



**Compliance Questionnaire and
Reliability Standard Audit Worksheet**

**PRC-004-2.1a - Analysis and Mitigation of Transmission and Generation
Protection System Misoperations**

Registered Entity: *(Must be completed by the Compliance Enforcement Authority)*

NCR Number: *(Must be completed by the Compliance Enforcement Authority)*

Applicable Function(s): TO, DP, GO

Auditors:

NERC Compliance Questionnaire and Reliability Standard Audit Worksheet

Disclaimer

NERC developed this Reliability Standard Audit Worksheet (RSAW) language in order to facilitate NERC's and the Regional Entities' assessment of a registered entity's compliance with this Reliability Standard. The NERC RSAW language is written to specific versions of each NERC Reliability Standard. Entities using this RSAW should choose the version of the RSAW applicable to the Reliability Standard being assessed. While the information included in this RSAW provides some of the methodology that NERC has elected to use to assess compliance with the requirements of the Reliability Standard, this document should not be treated as a substitute for the Reliability Standard or viewed as additional Reliability Standard requirements. In all cases, the Regional Entity should rely on the language contained in the Reliability Standard itself, and not on the language contained in this RSAW, to determine compliance with the Reliability Standard. NERC's Reliability Standards can be found on NERC's website. Additionally, NERC Reliability Standards are updated frequently, and this RSAW may not necessarily be updated with the same frequency. Therefore, it is imperative that entities treat this RSAW as a reference document only, and not as a substitute or replacement for the Reliability Standard. It is the responsibility of the registered entity to verify its compliance with the latest approved version of the Reliability Standards, by the applicable governmental authority, relevant to its registration status.

The NERC RSAW language contained within this document provides a non-exclusive list, for informational purposes only, of examples of the types of evidence a registered entity may produce or may be asked to produce to demonstrate compliance with the Reliability Standard. A registered entity's adherence to the examples contained within this RSAW does not necessarily constitute compliance with the applicable Reliability Standard, and NERC and the Regional Entity using this RSAW reserves the right to request additional evidence from the registered entity that is not included in this RSAW. Additionally, this RSAW includes excerpts from FERC Orders and other regulatory references. The FERC Order cites are provided for ease of reference only, and this document does not necessarily include all applicable Order provisions. In the event of a discrepancy between FERC Orders, and the language included in this document, FERC Orders shall prevail.

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Registered Entity: _____
NCR Number: _____
Compliance Assessment Date: _____
RSAW Version: RSAW_PRC-004-2.1a_v1.54
Revision Date: ~~March~~ July 2014

Subject Matter Experts

Identify your company's subject matter expert(s) responsible for this Reliability Standard. Include the person's title, organization and the requirement(s) for which they are responsible. Insert additional lines if necessary.

Response: (*Registered Entity Response Required*)

| SME Name | Title | Organization | Requirement |
|----------|-------|--------------|-------------|
| | | | |
| | | | |

Reliability Standard Language

PRC-004-2.1a— Analysis and Mitigation of Transmission and Generation Protection System Misoperations

Purpose:

Ensure all transmission and generation Protection System Misoperations affecting the reliability of the Bulk Electric System (BES) are analyzed and mitigated.

Applicability:

- Transmission Owner
- Distribution Provider that owns a transmission Protection System
- Generator Owner

NERC BOT Approval Date:

FERC Approval Date:

Reliability Standard Enforcement Date in the United States:

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 Corrective Action Plan to avoid future Misoperations of a similar nature according to the Regional Entity’s procedures.

Describe, in narrative form, how you meet compliance with this requirement: (*Registered Entity Response Required*)

[Empty light blue box for narrative response]

Data Request: Provide a list of all Transmission Protection System Misoperations during the audit period.

Entity Response: (*Registered Entity Response Required*)

[Empty light blue box for entity response]

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Registered Entity Evidence Listing (Required):

Provide the following for all evidence submitted (Insert additional rows if necessary):

File Name, File Extension, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description

| |
|----|
| 1. |
| 2. |
| 3. |

R1 Supporting Evidence and Documentation

This section must be completed by the Compliance Enforcement Authority

Compliance Assessment Approach Specific to PRC-004-2.1a R1

- ___ Review the evidence provided by the entity to determine if the entity has had any transmission Protection System Misoperations on its transmission Protection System.

- ___ Review the evidence provided by the entity to verify that the entity analyzed all transmission Protection System Misoperations and verify if identified Misoperations resulted in the development and implementation of Corrective Action Plans to avoid future Misoperations of a similar nature in accordance with its Regional Entity's procedures.

- ___ Review the evidence provided by the entity to verify that the entity has maintained a record of all transmission Protection System Misoperations in accordance with its Regional Entity's Procedures.

Note to Auditor: Review entity's responses to questions in the Supplemental Information section of this document, concerning the entity's process for identifying misoperations, as part of your compliance assessment. Also, understand Regional Entity's procedures for analyzing Protection System Misoperations and developing and implementing a Corrective Action Plan to avoid future Misoperations of a similar nature and for submitting the documentation of the Misoperations analysis and Corrective Action Plans developed.

Auditor's Detailed Notes:

Additional Evidence Reviewed:

| Title | Date | Version |
|-------|------|---------|
| | | |
| | | |

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R2. The Generator Owner shall analyze its generator and generator interconnection 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.

•For Misoperations occurring on the protection systems of individual dispersed power producing resources identified under Inclusion I4 of the BES definition where the Misoperations affected an aggregate nameplate rating of less than or equal to 75 MVA of BES facilities, this requirement does not apply.

Describe, in narrative form, how you meet compliance with this requirement: (Registered Entity Response Required)

Data Request: Provide a list of all applicable generator and generator interconnection Facility Protection System Misoperations during the audit period.

Entity Response: (Registered Entity Response Required)

Registered Entity Evidence Listing (Required):

Provide the following for all evidence submitted (Insert additional rows if necessary):

File Name, File Extension, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description

| |
|----|
| 1. |
| 2. |
| 3. |

R2 Supporting Evidence and Documentation

This section must be completed by the Compliance Enforcement Authority

Compliance Assessment Approach Specific to PRC-004-2.1a R2.

___ Review the evidence provided by the entity to determine if the entity has had any applicable generator or generator interconnection Facility Protection System Misoperations during the audit period.

___ Review the evidence provided by the entity to verify that the entity analyzed all applicable generator and generator interconnection Facility Protection System Misoperations and verify if identified Misoperations resulted in the development and implementation of Corrective Action Plans to avoid future Misoperations of a similar nature.

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___ Review the evidence provided by the entity to verify that the entity has maintained a record of all applicable generator and generator interconnection Facility Protection System Misoperations in accordance with its Regional Entity Procedures.

___ Note to Auditor: Review entity's responses to questions in the Supplemental Information section of this document, concerning the entity's process for identifying misoperations, as part of -your compliance assessment. Also, understand Regional Entity's procedures for analyzing Protection System Misoperations and developing and implementing a Corrective Action Plan to avoid future Misoperations of a similar nature and for submitting the documentation of the Misoperations analysis and Corrective Action Plans developed.

Auditor's Detailed Notes:

Additional Evidence Reviewed:

| Title | Date | Version |
|-------|------|---------|
| | | |
| | | |

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.

•For Misoperations occurring on the protection systems of individual dispersed power producing resources identified under Inclusion I4 of the BES definition where the Misoperations affected an aggregate nameplate rating of less than or equal to 75 MVA of BES facilities, this requirement does not apply.

Describe, in narrative form, how you meet compliance with this requirement: (*Registered Entity Response Required*)

Registered Entity Evidence Listing (Required):

Provide the following for all evidence submitted (Insert additional rows if necessary):

File Name, File Extension, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description

| | |
|----|--|
| 1. | |
| 2. | |
| 3. | |

R3 Supporting Evidence and Documentation

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This section must be completed by the Compliance Enforcement Authority

Compliance Assessment Approach Specific to PRC-004-2.1a R3.

If the entity had any Misoperations and/or corrective action plans as determined in R1 and/or R2 (to the extent applicable per the bulleted language of Requirements R2 and R3):

- ___ Determine if the entity supplied the required documentation of Misoperations analyses and Corrective Action Plans to the Regional Entity as per its Regional Entity's procedures.

Auditor's Detailed Notes:

Additional Evidence Reviewed:

| Title | Date | Version |
|-------|------|---------|
| | | |
| | | |

Supplemental Information

PRC-004-2.1A— Questions

Describe how your company identifies and documents transmission and/or generation Protection System Misoperations, their analyses, and corrective actions taken.

Entity Response: *(Registered Entity Response Required)*

Describe your process for investigation and analysis of transmission and/or generation Protective Relay Misoperations. Comment on how your company decides what appropriate actions to take to avoid future Misoperations (*i.e.*, – development and implementation of a Corrective Action Plan).

Entity Response: *(Registered Entity Response Required)*

Other - The list of questions above is not all inclusive of evidence required to show compliance with the Reliability Standard. Provide additional information here, **as necessary**, that demonstrates compliance with this Reliability Standard.

Entity Response: *(Registered Entity Response)*

Compliance Findings Summary (to be filled out by auditor)

| Req. | NF | PV | OEA | NA | Statement |
|------|----|----|-----|----|-----------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |

Order 693

P 1418. Protection and Control systems (PRC) on Bulk-Power System elements are an integral part of reliable grid operation. Protection systems are designed to detect and isolate faulty elements on a system, thereby limiting the severity and spread of system disturbances, and preventing possible damage to protected elements. The function, settings and limitations of a protection system are critical in establishing SOLs and IROLs. The PRC Reliability Standards apply to transmission operators, transmission owners, generator operators, generator owners, distribution providers and regional reliability organizations and cover a wide range of topics related to the protection and control of power systems.

P 1462. PRC-004-1 ensures that all transmission and generation protection system misoperations affecting the reliability of the Bulk-Power System are analyzed and mitigated by requiring transmission owners, generator owners and distribution providers that own a transmission protection system to analyze and document protection system misoperations. These entities must also develop corrective action plans in accordance with the regional reliability organization's procedures.

P 1467. The Commission approves Reliability Standard PRC-004-1 as mandatory and enforceable.

North American Electric Reliability Corporation, 136 FERC ¶ 61,208 (September 26, 2011)

1. On April 15, 2011, the North American Electric Reliability Corporation (NERC) filed a petition seeking Commission approval of an interpretation of Requirements R1 and R3 of Reliability Standard PRC-004-1 (Analysis and Mitigation of Transmission and Generation Protection System Misoperations) and Requirements R1 and R2 of Reliability Standard PRC-005-1 (Transmission and Generation Protection System Maintenance and Testing). The Commission approves NERC's interpretation, effective as of the date of this order.

4. NERC states that on March 25, 2009, the Y-W Electric Association and Tri-State Generation and Transmission Association requested an interpretation from NERC for the term "transmission Protection System" as it appears in Requirements R1 and R3 of PRC-004-1 and Requirements R1 and R2 of PRC-005-1 and "specifically whether protection for a radially-connected transformer protection system energized from the BES [bulk electric system] is considered a transmission Protection System and is subject to these standards." n4

7. NERC interprets "transmission Protection System," as it appears in Requirements R1 and R3 of PRC-004-1 and Requirements R1 and R2 of PRC-005-1, to mean "any Protection System that is installed for the purpose of detecting faults on transmission elements (lines, buses, transformers, etc.) identified as being included in the Bulk Electric System (BES) and trips an interrupting device that interrupts current supplied directly from the BES." n5 In addition, NERC's proposed interpretation states that "[a] Protection System for a radially connected transformer energized from the BES would be considered a transmission Protection System and subject to these standards [*6] only if the protection trips an interrupting device that interrupts current supplied directly from the BES and the transformer is a BES element." n6

11. The Commission approves NERC's interpretation as it is consistent with the intent of Requirements R1 and R3 of PRC-004-1 and Requirements R1 and R2 of PRC-005-1. The interpretation clarifies that the Requirements are "applicable to any Protection System that is installed for the purpose of detecting faults on

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transmission elements (lines, buses, transformers, etc.) identified as being included in the [BES] and trips an interrupting device that interrupts current supplied directly from the BES." n7 This interpretation is consistent with the Commission's understanding that a "transmission Protection System" is installed for the purpose of detecting and isolating faults affecting the reliability of the bulk electric system through the use of current interrupting devices. The Commission further understands that the "interrupting device" referred to in the interpretation is a device that has the performance capability to interrupt full fault current associated with the protected bulk electric system facilities.

North American Electric Reliability Corporation, Order No. 785, 144 FERC ¶ 61,221 (2013) (Approving Generator Requirements at the Transmission Interface).

P7. "NERC asserted that the proposed modifications in Reliability Standards PRC-004-2.1a and PRC-005-1.1b are designed merely to clarify that their requirements extend not only to protection systems associated with the generating facility or station itself, but also to any protection systems associated with the generator interconnection facilities."

P10. In the NOPR, "the Commission found that the clarifications proposed in PRC-004-2.1a and PRC-005-1.1b would mitigate the possibility that the standards' requirements could be interpreted to exclude the generator interconnection facilities."

P 30. "We agree with NERC that the changes mitigate the possibility that entities could interpret the standards to exclude generator interconnection facilities."

Appendix 1¹ of Standard PRC-004-2.1a

| Requirement Number and Text of Requirement |
|--|
| <p>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 Reliability Organization’s procedures developed for Reliability Standard PRC-003 Requirement 1.</p> <p>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 Corrective Action Plans according to the Regional Reliability Organization’s procedures developed for PRC-003 R1.</p> |
| Question: |
| <p>Is protection for a radially-connected transformer protection system energized from the BES considered a transmission Protection System subject to this standard?</p> |
| Response: |
| <p>The request for interpretation of PRC-004-1 Requirements R1 and R3 focuses on the applicability of the term “transmission Protection System.” The NERC Glossary of Terms Used in Reliability Standards contains a definition of “Protection System” but does not contain a definition of transmission Protection System. In these two standards, use of the phrase transmission Protection System indicates that the requirements using this phrase are applicable to any Protection System that is installed for the purpose of detecting faults on transmission elements (lines, buses, transformers, etc.) identified as being included in the Bulk Electric System (BES) and trips an interrupting device that interrupts current supplied directly from the BES.</p> <p>A Protection System for a radially connected transformer energized from the BES would be considered a transmission Protection System and subject to these standards only if the protection trips an interrupting device that interrupts current supplied directly from the BES and the transformer is a BES element.</p> |

¹ When the request for interpretation was made, it was for a previous version of the standard. Although the interpretation references a previous version of the standard, because it is still applicable in this case, it is appended to this version of the standard.

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Revision History

| Version | Date | Reviewers | Revision Description |
|------------|------------------|---------------------------------------|--|
| 1 | September 2011 | QRSAW WG | Original Document. |
| 1 | October 14, 2011 | NERC Legal | Updated Excerpts from FERC Orders from March 31, 2009 through and including October 14, 2011. |
| 1.1 | February 2013 | Jacki Power | Appended FERC-approved interpretation of R1 and R3 |
| 1.1 | April 2013 | Willie Phillips | Legal review. No changes. |
| 1.2 | August 2013 | NERC Compliance, RSAW-WG, CMFG, ECEMG | Edited Compliance Assessment Approaches throughout to instruct auditors to focus on entities identification and analysis of Protection System misoperations. Also, edited Notes to Auditor to reference the Supplemental Information section to understand entity's process for identifying Protection System misoperations. |
| 1.3 | March 2014 | NERC Compliance | Added table for Registered Entity to provide audit evidence. |
| 1.4 | March 2014 | RSAW Task Force | Updated to reflect changes to standard from errata. |
| <u>1.5</u> | <u>July 2014</u> | <u>NERC Compliance</u> | <u>Updated to reflect applicability to dispersed power producing resources in Requirements R2 and R3.</u> |

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