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## MEMORANDUM

To: Transmission Owners (TOs), Distribution Providers (DPs) that own transmission Protection System(s), and Generator Owners (GOs)

From: Texas Reliability Entity, Inc.

Date: March 1, 2014

Re: PRC-004-2a Protection System Misoperation Reporting Procedures Revision

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Texas Reliability Entity, Inc. (Texas RE) serves in two capacities in the ERCOT Region: (1) the Regional Entity for the ERCOT Region pursuant to its Amended and Restated Delegation Agreement with North American Electric Reliability Corporation (NERC); and (2) the Reliability Monitor for the ERCOT Region pursuant to its Agreement with the Public Utility Commission of Texas (PUCT) and Electric Reliability Council of Texas, Inc. (ERCOT), dated July 1, 2010. As the Reliability Monitor, Texas RE monitors and reports to the PUCT regarding ERCOT Market Participants' compliance with reliability-related ERCOT Protocols, Operating Guides and Texas rules (ERCOT Regional Rules).

NERC Reliability Standard PRC-004-2.1a requires Texas RE to create procedures to address: (a) analyses of Protection System Misoperations; (b) Corrective Action Plan development and implementation; and (c) documentation of Protection System Misoperations analyses and Corrective Action Plans.

ERCOT Operating Guide Section 6.2.3 requires: (a) documenting protective relay system misoperations; (b) documenting Special Protection System (SPS) misoperations; and (c) reporting of such misoperations.

This memorandum is being provided to all registered Transmission Owners (TOs), Distribution Providers (DPs) that own transmission Protection System(s), and Generator Owners (GOs) in the ERCOT Region.

The attached procedure is intended to implement the Protection System Misoperation analysis and documentation process referenced in PRC-004-2.1a, Requirements R1, R2 and R3, and also covers reporting Misoperation reporting requirements referenced in the ERCOT Operating Guides. This revised procedure incorporates changes in the ERCOT Operating Guides for NOGRR123 and becomes effective on April 1, 2014.

Quarterly Misoperation reports will be due on the last day of the second month after each calendar quarter per the table below. All Protection System Misoperations shall be reported via the attached reporting procedure.

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<b>Reporting Period</b>	<b>Due Date</b>
January 1 through March 31	May 31
April 1 through June 30	August 31
July 1 through September 30	November 30
October 1 through December 31	February 28

Please see attached procedure document and refer to the periodic data submittal form on the Texas RE website (<http://www.texasre.org>).

NOTE: The technical requirements, definitions, periodic data submission requirements and submission frequency are similar to those currently in the ERCOT Nodal Operating Guide, Section 6 and Section 8b, as developed by the ERCOT System Protection Working Group.

**Texas Reliability Entity, Inc.**

**Regional Criteria**

**Procedure For**

**Analysis, Mitigation and Reporting of  
Transmission and Generation Protection  
System Misoperations**

**NERC Reliability Standards  
PRC-004-2.1a, PRC-016-0.1, and PRC-022-1**

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# **Procedure for Analysis, Mitigation and Reporting of Transmission and Generation Protection System Misoperations**

## **I. Introduction/Purpose**

This document sets forth the Texas Reliability Entity, Inc. (Texas RE) procedures for the analysis, documentation, and reporting of Misoperations of the following:

- Transmission Protection Systems;
- Generation Protection Systems;
- Special Protection Systems (SPS);
- Undervoltage Load Shed (UVLS) systems;
- Underfrequency Load Shed (UFLS) systems;

This document also addresses the development and implementation of corrective actions taken to mitigate future Misoperations per NERC Reliability Standards PRC-004, PRC-016 and PRC-022.<sup>1</sup>

While protective relaying systems operate with a high degree of reliability and security, on occasion, relays and relaying schemes misoperate. Such misoperations can result in widespread disturbances and can have adverse effects on neighboring entities and systems. It is therefore imperative that all Protection System operations be monitored for correctness, and, if a misoperation occurs, an appropriate analysis is performed and corrective actions are taken to prevent re-occurrence.

Information submitted on Protection System Misoperations as part of this process will be treated as confidential. Such information will be maintained, distributed, and communicated in a manner consistent with Section 1500 of the NERC Rules of Procedure.

## **II. References**

- a. NERC Standard PRC-004-2.1a, 'Analysis and Mitigation of Transmission and Generation Protection System Misoperations'
- b. NERC Standard PRC-016-0.1, 'Special Protection System Misoperations'
- c. NERC Standard PRC-022-1, 'Undervoltage Load Shedding Program Performance'
- d. NERC Standard PRC-006-1, 'Automatic Underfrequency Load Shedding'
- e. ERCOT Nodal Operating Guide (NOG) §6.2.3
- f. Texas RE Misoperation Reporting Template

## **III. Applicability**

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<sup>1</sup> In addition to its role as a Regional Entity, Texas RE also acts as the Reliability Monitor for the Public Utility Commission of Texas (PUCT), and as such is responsible for monitoring, investigating, auditing and reporting to the PUCT regarding compliance with the reliability-related ERCOT Protocols and Operating Guides by ERCOT Market Entities.

This procedure applies to the following Registered Entities:

- a. Transmission Owners (TOs)
- b. Distribution Providers (DPs) that own transmission Protection System(s)
- c. Generator Owners (GOs)
- d. Transmission Owners, Generator Owners, and Distribution Providers that own a Special Protection System (SPS)
- e. Transmission Owners, Transmission Operators, Distribution Providers, or Load Serving Entities (LSE) that own or operate UFLS systems
- f. Transmission Operators, Distribution Providers and Load-Serving Entities that operate UVLS systems

#### **IV. Protection System Misoperation Requirements**

In the ERCOT Region, all possible Protection System Misoperations (unwanted trips, failures to trip when intended, etc.) shall be analyzed by the facility owner(s) promptly and any deficiencies shall be investigated and corrected per the following NERC requirements:

- a. PRC-004-2.1a 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 Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Entity's procedures.
- b. PRC-004-2.1a R2: The Generator Owner shall analyze its generator Facility Protection System Misoperations, and shall develop and implement a Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Entity's procedures.
- c. PRC-004-2.1a R3: The Transmission Owner, any Distribution Provider that owns a transmission Protection System, and the Generator Owner shall each provide to its Regional Entity, documentation of its Misoperations analyses and Corrective Action Plans according to the Regional Entity's procedures.
- d. PRC-016-0.1 R3: The Transmission Owner, Generator Owner, and Distribution Provider that owns an SPS shall provide documentation of the misoperation analyses and the corrective action plans to its Regional Reliability Organization and NERC on request.
- e. PRC-022-1 R1.5: 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: (R1.5) For any Misoperation, a Corrective Action Plan to avoid future Misoperations of a similar nature.
- f. PRC-006-1, R11: Each Planning Coordinator, in whose area a BES islanding event results in system frequency excursions below the initializing set points of the UFLS program, shall conduct and document an assessment of the event within one year of event actuation to evaluate (1) the performance of the UFLS equipment, and (2) the effectiveness of the UFLS program.

#### **V. Definitions**

**Protection System:** Per the current NERC Glossary of Terms used in NERC Reliability Standards, “Protection System” definition as modified below.

- Protective relays which respond to electrical quantities,
- Communications systems necessary for correct operation of protective functions
- Voltage and current sensing devices providing inputs to protective relays,
- Station dc supply associated with protective functions (including batteries, battery chargers, and non-battery-based dc supply), and
- Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices.

For ERCOT Region reporting purposes only, the definition of “Protection System” includes reporting requirements for the following additional protection and control equipment<sup>2</sup>:

- Transformer sudden pressure relays and fault pressure relays

**Special Protection System:** Per the current definition in the NERC Glossary of Terms contained in the NERC Reliability Standards.

**Corrective Action Plan:** Per the current definition in the NERC Glossary of Terms contained in NERC Reliability Standards.

**Applicable Elements:** Protection System Misoperations shall be analyzed, mitigated and reported according to this procedure for the following applicable elements:

- a. Transmission lines operated at 100kV or higher;
- b. Circuit breakers operated at 100kV or higher;
- c. Transformers with one primary terminal and at least one secondary terminal operated at 100kV or higher (\* See Note);
- d. Generation resources with gross individual nameplate ratings greater than 20 MVA or gross plant/facility aggregate nameplate ratings greater than 75 MVA, either directly-connected or connected through the high-side of the step-up transformer(s) at a voltage of 100 kV or above (\* See Note);
- e. Any generation resource that is a Blackstart Resource;
- f. Buses operated at 100kV or higher;
- g. Series/Shunt capacitors operated at 100kV or higher;
- h. Series/Shunt reactors operated at 100kV or higher;
- i. HV DC systems operated at 100kV or higher;
- j. Dynamic reactive systems operated at 100kV or higher;
- k. Special Protection Systems/Remedial action schemes;
- l. Undervoltage load shed systems (UVLS) (\* See Note);
- m. Underfrequency load shed systems (UFLS) (\* See Note); and
- n. (For ERCOT Region purposes only) Generation resources with gross individual nameplate ratings greater than 20 MVA or gross plant/facility aggregate nameplate ratings greater than 75 MVA, either directly-connected or connected through the high-side of the step-up transformer(s) at a voltage between 60 kV and 100 kV<sup>3</sup>:

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<sup>2</sup> This equipment is not subject to compliance monitoring and enforcement activities under the NERC Reliability Standards.

<sup>3</sup> This equipment is not subject to compliance monitoring and enforcement activities under the NERC Reliability Standards.

\* **NOTE:** For the purposes of this procedure, for multi-function relays applied at less than 100kV, only a misoperation of the UVLS or UFLS function shall be reported. Misoperations of transformer Protection System shall be reported using the high side voltage of the transformer. Misoperations of generator Protection Systems shall be reported using the high side voltage of the generator step-up transformer.

### **Protection System Misoperation:**

NERC Glossary of Terms Definition of 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 unintentional Protection System operation when no fault or other abnormal condition has occurred unrelated to on-site maintenance and testing activity.

Definition of Misoperation:

- a. **Failure to Trip During Fault** – Any failure of a Protection System to operate for a Fault within the zone it is designed to protect. The failure of a Protection System component is not a Misoperation as long as the overall performance of the Protection System for the Element it is designed to protect is correct;
- b. **Failure to Trip Other than Fault** – A failure of a Protection System to operate for a non-Fault condition for which the Protection System was intended to operate, such as a power swing, under-voltage, over excitation, or loss of excitation. The failure of a Protection System component is not a Misoperation as long as the overall performance of the Protection System for the Element it is designed to protect is correct;
- c. **Slow Trip During Fault** – A Protection System operation that is slower than intended for a Fault within the zone it is designed to protect;
- d. **Slow Trip Other than Fault** – A Protection System operation that is slower than intended for a non-Fault condition such as a power swing, under-voltage, over excitation, or loss of excitation for which the Protection System was intended to operate;
- e. **Unnecessary Trip During a Fault** – Any unnecessary Protection System operation for a fault not within the zone of protection;
- f. **Unnecessary Trip Other Than Fault** – Any unnecessary Protection System operation when no fault or other abnormal condition has occurred; and

The following events ARE NOT reportable Protection System Misoperations subject to these procedures:

- a. Trip Initiated by a Control System – Operations initiated by control systems (not by Protection System), such as those associated with generator controls, or turbine/boiler controls, Static VAR Compensators, Flexible AC Transmission devices, HVDC terminal equipment, circuit breaker mechanism, or other facility control systems;
- b. Facility owner authorized personnel action that directly initiates a trip<sup>4</sup>;

<sup>4</sup> It is the intent of this reporting process to identify Misoperations of the Protective System as it interrelates with the electrical system, not as it interrelates to personnel involved with the protective relay system. If an individual directly initiates an operation, it is not counted as a Misoperation (e.g., unintentional operation during tests); however, if a technician leaves trip test switches or cut-off switches in an inappropriate position and a system fault or condition causes a Misoperation, this would be counted as a Protection System Misoperation.



- c. Failure of Relay Communications – A communication failure in and of itself is not a misoperation if it does not result in misoperation of the associated protective relay system.
- d. Lack of targeting, such as when a high-speed pilot system is beat out by high-speed zone;
- e. A primary or backup Protection System failure to operate, if fault clearing is consistent with the time normally expected with proper functioning of at least one protection system;
- f. Operation of properly coordinated backup Protection System relays to clear the fault in an adjacent zone, if the primary protection fails to clear the fault within the specified time;
- g. Correct breaker failure relay operation in association with a failed breaker, unless the breaker failed to operate due to a defective trip coil;
- h. Human and operational errors or equipment failures occurring while work is performed (e.g., maintenance, construction and/or commissioning activities) in the substation (e.g., a cover being replaced in an incorrect manner, secondary leads replaced in the wrong position, an incorrect test switch being used to isolate equipment resulting in a trip);
- i. Generator mechanical trips, such as turbine or fuel system trips;
- j. Generator trips caused by automatic voltage regulator, exciter control, or power system stabilizer (however, Misoperation of protection functions within the excitation system shall be reported per examples of reportable Misoperations); and
- k. An operation of a generator Protection System that does not result in the loss of generation, while a unit is being brought on or off line and is not synchronized with the system.

**SPS Misoperation:** SPS Misoperations are defined as follows:

- a. **Failure to Operate** – Any failure of a SPS to perform its intended function within the designed time when system conditions intended to trigger the SPS occurs;
- b. **Failure to Arm** – Any failure of a SPS to automatically arm itself for system conditions that are intended to result in the SPS being automatically armed;
- c. **Unnecessary Operation** – Any operation of a SPS that occurs without the occurrence of the intended system trigger condition(s);
- d. **Unnecessary Arming** – Any automatic arming of a SPS that occurs without the occurrence of the intended arming system condition(s); and
- e. **Failure to Reset** – Any failure of a SPS to automatically reset following a return of normal system conditions, if the system design requires automatic reset.

**Protection System Misoperation Causes:** Causes of Protection System misoperations, including SPS misoperations, shall be classified as follows in reports provided to the Regional Entity:

- a. **AC system** – This category includes misoperations due to problems in the AC inputs to the Protection System. Examples include misoperations associated with Current Transformer (CT) saturation, loss of polarizing or reference voltages associated with Voltage Transformer (VT) circuits or fuse failures, or rodent damaged wiring in voltage or current circuit;
- b. **As-left personnel error** – This category includes misoperations due to the as-left condition of the protection system following maintenance or construction procedures. These include test switches left open, wiring errors not associated with incorrect drawings, carrier grounds left in place, settings placed in the wrong relay, or incorrect field settings left in the relay that do not match engineering approved settings;
- c. **Communication failure** – This category includes misoperations due to failures in the communication systems associated with Protection System schemes inclusive of transmitters and receivers. Examples include misoperations caused by loss of carrier, spurious transfer trips associated with noise, telecommunication errors resulting in



malperformance of communications over leased lines, loss of fiber optic communication equipment, or microwave problems associated with weather conditions;

- d. **DC system** – This category includes misoperations due to problems in the DC control circuits. These include problems in the battery or charging systems, trip wiring to breakers, or loss of DC power to a relay or communication device;
- e. **Incorrect settings** - This category includes misoperations due to issued setting errors, including those caused by modeling errors, associated with electromechanical and solid state relays, and the protection element settings in microprocessor-based relays;
- f. **Logic errors** – This category includes misoperations due to issued logic setting errors associated with programming microprocessor relay inputs, outputs, custom user logic, or protection function mapping to communication or physical I/O points;
- g. **Design errors** - This category includes misoperations due to incorrect physical design. Examples would include incorrect configuration on ac or dc schematic or wiring drawings, or incorrectly applied protective equipment (hardware or firmware);
- h. **Relay failure/malfunction** – This category includes misoperations due to improper operation of the relays themselves. These may be due to component failures, physical damage to a device, firmware problems, or manufacturer errors. Examples include misoperations caused by changes in relay characteristic due to capacitor aging, misfiring thyristors, damage due to water from a leaking roof, relay power supply failure, or internal wiring/logic error. Failures of auxiliary tripping relays fall under this category;
- i. **Other/Explainable** – This category includes Misoperations that were determined to have an identified cause but they do not fit into any of the above categories. For example, environment damage due to water from a leaking roof or animals, temporary changes in network topology that because of their low probability of occurrence are not accounted for in the design of the Protection System; and
- j. **Unknown/Unexplainable** – This category includes misoperations where no clear cause can be determined. These types of Misoperations require extensive documentation of investigative actions if this cause code is utilized.

## **VI. Analysis and Corrective Action Plan Requirements**

Timely analysis of Misoperations and development and implementation of Corrective Action Plans is of critical importance to Bulk Electric System reliability in the ERCOT Region.

When it analyzes a Protection System or SPS Misoperation, the responsible entity shall, to the best of its ability, accurately identify the underlying or “root” cause in sufficient detail to develop a Corrective Action Plan that remedies the problem to prevent Misoperation recurrence. Where a cause cannot be identified, a thorough documentation of the investigation is required to aid future investigation of the Misoperation, particularly if it recurs. It is expected that the responsible entity will perform due diligence to identify the Misoperation cause. Evidence which may assist in analyzing Misoperations includes sequence of events data, relay targets, Disturbance Monitoring Equipment (DME) records, relay calibration and simulation tests, communication noise and attenuation tests, CT/VT ratio tests, DC continuity checks and functional tests, and studies (e.g., short circuit and coordination studies) performed in the attempt to determine the root cause.

The owner of the Protection System that misoperated is responsible for reporting the Misoperation. If a Misoperation occurs on a tie line between two entities responsible for reporting Misoperation data per this procedure, the Misoperation shall be reported by one or the other entity, but not both. The entities shall reach agreement on which party submits the Misoperation in its quarterly report. Texas RE may be consulted for input on this decision.

When a root cause of a Misoperation is identified, the owner of the Protection System shall develop a Corrective Action Plan to address the cause(s) and improve the performance and reliability of the Protection System. Registered Entities should have a process in place to develop Corrective Action Plans for Protection System Misoperations. A Corrective Action Plan should include interim corrective actions (if necessary), final corrective actions, and a timeline for completion. Interim corrective actions may be useful to quickly address some of the aspects of the Misoperation prior to implementation of a final solution.

Registered Entities shall complete Misoperation analyses and Corrective Action Plans per the following timelines:

<b>Corrective Action Item</b>	<b>Due Date</b>
Analyze Misoperation to determine root cause	Within 90 calendar days of event
Develop Corrective Action Plan and timetable for implementation (if root cause identified)	Within 120 calendar days of event
Develop additional investigation steps and work timetable (if root cause not identified)	Within 120 calendar days of event
Complete implementation of Corrective Action Plan	Within 180 calendar days after finalizing the Corrective Action Plan or per the Corrective Action Plan timetable, whichever is longer

## **VII. Periodic Data Submittal Requirements**

The Transmission Owner, Distribution Provider that owns a transmission Protection System, and the Generator Owner that owns a Protection System shall each provide documentation to Texas RE of its Protection System and SPS Misoperation analyses and Corrective Action Plans according to the these procedures.

Responsible entities shall document the performance of their Protection Systems utilizing the methodology below to count the total number of protective relay system events. Performance analysis will be based on the total number of Protection System Misoperations versus the total number of Protection System operations and/or events.

### **Definition of Protection System Operation/Event**

1. The correct operation of Protection Systems associated with isolating a faulted system element.
2. The correct operation of Protection Systems associated with isolating equipment for non-fault conditions such as power swings, over excitation, or loss of field (excluding control functions performed by a protective relay; e.g., when a reverse power relay is used to trip a breaker during generator shutdown).

3. The unintended operation of Protection Systems for a fault outside the zone it is designed to protect.
4. The unintended operation of Protection Systems for a non-fault condition.
5. Any failure of a Protection System to operate for its intended function such as clearing a fault within the zone it is designed to protect.

**Notes:**

1. When reclosing is applied (automatic or manual), a sequence of reclosing and tripping associated with isolating a faulted system element is counted as a single operation. Multiple unintended operations of an element due to this sequence of reclosing and tripping would also be counted as a single operation.
2. Transformer operations are reported by the high-side voltage. Generator operations are reported by the generator step-up transformer high-side voltage.

**Examples**

1. A permanent fault occurs on Line A and all line breakers operate and go through a complete reclose sequence (trip, close, trip, close, and trip). This event is considered one operation. Analysis would indicate that this was a correct operation.
2. Line B faults and all line breakers operate correctly but, at the same time, a breaker on Line C operates. This event is considered two operations, since two transmission elements were involved. Analysis would identify that the Line B operation was correct and that the Line C operation was a misoperation.
3. A breaker(s) on Line D opens under a non-fault condition due to a failed relay. This event is considered one operation. Analysis would identify the Line D operation as a misoperation.
4. Line faults with one breaker failure.
  - a. No breaker failure relaying: There would be one operation associated with the line fault, and one additional operation for each required remote backup clearing operation.
  - b. Breaker failure relaying with local tripping and no transfer tripping of remote ends: There would be one operation for the fault with the breaker failure, one operation for the breaker failure local clearing, and an additional operation for each required remote backup clearing. For example, if the line fault occurred and the breaker between two lines on a breaker and a half bus failed, there would be three operations. One operation associated with the fault, one operation for the breaker failure local clearing, and one operation for the remote end trip of the second line connected to the failed breaker.
  - c. Breaker failure with transfer tripping of remote ends: For the scenario in 4b, there would be two operations, one for the fault and a second for the breaker failure protection clearing.
5. Operations which are initiated by control systems (not by Protection Systems), such as those associated with generator controls, turbine/boiler controls, Static VAR Compensators (SVCs), Flexible AC Transmission Systems (FACTS), High-Voltage DC (HVDC) transmission systems, circuit breaker mechanisms, or other facility control systems, are not reported as operations of a Protection System.

Periodic Data Submittals consist of two worksheets within the Protection System Misoperation Report Template:

- a. Misoperation Summary Form. Total number of events will be submitted on the Misoperation Summary Form.

- b. Misoperation Entry Form. Reference Attachment 1 for a description of the Misoperation Report Template fields and the information to be provided.

Protection System Misoperation reports shall be submitted on the most recent version of the Misoperation Report Template posted on the Texas RE website (<http://www.texasre.org>).

All forms and reports are to be submitted via the Texas RE portal ([webCDMS](#)). If, for any reason, the Texas RE portal is unavailable, reports should be submitted to [rapa@texasre.org](mailto:rapa@texasre.org).

Changes, updates or corrections to the analysis of a specific Misoperation or Corrective Action Plan should be submitted in a subsequent quarterly report following the update. Resubmittal(s) of Misoperation information will be identified on the Misoperation Report Template by referencing the unique Misoperation ID from previous reports and updating data as appropriate. Each Responsible Entity will report the status of each of its Misoperation Corrective Action Plan or interim action plans in the periodic data submittal until the Corrective Action Plan is completed.

Each Responsible Entity should retain its complete documentation concerning Misoperations, analyses, Corrective Action Plans, etc. in accordance with NERC requirements for data retention. Additional information should not be submitted to Texas RE unless requested.

## VIII. Submission Frequency

Entities will submit required data quarterly according to the following schedule:

Reporting Period	Due Date
January 1 through March 31	May 31
April 1 through June 30	August 31
July 1 through September 30	November 30
October 1 through December 31	February 28

If the due date falls on a non-working day (i.e., weekend or state/federal holiday), the data submittal will be due on the next business day.

## IX. Texas RE Review and Oversight

Texas RE will review the required data submittals within 30 calendar days after date it is submitted to Texas RE. Each Protection System Misoperation submittal will be reviewed for: (1) Misoperation description; (2) Misoperation Cause; (3) Corrective actions taken or planned; and (4) Completeness. Appropriate follow-up actions will be taken to ensure all Misoperations are resolved and that corrective actions are implemented for all outstanding Misoperations. Additional follow-up actions, if any, will be completed no later than 45 calendar days after the end of each reporting period. Texas RE submits Protection System Misoperation data to NERC 45 to 60 calendar days after the end of each reporting due date. Texas RE removes from its report to NERC, all submitted misoperations for components that are not included under the NERC definition of a Protection System, and other ERCOT Region-only data. The removed

data is not included in the scope of audits conducted regarding compliance with a NERC Reliability Standard for Protection Systems.

On an annual basis, Texas RE will assess the Misoperation data and develop a regional Misoperation summary report. This report will be shared with the ERCOT System Protection Working Group and other ERCOT working groups as necessary. The report may include overall regional Misoperation performance, summary data of Misoperation causes, observed Misoperation trends, and recommendations for follow-up from a regional perspective. Before sharing such data, Texas RE will redact individual Registered Entity identities.

## **X. Revision History**

This procedure is effective on the first day of the next calendar quarter after approval by Texas RE management. Texas RE will continue to work with the Registered Entities on changes to this procedure and the related Misoperation Report Template.

<b>Revision</b>	<b>Date</b>	<b>Approved By</b>	<b>Comments</b>
0	March 23, 2012	Mark Henry	Initial
1	May 25, 2012	Mark Henry	Revised to incorporate stakeholder comments regarding non-NERC defined Protection System equipment
2	September 30, 2012		Revised to incorporate changes to NERC template and NERC event count methodology
3	December 4, 2013	Mark Henry	Revised to incorporate changes to the NERC misoperation definitions and reporting template, and removal of references to obsolete Standard PRC-009
4	March 1, 2014	Mark Henry	Updated for approval of PRC-004-2.1a. Revised for NOGRR123 to remove automatic reclosing as a misoperation type and to align ERCOT Operating Guides with NERC reporting requirements

## **XI. Review and Retention Requirements**

The Texas RE Reliability Services group will review this document every three years or as appropriate for possible revision. The existing or revised document will be publicly posted and distributed to all affected Transmission Owners, Generator Owners, and Distribution Providers within 30 calendar days of approval of these procedures. Texas RE will retain documentation of any changes to this procedure for a period of six years.

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Additionally, Texas RE will keep the required Misoperation data submittals for each Registered Entity for a minimum of six years.

## ATTACHMENT 1 – Quarterly Misoperation Report Form Fields

### MISOPERATION SUMMARY FORM

Field Name	Description
Data Submission Year	Enter 4-digit year of the report
Data Submission Quarter	Select report quarter from drop-down list
Functional Entity Type	Select functional entity type from drop-down list
Regional Entity Name	Automatically populated
Functional Entity Name	Select functional entity name from drop-down list
Functional Entity NCR	Automatically populated based on Entity name (NERC ID in “NCR#####” format)
Has the Functional Entity has experienced a Misoperation this Quarter	Select “Yes” or “No” from drop-down list
Does the Functional Entity own a Transmission or Generation Protection System (PRC-004)	Select “Yes” or “No” from drop-down list
Does the Functional Entity own a Special Protection System (PRC-016)	Select “Yes” or “No” from drop-down list
Total Number of Protection System Misoperations	Automatically populated based on entries from Misoperation Entry Form
Total Number of Protection System Events/Operations by Voltage Class (NERC Methodology)	Entry total number of Protection System events for each voltage class
Verification	Enter name and title of member of senior management or authorized representative responsible for oversight of the program. Enter date of report.

### MISOPERATION ENTRY FORM

Field Name	Description
Misoperation ID	Automatically populated based on Entity name, Misoperation date/time, and Facility name
Regional Entity	Select ‘TRE’ from drop-down list
Entity Name	Enter Registered Entity name from drop-down list
NERC ID	Automatically populated based on Entity name (NERC ID in “NCR#####” format)
Misoperation Date	Enter Date of Misoperation in MM/DD/YYYY format
Misoperation Time	Enter Time of Misoperation in HH:MM:SS format
Time Zone	Select the appropriate standard time zone from drop-down list
Facility Name	Substation or generation station where the Misoperation occurred
Equipment Name	Identify by name the generator, transmission line, transformer, bus or equipment protected by the Protection System that Misoperated.
Equipment Type	Select equipment type (i.e. line, bus, transformer, generator, etc.) from dropdown list
Facility Voltage	Select facility voltage, in kV, from drop-down list



Equipment Removed from Service	Enter names of the equipment becoming unavailable due to the Misoperation (equipment refers only to circuits, transformers, and busses, but not breakers UNLESS the breaker is the only element. Breaker should be used only if a single breaker tripped and did not interrupt network flow on an element).
Event Description	Provide a brief description of the event and detailed description of Misoperation root causes, including corrective actions taken.
Misoperation Category	Select Misoperation category from drop-down list.
Cause(s) of Misoperation	Select root cause(s) of the Misoperation from drop-down list.
Protection Systems/Components that Misoperated	Provide information on the components/Protection Systems that misoperated including relay models (types) and protection schemes.
Relay Technology	If the Cause of Misoperation is "Relay failures/malfunctions" or "Incorrect settings/logic/design errors", identify the relay technology installed. Select 'Electromechanical', 'Solid State', or 'Microprocessor' from drop-down list.
TADS Reportable?	Automatically populated based on voltage selection and equipment type
TADS Event ID	Enter TADS Event ID, if applicable
GADS Reportable?	Automatically populated based on voltage selection and equipment type
GADS Event ID	Enter GADS ID of the generator if the misoperation involved a generator forced outage using the drop-down list. If there are multiple generators involved, please select the first generator that had a forced outage.
Analysis and Corrective Action Status	Select Corrective Action status ('Analysis in Progress', 'Analysis Complete', 'Corrective Action in Progress', or 'Corrective Action Complete') from drop-down list
Corrective Action Plan	Provide a brief description of the Corrective Action Plan
Actual Analysis Completion Date	If analysis of Misoperation is complete, enter actual completion date in MM/DD/YYYY format
Actual Corrective Action Completion Date	If corrective actions are complete, enter Corrective action actual completion date in MM/DD/YYYY format
Name of Person Filing Report	Name of person filing the Misoperation report
Phone Number	Phone number of person filing the Misoperation report
Email Address	Email address of person filing the Misoperation report
Date of Report	Enter date of the Misoperation report in MM/DD/YYYY format