5. **Proposed Effective Date:** January 1, 2007.

### B. Requirements

- R1. The Regional Reliability Organization shall the following installation requirements for sequence of event recording equipment:
  - R1.1. Location and monitoring requirements, including the following:
    - R1.1.1. Criteria for equipment location (e.g. by voltage, geographic area, station size, etc.).
    - R1.1.2. Protection System devices to be monitored.
  - R1.2. Equipment characteristic requirements, including the following:
    - R1.2.1. Capability to record events with a resolution of one millisecond or better.
    - R1.2.2. Time synchronized to Coordinated Universal Time (UTC) within one millisecond or better. The time synchronism may be expressed in local time, as long as the local time zone used is clearly stated.
- R2. The Regional Reliability Organization shall establish the following installation requirements for Fault Recording Equipment:
  - R2.1. Location and monitoring requirements, including the following:
    - R2.1.1. Criteria for equipment location (e.g. by voltage, geographic area, station size, etc.).
    - R2.1.2. Elements to be monitored at each location
    - R2.1.3. Electrical quantities to be recorded for each monitored element shall be sufficient to determine the following:
      - R2.1.3.1. Three phase to neutral voltages
      - R2.1.3.2. Three phase currents and neutral currents
      - R2.1.3.3. Polarizing currents and voltages, if used
      - R2.1.3.4. Frequency
      - R2.1.3.5. Megawatts and megavars
  - R2.2. Equipment characteristic requirements, including the following:
    - R2.2.1. Recording duration requirements.
    - R2.2.2. Minimum sampling rate of 16 samples per cycle.

## Standard PRC-002-1 — Define Regional Disturbance Monitoring and Reporting Requirements

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- R2.2.3.** Time synchronized to UTC within four milliseconds. The time synchronism may be expressed in local time, as long as the local time zone used is clearly stated.
  - R2.2.4.** Event triggering requirements.
  - R2.2.5.** Data retention capabilities (e.g., length of time data is to be available for retrieval).
- R3.** The Regional Reliability Organization shall establish the following installation requirements for Dynamic Disturbance Recording Equipment:
  - R3.1.** Location and monitoring requirements including the following:
    - R3.1.1.** Criteria for equipment location giving consideration to the following:
      - Site(s) in or near major load centers
      - Site(s) in or near major generation clusters
      - Site(s) in or near major voltage sensitive areas
      - Site(s) on both sides of major transmission interfaces
      - A major transmission junction
      - Elements associated with Interconnection Reliability Operating Limits
      - Major EHV interconnections between control areas
      - Coordination with neighboring Regions within the interconnection
    - R3.1.2.** Elements and number of phrases to be monitored at each location.
    - R3.1.3.** Electrical quantities to be recorded for each monitored element shall be sufficient to determine the following:
      - R3.1.3.1.** Voltage, current and frequency
      - R3.1.3.2.** Megawatts and megavars
  - R3.2.** Equipment characteristic requirements, including the following:
    - R3.2.1.** Capability for continuous recording.
    - R3.2.2.** Time synchronized to UTC within 100 microseconds (2.2 degrees) or better. The time synchronism may be expressed in local time, as long as the local time zone used is clearly stated.
    - R3.2.3.** Data sampling rate of at least 1600 samples per second and recording rate of the RMS value of electrical quantities of at least 30 samples per second.
- R4.** The Regional Reliability Organization shall establish the following requirements for the storage and retention of the Disturbance data for specific system Disturbance events.
  - R4.1.** All DME data for identified events shall be archived for at least three years.
  - R4.2.** All Dynamic Disturbance Recorder data shall be retained for at least ten days.
- R5.** The Regional Reliability Organization shall establish requirements for facility owners to report Disturbance data recorded by their DME installations. The data reporting requirements shall include the following:

## Standard PRC-002-1 — Define Regional Disturbance Monitoring and Reporting Requirements

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- R5.1.** Criteria for events that require the collection of data from DMEs.
- R5.2.** List of entities that must be provided with recorded Disturbance data.
- R5.3.** Timetable for response to data request.
- R5.4.** Availability of recorded Disturbance data in COMTRADE format (in conformance with IEEE Std. C37.111-1997 or its successor standard).
- R5.5.** Naming of data files in conformance with the latest version of IEEE Recommended Practice for Naming Time Sequence Data Files (draft standard PC37.232).
- R5.6.** Data content requirements and guidelines.
- R6.** The Regional Reliability Organization shall establish requirements for DME maintenance and testing.
- R7.** The Regional Reliability Organization shall provide its requirements (and any revisions to those requirements) including those for DME installation; Disturbance data reporting; Disturbance data storage and retention; and DME maintenance and testing to the affected Transmission Owners and Generator Owners within 30 calendar days of approval of those requirements.
- R8.** The Regional Reliability Organization shall periodically (at least every five years) review, update and approve its Regional requirements for Disturbance monitoring and reporting..

### C. Measures

- M1.** The Regional Reliability Organization's requirements for the installation of Disturbance Monitoring Equipment shall address Requirements 1 through 3.
- M2.** The Regional Reliability Organization's requirements for storage and retention of Disturbance data include those elements identified in Requirement 4.
- M3.** The Regional Reliability Organization's Disturbance monitoring data reporting requirements include all elements identified in Requirement 5.
- M4.** The Regional Reliability Organization shall have requirements for the maintenance and testing of DME equipment as required in Requirement 6.
- M5.** The Regional Reliability Organization shall have evidence it provided its Regional Disturbance monitoring and reporting requirements as required in Requirement 7.
- M6.** The Regional Reliability Organization shall have evidence it conducted a review at least once every five years of its regional requirements for Disturbance monitoring and reporting.

### D. Compliance

#### 1. Compliance Monitoring Process

##### 1.1. Compliance Monitoring Responsibility

NERC.

##### 1.2. Compliance Monitoring Period and Reset Timeframe

One calendar year.

##### 1.3. Data Retention

The Regional Reliability Organization shall retain documentation of its DME requirements and any changes to it for three years.

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The Compliance Monitor will retain its audit data for three years.

### 1.4. Additional Compliance Information

The Regional Reliability Organization shall demonstrate compliance through providing its documentation of Disturbance Monitoring and Reporting requirements or self-certification as determined by the Compliance Monitor.

## 2. Levels of Non-Compliance

**2.1. Level 1:** There shall be a level one non-compliance if either of the following conditions exist:

**2.1.1** Disturbance reporting requirements were not specified as required in Requirements 5.1 through 5.5.

**2.1.2** DME maintenance and testing requirements were not specified.

**2.2. Level 2:** There shall be a level two non-compliance if any of the following conditions exist:

**2.2.1** Equipment characteristics were not specified for one or more types of DMEs

**2.2.2** Time synchronization requirements were not specified for one or more of the DMEs as required in Requirements 1.2.2, 2.2.3, and 3.2.2.

**2.2.3** Requirements do not provide criteria for equipment location or criteria for monitored elements or monitored quantities as required Requirements 1.1, 2.1 and 3.1.

**2.3. Level 3:** Disturbance data storage and retention requirements were not specified for one or more of the DMEs as required in Requirement 4.

**2.4. Level 3:** Disturbance monitoring and reporting requirements were not available or were not provided to Transmission Owners and Generator Owners.

## E. Regional Differences

None identified.

## Version History

Version	Date	Action	Change Tracking

# Standard PRC-003-1 — Regional Requirements for Analysis of Misoperations of Transmission and Generation Protection Systems

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### Misoperation:

## Standard PRC-003-1 — Regional Requirements for Analysis of Misoperations of Transmission and Generation Protection Systems

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- Any failure of a Protection System element to operate within the specified time when a fault or abnormal condition occurs within a zone of protection.
- Any operation for a fault not within a zone of protection (other than operation as backup protection for a fault in an adjacent zone that is not cleared within a specified time for the protection for that zone).
- Any operation when no fault or other abnormal condition has occurred.
- Any failure to properly reclose following a Protection System operation.

**Mitigation Plan:** A list of corrective actions and an associated timetable for implementation to remedy a specific problem.

**The following definition is provided here for reference but is introduced in PRC-002:**

**Protection System:** Protective relays, associated communication systems, voltage and current sensing devices, power circuit breakers, station batteries and DC control circuitry.

# Standard PRC-003-1 — Regional Requirements for Analysis of Misoperations of Transmission and Generation Protection Systems

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## A. Introduction

1. **Title:** Regional Procedure for Analysis of Misoperations of Transmission and Generation Protection Systems
2. **Number:** PRC-003-1
3. **Purpose:** To ensure all transmission and generation Protection System Misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated.
4. **Applicability**
  - 4.1. Regional Reliability Organization.
5. **Proposed Effective Date:** May 1, 2006.

## B. Requirements

- R1. Each Regional Reliability Organization shall establish, document and maintain its requirements for, review, analysis, reporting and mitigation of all transmission and generation Protection System Misoperations. These requirements shall include the following elements:
  - R1.1. The Protection Systems to be reviewed and analyzed for Misoperations (due to their potential impact on BES reliability).
  - R1.2. Data reporting requirements (periodicity and format) for Misoperations.
  - R1.3. Process for review, follow up, and documentation of Mitigation Plans for misoperations.
  - R1.4. Identification of the Regional Reliability Organization group responsible for the requirements and the process for approval of the requirements.
- R2. Each Regional Reliability Organization shall maintain and periodically update documentation of its requirements for review, analysis, reporting, and mitigation of transmission and generation Protection System Misoperations and shall distribute those requirements and any changes to those requirements, to the affected Transmission Owners, Distribution Providers that own a transmission Protection Systems, and Generator Owners within 30 calendar days of approval of those requirements.

## C. Measures

- M1. The Regional Reliability Organization shall have documented requirements for the review, analysis, reporting, and mitigation of transmission and generation Protection System Misoperations as defined in Requirement 1.
- M2. The Regional Reliability Organization shall have evidence it provided its requirements for the review, analysis, reporting and mitigation of transmission and generation Protection System Misoperations to the affected Transmission Owners, Distribution Providers that own transmission Protection Systems, and Generator Owners as defined in Requirement 2.

## D. Compliance

1. **Compliance Monitoring Process**
  - 1.1. **Compliance Monitoring Responsibility**

NERC
  - 1.2. **Compliance Monitoring Period and Reset Timeframe**

One calendar year.

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## 1.3. Data Retention

The Regional Reliability Organization shall retain documentation of its requirements for analysis of transmission and generation Protection System Misoperations and any changes to those requirements for three years.

The Compliance Monitor shall retain any audit data for three years.

## 1.4. Additional Compliance Information

The Regional Reliability Organization shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

## 2. Levels of Non-Compliance

**2.1. Level 1:** Requirements were not reviewed and updated within the review cycle period as required in Requirement 2.

**2.2. Level 2:** Requirements did not include one of the elements defined in Requirements 1.1 through 1.4.

**2.3. Level 3:** Requirements did not include two or more of the elements defined in Requirements 1.1 through 1.4.

**2.4. Level 4:** There shall be a level four non-compliance if either of the following conditions exist:

**2.4.1** No evidence of Requirements

**2.4.2** Requirements were not provided to the affected Transmission Owners, Distribution Providers that own transmission Protection Systems, and Generator Owners as defined in Requirement 2.

## E. Regional Differences

None identified.

## Version History

Version	Date	Action	Change Tracking

# Standard PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations

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## Standard Development Roadmap

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

This proposed standard is the Version 0 PRC-002 modified to include a translation of planning measure I.F.M3, which was not included in the approval Version 0 reliability standards because it required further work.

### Development Steps Completed:

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6. Post standards and implementation plan for 30-day review by Board.	January 6 – February 6, 2006
7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

**Definitions of Terms Used in Standard**

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No new definitions are proposed for this standard.

**The following definitions are provided here for reference but are introduced in other standards:**

- Misoperation is 1<sup>st</sup> defined in PRC-003
- Mitigation Plan is 1<sup>st</sup> defined in PRC-003
- Protection System is 1<sup>st</sup> defined in PRC-002

**Misoperation:**

- Any failure of a Protection System element to operate within the specified time when a fault or abnormal condition occurs within a zone of protection.
- Any operation for a fault not within a zone of protection (other than operation as backup protection for a fault in an adjacent zone that is not cleared within a specified time for the protection for that zone).
- Any operation when no fault or other abnormal condition has occurred.
- Any failure to properly reclose following a Protection System operation.

**Mitigation Plan:** A list of corrective actions and an associated timetable for implementation to remedy a specific problem.

**Protection System:** Protective relays, associated communication systems, voltage and current sensing devices, power circuit breakers, station batteries and DC control circuitry.

## **Standard PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations**

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### **A. Introduction**

- 1. Title:** Analysis and Mitigation of Transmission and Generation Protection System Misoperations
- 2. Number:** PRC-004-1
- 3. Purpose:** Ensure all transmission and generation Protection System misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated.
- 4. Applicability**
  - 4.1.** Transmission Owner
  - 4.2.** Distribution Provider that owns a transmission Protection System
  - 4.3.** Generator Owner
- 5. Proposed Effective Date:** August 1, 2006.

### **B. Requirements**

- R1.** The Transmission Owner and any Distribution Provider that owns a transmission Protection System shall each analyze its transmission Protection System Misoperations and shall develop and implement a Mitigation Plan to avoid future Misoperations of a similar nature.
- R2.** The Generator Owner shall analyze its generator Protection System Misoperations, and shall develop and implement a Mitigation Plan to avoid future Misoperations of a similar nature.
- R3.** The Transmission Owner, any Distribution Provider that owns a transmission Protection System, and the Generator Owner shall each provide to its Regional Reliability Organization, documentation of its Misoperations analyses and Mitigation Plans according to the Regional Reliability Organization's procedures developed for Reliability Standard PRC-003 Requirement R1.

### **C. Measures**

- M1.** The Transmission Owner, and any Distribution Provider that owns a transmission Protection System shall each have evidence it analyzed its Protection System Misoperations and developed and implemented its Mitigation Plan to avoid future Misoperations of a similar nature.
- M2.** The Generator Owner shall have evidence it analyzed its Protection System Misoperations and developed and implemented its Mitigation Plan to avoid future Misoperations of a similar nature.
- M3.** Each Transmission Owner, and any Distribution Provider that owns a transmission Protection System, and each Generator Owner shall have evidence it provided documentation of its Protection System Misoperations, analyses and Mitigation Plans according to the Regional Reliability Organization procedures developed for Reliability Standard PRC-003 Requirement 1.

### **D. Compliance**

- 1. Compliance Monitoring Process**
  - 1.1. Compliance Monitoring Responsibility**

Regional Reliability Organization.
  - 1.2. Compliance Monitoring Period and Reset Timeframe**

## Standard PRC-004-1 — Analysis and Mitigation of Transmission and Generation Protection System Misoperations

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One calendar year.

### 1.3. Data Retention

The Transmission Owner, Generator Owner, and Distribution Provider that owns a transmission or generation Protection System shall retain data on Protection System Misoperations and accompanying Mitigation Plans until the Mitigation Plan has been executed or for 12 months, whichever is later.

The Compliance Monitor shall retain any audit data for three years

### 1.4. Additional Compliance Information

The Transmission Owner, and any Distribution Provider that owns a transmission Protection System and the Generator Owner shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

## 2. Levels of Non-Compliance for Transmission Owners and Distribution Providers that own a Transmission Protection System:

**2.1. Level 1:** Documentation of Misoperations is complete according to Requirement 1 but documentation of Mitigation Plans is incomplete.

**2.2. Level 2:** Documentation of Misoperations is incomplete according to R1 and documentation of Mitigation Plans is incomplete.

**2.3. Level 3:** Documentation of Misoperations is incomplete according to R1 and there are no associated Mitigation Plans.

**2.4. Level 4:** Misoperations have not been analyzed and documentation has not been provided to the Regional Reliability Organization according to Requirement 3.

## 3. Levels of Non-Compliance for Generator Owners

**3.1. Level 1:** Documentation of Misoperations is complete according to Requirement 2, but documentation of Mitigation Plans is incomplete.

**3.2. Level 2:** Documentation of Misoperations is incomplete according to R2 and documentation of Mitigation Plans is incomplete.

**3.3. Level 3:** Documentation of Misoperations is incomplete according to R2 and there are no associated Mitigation Plans.

**3.4. Level 4:** Misoperations have not been analyzed and documentation has not been provided to the Regional Reliability Organization according to Requirement 3.

## E. Regional Differences

None identified.

### Version History

Version	Date	Action	Change Tracking

**Standard PRC-004-1 — Analysis and Mitigation of Transmission and Generation  
Protection System Misoperations**

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## Standard PRC-005-1 — Transmission and Generation Protection System Maintenance and Testing

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### Standard Development Roadmap

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6. Post standards and implementation plan for 30-day review by Board.	January 6 – February 6, 2006
7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

## Standard PRC-005-1 — Transmission and Generation Protection System Maintenance and Testing

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### Definitions of Terms Used in Standard

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No new definitions are proposed for this standard.

**The following definition is provided here for reference but is introduced in PRC-002:**

**Protection System:** Protective relays, associated communication systems, voltage and current sensing devices, power circuit breakers, station batteries and DC control circuitry.

## Standard PRC-005-1 — Transmission and Generation Protection System Maintenance and Testing

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### A. Introduction

1. **Title:** **Transmission and Generation Protection System Maintenance and Testing**
2. **Number:** PRC-005-1
3. **Purpose:** To ensure all transmission and generation Protection Systems affecting the reliability of the Bulk Electric System (BES) are maintained and tested.
4. **Applicability**
  - 4.1. Transmission Owner.
  - 4.2. Generator Owner.
  - 4.3. Distribution Provider that owns a transmission Protection System.
5. **Proposed Effective Date:** May 1, 2006.

### B. Requirements

- R1. Each Transmission Owner, Generator Owner and Distribution Provider that owns a transmission or generation Protection System shall have a Protection System maintenance and testing program for Protection Systems that affect the reliability of the BES. The program shall include:
  - R1.1. Maintenance and testing intervals and their basis.
  - R1.2. Summary of maintenance and testing procedures.
- R2. Each Transmission Owner, Generator Owner and any Distribution Provider that owns a transmission or generation Protection System shall provide documentation of its Protection System maintenance and testing program and the implementation of that program to its Regional Reliability Organization on request (within 30 calendar days). The documentation of the program implementation shall include:
  - R2.1. Evidence Protection System devices were maintained and tested within the defined intervals.
  - R2.2. Date each Protection System device was last tested/maintained.

### C. Measures

- M1. Each Transmission Owner, Generator Owner and Distribution Provider that owns a transmission or generation protection system that affects the reliability of the BES shall have an associated Protection System maintenance and testing program as defined in Requirement 1.
- M2. Each Transmission Owner, Generator Owner and Distribution Provider that owns a transmission or generation protection system that affects the reliability of the BES shall have evidence it provided documentation of its associated Protection System maintenance and testing program and the implementation of its program as defined in Requirement 2.

### D. Compliance

1. **Compliance Monitoring Process**
  - 1.1. **Compliance Monitoring Responsibility**

Regional Reliability Organization.
  - 1.2. **Compliance Monitoring Period and Reset Timeframe**

## Standard PRC-005-1 — Transmission and Generation Protection System Maintenance and Testing

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One calendar year.

### 1.3. Data Retention

The Transmission Owner, Generator Owner and Distribution Provider that owns a transmission or generation Protection System shall retain evidence of the implementation of its Protection System maintenance and testing program for three years.

The Compliance Monitor shall retain any audit data for three years.

### 1.4. Additional Compliance Information

The Transmission Owner, Generator Owner and Distribution Provider that owns a transmission or generation Protection System shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

## 2. Levels of Non-Compliance

**2.1. Level 1:** Documentation of the maintenance and testing program provided was incomplete as required in Requirement 1, but records indicate maintenance and testing did occur within the identified intervals for the portions of the program that were documented.

**2.2. Level 2:** Documentation of the maintenance and testing program provided was complete as required in R1, but records indicate that maintenance and testing did not occur within the defined intervals.

**2.3. Level 3:** Documentation of the maintenance and testing program provided was incomplete, and records indicate implementation of the documented portions of the maintenance and testing program did not occur within the identified intervals.

**2.4. Level 4:** Documentation of the maintenance and testing program, or its implementation, was not provided.

## E. Regional Differences

None identified.

## Version History

Version	Date	Action	Change Tracking

## Standard PRC-018-1 — Disturbance Monitoring Equipment Installation and Data Reporting

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### Standard Development Roadmap

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This proposed standard is the Version 0 PRC-002 modified to include a translation of planning measure I.F.M3, which was not included in the approval Version 0 reliability standards because it required further work.

#### Development Steps Completed:

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#### Description of Current Draft:

This is a second draft of the standard to be posted for industry comment from September 1 – October 15, 2005.

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7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

**Definitions of Terms Used in Standard**

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No new definitions are proposed for this standard.

**The following definitions are provided here for reference but are introduced in PRC-002:**

**Disturbance Monitoring Equipment (DME):** Devices capable of recording system data pertaining to a Disturbance. Such equipment includes the following categories of recorders:

- Sequence of event recorders, which record equipment response to the event
- Fault recorders, which record actual waveform data replicating the system primary voltages and currents. This may include protective relays.
- Dynamic Disturbance recorders, which continuously record incidents that portray power system behavior during dynamic events such as low-frequency (0.1 Hz – 3 Hz) oscillations and abnormal frequency or voltage excursions

**Protection System:** Protective relays, associated communication systems, voltage and current sensing devices, power circuit breakers, station batteries and DC control circuitry.

## Standard PRC-018-1 — Disturbance Monitoring Equipment Installation and Data Reporting

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### A. Introduction

1. **Title:** **Disturbance Monitoring Equipment Installation and Data Reporting**
2. **Number:** PRC-018-1
3. **Purpose:** Ensure that Disturbance Monitoring Equipment (DME) is installed and that Disturbance data is reported in accordance with regional requirements to facilitate analyses of events.
4. **Applicability**
  - 4.1. Transmission Owner.
  - 4.2. Generator Owner.
5. **Proposed Effective Dates:**
  - 100% compliant with Requirements 2 through Requirement 5 by October 1, 2007 for already installed DME
  - 25% compliant with Requirement 1 by April 1, 2008
  - 50% compliant with Requirement 1 by April 1, 2009
  - 75% compliant with Requirement 1 by April 1, 2010
  - 100% compliant with Requirement 1 by April 1, 2011

### B. Requirements

- R1. The Transmission Owner and Generator Owner shall install DME in accordance with the Regional Reliability Organization installation requirements (PRC-002 Requirements 1 through 3).
- R2. The Transmission Owner and Generator Owner shall maintain, and report to the Regional Reliability Organization on request, the following data on its installed DME:
  - R2.1. Type of DME ((sequence of event recorder, fault recorder, or dynamic disturbance recorder).
  - R2.2. Make and model of equipment.
  - R2.3. Installation location.
  - R2.4. Resolution of time synchronization.
  - R2.5. Monitored Elements.
  - R2.6. Monitored Protection System Devices.
  - R2.7. Monitored electrical quantities.
  - R2.8. Operational status.
  - R2.9. Date last tested.
- R3. The Transmission Owner and Generator Owner shall each store and retain its Disturbance data (recorded by DMEs) in accordance with its Regional requirements (Reliability Standard PRC-002 Requirement 4).

## Standard PRC-018-1 — Disturbance Monitoring Equipment Installation and Data Reporting

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- R4.** The Transmission Owner and Generator Owner shall each provide Disturbance data (recorded by DMEs) in accordance with the Regional requirements (Reliability Standard PRC-002 Requirement 5).
- R5.** The Transmission Owner and Generator Owner shall have a DME maintenance and testing program in accordance with the Regional requirements (PRC-002 Requirement 6).

### C. Measures

- M1.** The Transmission Owner and Generator Owner shall each have evidence that its DME is installed in accordance with its associated Regional Reliability Organization's requirements.
- M2.** The Transmission Owner and Generator Owner shall each maintain the data listed in Requirements 2.1 through 2.9 on all its installed DME, and shall have evidence it provided this data to its Regional Reliability Organization within 30 calendar days of a request.
- M3.** The Transmission Owner and Generator Owner shall each have evidence it stored and retained its recorded Disturbance data in accordance with its Regional Reliability Organization's requirements.
- M4.** The Transmission Owner and Generator Owner shall each have evidence it provided recorded Disturbance data to all entities in accordance with its associated Regional Reliability Organization's requirements.
- M5.** The Transmission Owner and Generator Owner shall each have evidence its DME maintenance and testing program is in accordance with its associated Regional Reliability Organization's requirements.

### D. Compliance

#### 1. Compliance Monitoring Process

##### 1.1. Compliance Monitoring Responsibility

Regional Reliability Organization.

##### 1.2. Compliance Monitoring Period and Reset Timeframe

One calendar year.

##### 1.3. Data Retention

The Transmission Owner and Generator Owner shall retain any changes to the data on DME installations and any Disturbance data provided to the Regional Reliability Organization for three years.

The Compliance Monitor shall retain any audit data for three years.

##### 1.4. Additional Compliance Information

The Transmission Owner and Generator Owner shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

#### 2. Levels of Non-Compliance

- 2.1. Level 1:** There shall be a level one non-compliance if either of the following conditions is present:

## Standard PRC-018-1 — Disturbance Monitoring Equipment Installation and Data Reporting

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- 2.1.1** DME that meets all Regional installation requirements (in accordance with Requirement 1) were installed at 75% or more but not all of the locations.
    - 2.1.2** Recorded Disturbance data that meets all Regional data requirements (in accordance with Requirement 3) was provided for 75% or more but not all of the locations.
  - 2.2. Level 2:** There shall be a level two non-compliance if either of the following conditions is present:
    - 2.2.1** DME that meets all Regional installation requirements (in accordance with R1) were installed at 50% or more but less than 75% of the locations.
    - 2.2.2** Recorded Disturbance data that meets all Regional data requirements (in accordance with R3) was provided for 50% or more but less than 75% of the locations.
  - 2.3. Level 3:** There shall be a level three non-compliance if either of the following conditions is present:
    - 2.3.1** DME that meets all Regional installation requirements (in accordance with R1) were installed at 25% or more but less than 50% of the locations.
    - 2.3.2** Recorded Disturbance data that meets all Regional data requirements (in accordance with R3) was provided for 25% or more but less than 50% of the locations.
  - 2.4. Level 4:** There shall be a level four non-compliance if either of the following conditions is present:
    - 2.4.1** DME that meets all Regional installation requirements (in accordance with R1) were installed at less than 25% of the locations.
    - 2.4.2** Recorded Disturbance data that meets all Regional data requirements (in accordance with R3) was provided for less than 25% of the locations.

### E. Regional Differences

None identified.

### Version History

Version	Date	Action	Change Tracking

## Standard PRC-019-1 — Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection

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### Standard Development Roadmap

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## Standard PRC-019-1 — Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection

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### A. Introduction

1. **Title:** Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection
2. **Number:** PRC-019-1
3. **Purpose:** Ensure the generator capability curve is consistent with the actual generator capability and ensure generator voltage regulator controls and limit functions are coordinated with the generator's capabilities and protective relays.
4. **Applicability**
  - 4.1. Regional Reliability Organization.
  - 4.2. Generator Owner.
5. **Proposed Effective Dates:**
  - January 1, 2007 for Requirement 1
  - January 1, 2008 – 1<sup>st</sup> 20% compliant with Requirement 2, Requirement 3
  - January 1, 2009 – 2<sup>nd</sup> 20% compliant with R2, R3
  - January 1, 2010 – 3<sup>rd</sup> 20% compliant with R2, R3
  - January 1, 2011 – 4<sup>th</sup> 20% compliant with R2, R3
  - January 1, 2012 – 5<sup>th</sup> 20% compliant with R2, R3

### B. Requirements

- R1.** The Regional Reliability Organization shall establish and maintain criteria for exemptions to any of the Generator Owner requirements in Requirement 2.
- R2.** Unless exempted by the Regional Reliability Organization in accordance with Requirement 1, the Generator Owner shall provide the Regional Reliability Organization and the Transmission Operator with the following information:
  - R2.1.** Plots, or data that could be plotted for the following:
    - R2.1.1.** Generator capability curve, including specification of nominal voltage, ambient air or cooling temperature, or hydrogen pressure.
    - R2.1.2.** Steady state over-excitation limiter and under-excitation limiter control characteristics.
    - R2.1.3.** MW limit of the prime mover.
    - R2.1.4.** Any other limit that could restrict the megawatt or megavar capability (e.g., generator step-up transformer MVA rating, generator rotor shorted turn, etc.).
    - R2.1.5.** Loss of excitation / field protective relay characteristics.
    - R2.1.6.** Volts-per-hertz protection settings including volts-per-hertz limiters in the automatic voltage regulator.
- R3.** The Generator Owner shall provide the information in Requirements 2.1 through 2.1.6 to the Regional Reliability Organization and the Transmission Operator:
  - R3.1.** Within 30 calendar days of the date the unit is connected to the electric system.

## Standard PRC-019-1 — Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection

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- R3.2.** Within 30 calendar days of the date that any of the information in R2.1 through R2.1.6 changes.
- R3.3.** At least once every five years.
- R3.4.** Within 30 calendar days of a request from the Transmission Operator or Regional Reliability Organization.

### C. Measures

- M1.** The Regional Reliability Organization shall, within 30 calendar days of a request, provide to Generator Owners its exemption criteria defined in accordance with Requirement 1.
- M2.** The Generator Owner shall have evidence it provided the Transmission Operator and Regional Reliability Organization with the information identified in Requirements 2.1 through 2.1.6, in accordance with Requirement 3.

### D. Compliance

#### 1. Compliance Monitoring Process

##### 1.1. Compliance Monitoring Responsibility

NERC for the Regional Reliability Organization.

Regional Reliability Organization for Generator Owners.

##### 1.2. Compliance Monitoring Period and Reset Timeframe

The compliance reset period is one calendar year.

##### 1.3. Data Retention

The Generator Owner shall retain all current information needed to show coordination. The Compliance Monitor shall retain any audit data for three years.

##### 1.4. Additional Compliance Information

The Regional Reliability Organization and Generator Owner shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

#### 2. Levels of Non-Compliance

- 2.1. Level 1:** The Regional Reliability Organization did not provide the exemption criteria in accordance with Requirement 1.
- 2.2. Level 2:** The Generator Owner information on coordination of the generator voltage regulator controls and limit functions does not address one of the requirements identified in accordance with Requirements 2.1.1 through 2.1.6.
- 2.3. Level 3:** Not applicable.
- 2.4. Level 4:** The Generator Owner information on coordination of the generator voltage regulator controls and limit functions does not address two or more of the requirements identified in accordance with Requirements 2.1.1 through 2.1.6.

### E. Regional Differences

None identified.

**Standard PRC-019-1 — Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection**

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**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>

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No new definitions are proposed for this standard.

**A. Introduction**

1. **Title:** Under-Voltage Load Shedding Program Database
2. **Number:** PRC-020-1
3. **Purpose:** Ensure that a Regional database is maintained for Under-Voltage Load Shedding (UVLS) programs implemented by entities within the Region to mitigate the risk of voltage collapse or voltage instability in the Bulk Electric System (BES). Ensure the UVLS database is available for Regional studies and for dynamic studies and simulations of the BES.
4. **Applicability**
  - 4.1. Regional Reliability Organization with entities that own or operate a UVLS program.
5. **Proposed Effective Date:** May 1, 2006.

**B. 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 sufficient information to model the UVLS program in dynamic simulations of the interconnected transmission systems and, shall include the following items:
  - R1.1. Owner and operator of the UVLS program.
  - R1.2. Implementation Data:
    - R1.2.1. Size and location of customer load, or percent of connected load, to be interrupted.
    - R1.2.2. Corresponding voltage set points and overall scheme clearing times.
    - R1.2.3. Related generation protection.
    - R1.2.4. Islanding schemes.
    - R1.2.5. Automatic load restoration schemes.
  - R1.3. Any other schemes that are part of or impact the UVLS programs.
- 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.

**C. Measures**

- M1. The Regional Reliability Organization shall have evidence that it established and annually updated its UVLS database to include all elements in Requirements 1.1 through 1.3.
- M2. The Regional Reliability Organization shall have evidence that it provided the information in its UVLS database to the requesting entities and to NERC in accordance with Requirement 2.

**D. Compliance**

1. **Compliance Monitoring Process**
  - 1.1. **Compliance Monitoring Responsibility**

NERC
  - 1.2. **Compliance Monitoring Period and Reset Timeframe**

One calendar year.

**1.3. Data Retention**

The Regional Reliability Organization shall retain the current and prior annual updated database. The Compliance Monitor shall retain all audit data for three years.

**1.4. Additional Compliance Information**

The Regional Reliability Organization shall demonstrate compliance through self certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

**2. Levels of Non-Compliance**

**2.1. Level 1:** Did not update its UVLS database annually.

**2.2. Level 2:** UVLS program database information provided did not include all of the items identified in Requirements 1.1 through 1.3.

**2.3. Level 3:** Not applicable.

**2.4. Level 4:** Did not provide information from its UVLS program database.

**E. Regional Differences**

None identified.

**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>

**Standard Development Roadmap**

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

This proposed standard is the Version 0 PRC-002 modified to include a translation of planning measure I.F.M3, which was not included in the approval Version 0 reliability standards because it required further work.

**Development Steps Completed:**

1. A SAR was posted from December 2, 2004, through January 7, 2005.
2. The SAC appointed a standard drafting team on January 13, 2005.
3. The drafting team posted its response to SAR comments and all other historical comments on April 19, 2005.
4. The drafting team posted Draft 1 of the standard on April 21, 2005.

**Description of Current Draft:**

This is a second draft of the standard to be posted for industry comment from September 1 – October 15, 2005.

**Future Development Plan:**

<b>Anticipated Actions</b>	<b>Anticipated Date</b>
1. Review comments from industry posting; post consideration of comments.	October 15 - November 1, 2005
2. Post standards and implementation plan for 30-day pre-ballot review.	November 1 - 30, 2005
3. Conduct 1 <sup>st</sup> ballot.	December 1 -10 2005
4. Consider comments submitted with 1 <sup>st</sup> ballot; post consideration of comments	December 12- 23, 2005
5. Conduct 2 <sup>nd</sup> ballot.	December 26 – January 6
6. Post standards and implementation plan for 30-day review by Board.	January 6 – February 6, 2006
7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

**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.*

No new definitions are proposed for this standard.

**A. Introduction**

1. **Title:** Under-Voltage Load Shedding Program Data
2. **Number:** PRC-021-1
3. **Purpose:** Ensure data is provided to support the Regional database maintained for Under-Voltage Load Shedding (UVLS) programs that were implemented to mitigate the risk of voltage collapse or voltage instability in the Bulk Electric System.
4. **Applicability**
  - 4.1. Transmission Owner that owns a UVLS program.
  - 4.2. Distribution Provider that owns a UVLS program.
5. **Proposed Effective Date:** August 1, 2006

**B. Requirements**

- R1. Each Transmission Owner and Distribution Provider that owns a UVLS program shall provide, and annually update, its UVLS implementation data to support the Regional UVLS program database. The following implementation 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. Related generation protection.
  - R1.6. Islanding schemes.
  - R1.7. Automatic load restoration schemes.
  - R1.8. Any other schemes that are part of or impact the UVLS programs.
- 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.

**C. Measures**

- M1. Each Transmission Owner and Distribution Provider that owns a UVLS program shall have documentation of its UVLS program that shows an annual update and includes all items specified in Requirements 1.1 through 1.8.
- M2. Each Transmission Owner and Distribution Provider that owns a UVLS program shall have evidence it provided the Regional Reliability Organization with its UVLS program data within 30 calendar days of a request.

**D. Compliance**

1. **Compliance Monitoring Process**
  - 1.1. **Compliance Monitoring Responsibility**

Regional Reliability Organization.
  - 1.2. **Compliance Monitoring Period and Reset Timeframe**

One calendar year.

**1.3. Data Retention**

Each Transmission Owner and Distribution Provider that owns a UVLS program shall retain data for two years.

The Compliance Monitor shall retain all audit data for three years.

**1.4. Additional Compliance Information**

Transmission Owner and Distribution Provider shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

**2. Levels of Non-Compliance**

**2.1. Level 1:** Did not update its UVLS program data annually.

**2.2. Level 2:** UVLS program data provided did not address one of the items identified in Requirements 1.1 through 1.8.

**2.3. Level 3:** UVLS program data provided did not address two or more of the items identified in R1.1 through R1.8.

**2.4. Level 4:** Did not provide any UVLS program data.

**E. Regional Differences**

None identified.

**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>

**Standard Development Roadmap**

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This proposed standard is the Version 0 PRC-002 modified to include a translation of planning measure I.F.M3, which was not included in the approval Version 0 reliability standards because it required further work.

**Development Steps Completed:**

1. A SAR was posted from December 2, 2004, through January 7, 2005.
2. The SAC appointed a standard drafting team on January 13, 2005.
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**Description of Current Draft:**

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<b>Anticipated Actions</b>	<b>Anticipated Date</b>
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5. Conduct 2 <sup>nd</sup> ballot.	December 26 – January 6
6. Post standards and implementation plan for 30-day review by Board.	January 6 – February 6, 2006
7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

**Definitions of Terms Used in Standard**

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No new definitions are proposed for this standard.

**A. Introduction**

- 1. Title: Under-Voltage Load Shedding Program Performance**
- 2. Number:** PRC-022-1
- 3. Purpose:** Ensure that Under Voltage Load Shedding (UVLS) programs perform as intended to mitigate the risk of voltage collapse or voltage instability in the Bulk Electric System.
- 4. 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 operates a UVLS program.
- 5. Proposed Effective Date:** May 1, 2006

**B. Requirements**

- R1.** Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program 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 (trips) may be sufficient and dynamic simulations may not be needed.
  - R1.4.** A summary of the findings.
  - R1.5.** For any Misoperation, a Mitigation plan to avoid future Misoperations of a similar nature.
- 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.

**C. Measures**

- M1.** Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall have documentation of its UVLS operations and Misoperations in accordance with Requirements 1.1 through 1.5.
- M2.** Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall have evidence that it provided documentation of its analysis of UVLS program performance within 90 calendar days of a request by the Regional Reliability Organization.

**D. Compliance**

- 1. Compliance Monitoring Process**
  - 1.1. Compliance Monitoring Responsibility**

Regional Reliability Organization.
  - 1.2. Compliance Monitoring Period and Reset Timeframe**

One calendar year.

**1.3. Data Retention**

Each Transmission Operator, Load-Serving Entity, and Distribution Provider that operates a UVLS program shall retain documentation of its analyses of UVLS operations and Misoperations for two years. The Compliance Monitor shall retain any audit data for three years.

**1.4. Additional Compliance Information**

Transmission Operator, Load-Serving Entity, and Distribution Provider shall demonstrate compliance through self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event), as determined by the Compliance Monitor.

**2. Levels of Non-Compliance**

**2.1. Level 1:** Not applicable.

**2.2. Level 2:** An analysis of UVLS performance was provided but did not include one of the five requirements in Reliability Standard PRC-002 Requirement 1.

**2.3. Level 3:** An analysis of UVLS performance was provided but did not include two or more of the five requirements in Reliability Standard PRC-002 R1.

**2.4. Level 4:** An analysis of UVLS performance was not provided.

**E. Regional Differences**

None identified.

**Version History**

<b>Version</b>	<b>Date</b>	<b>Action</b>	<b>Change Tracking</b>

## Standard PRC-024-1 — Generator Performance During Frequency and Voltage Excursions

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### Standard Development Roadmap

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

This proposed standard is the Version 0 PRC-002 modified to include a translation of planning measure I.F.M3, which was not included in the approval Version 0 reliability standards because it required further work.

#### Development Steps Completed:

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4. The drafting team posted Draft 1 of the standard on April 21, 2005.

#### Description of Current Draft:

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#### Future Development Plan:

Anticipated Actions	Anticipated Date
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5. Conduct 2 <sup>nd</sup> ballot.	December 26 – January 6
6. Post standards and implementation plan for 30-day review by Board.	January 6 – February 6, 2006
7. Board adoption date.	February 6, 2006
8. Effective date.	January 1, 2007

## **Standard PRC-024-1 — Generator Performance During Frequency and Voltage Excursions**

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### **Definitions of Terms Used in Standard**

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No new definitions are proposed for this standard.

## Standard PRC-024-1 — Generator Performance During Frequency and Voltage Excursions

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### A. Introduction

1. **Title:** Generator Performance During Frequency and Voltage Excursions
2. **Number:** PRC-024-1
3. **Purpose:** To ensure that generators remain connected to the electrical grid during voltage and frequency excursions and are not normally tripped manually or by preset protection schemes during frequency and voltage excursions.
4. **Applicability**
  - 4.1. Regional Reliability Organizations.
  - 4.2. Generator Owners.
5. **Proposed Effective Date:**

Requirements 1 through 6 – January 1, 2007

Requirement 7 - January 1, 2008

### B. Requirements

- R1.1.** The Regional Reliability Organization shall establish criteria for generators to remain connected during system frequency and voltage excursions expressed as a function of:
  - R1.1.1.** Time duration in seconds or cycles.
  - R1.1.2.** Amplitude or magnitude of the excursion.
  - R1.1.3.** Relationship between time and amplitude or magnitude.
- R2.** The Regional Reliability Organization shall establish and maintain requirements for generators to remain connected during frequency and voltage disturbances. These requirements shall include:
  - R2.1.** Coordination between the generator under frequency protection and the regional Under Frequency Load Shedding (UFLS) program.
  - R2.2.** Coordination of generator protection, including back-up protection, with transmission Protection Systems.
- R3.** The Regional Reliability Organization shall establish and maintain criteria for exemptions to the requirements established in accordance with PRC-024 R1 and R2.
- R4.** The Regional Reliability Organization shall establish and maintain a procedure for handling variances (i.e., different criteria or methods) from the Regional Reliability Organization's requirements established in PRC-024 R1 and R2, including steps for requesting and approving such variances.
- R5.** The Regional Reliability Organization shall provide documentation of its excursion requirements, exemptions and variance procedure to the Transmission Owners and Generator Owners within its Region within 30 calendar days of approval.
- R6.** The Regional Reliability Organization shall, at least every five years, review and, as necessary, update its requirements, exemption criteria, and variance procedure.
- R7.** Generator Owners and Transmission Owners shall comply with the regional requirements for coordination of generator protection defined in PRC-024 R1 and R2 and any approved variances.

**C. Measures**

- M1.** The Regional Reliability Organization shall, within 30 calendar days of a request, provide NERC with its requirements, exemption criteria, and variance procedure for generators to withstand excursions in voltage and frequency.
- M2.** The Regional Reliability Organization shall have evidence it provided the requirements, criteria and procedures to the Transmission Operators and Generator Operators within its Region within 30 calendar days of approval.
- M3.** The Regional Reliability Organization shall have evidence it reviewed and updated its requirements, criteria and procedures as required in Requirement 6.
- M4.** Generator Owners and Transmission Owners shall, within 30 calendar days of a request, provide the Regional Reliability Organization with documentation that it met the regional requirements for coordination of generator protection defined in Requirements 1 and 2 and any approved regional variances.

**D. Compliance**

**1. Compliance Monitoring Process**

**1.1. Compliance Monitoring Responsibility**

NERC for Regional Reliability Organizations.

Regional Reliability Organizations for Generator Owners and Transmission Owners.

**1.2. Compliance Monitoring Period and Reset Timeframe**

One calendar year.

**1.3. Data Retention**

The Regional Reliability Organization shall retain its current and previous criteria revision.

The Compliance Monitor shall retain any audit data for three years.

Generator Owners and Transmission Owners shall maintain documentation required in M4 for three years.

**1.4. Additional Compliance Information**

The Regional Reliability Organization, Generator Owner, and Transmission Owner shall demonstrate compliance through the following methods, as determined by the compliance monitor: Self-certification or audit (periodic, as part of targeted monitoring or initiated by complaint or event).

**2. Levels of Non-Compliance for Regional Reliability Organization:**

- 2.1. Level 1:** Did not meet Requirement 3, 4 or 6.
- 2.2. Level 2:** Did not meet one of the following requirements: 1.1, 1.2, 1.3, 2.1 or 2.2.
- 2.3. Level 3:** Did not meet Requirement 5.
- 2.4. Level 4:** Did not meet more than one of the following requirements: 1.1, 1.2, 1.3, 2.1, or 2.2.

## Standard PRC-024-1 — Generator Performance During Frequency and Voltage Excursions

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### 3. Levels of Non-Compliance for Generator Owner and Transmission Owner:

- 3.1. **Level 1:** Not applicable.
- 3.2. **Level 2:** Did not meet one of the regional requirements defined in Requirements 1.1, 1.3, 2.1 or 2.2 and any approved regional variances.
- 3.3. **Level 3:** Not applicable.
- 3.4. **Level 4:** Did not meet more than one of the regional requirements defined in Requirements 1.1, 1.2, 1.3, 2.1, and 2.2 and any approved Regional variances.

### E. Regional Differences

None identified.

### Version History

Version	Date	Action	Change Tracking