

**Compliance Questionnaire and**

**Reliability Standard Audit Worksheet**

**PRC-001-1.1(ii) — System Protection Coordination**

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

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

**Applicable Function(s): BA, TOP, GOP**

**Auditors:**

**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.

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)***

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| **SME Name** | **Title** | **Organization** | **Requirement** |
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# Reliability Standard Language

**PRC-001-1.1(ii) — System Protection Coordination**

**Purpose:**

To ensure system protection is coordinated among operating entities.

**Applicability:**

Balancing Authorities

Transmission Operators

Generator Operators

**NERC BOT Approval Date: 2/12/2015**

**FERC Approval Date: 5/29/2015**

**Reliability Standard Enforcement Date in the United States: 5/29/2015**

**Requirements**:

1. Each Transmission Operator, Balancing Authority, and Generator Operator shall be familiar with the purpose and limitations of Protection System schemes applied in its area.

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

***Response Required)***

**Question:**

Who are the Transmission Operator, Generator Operator, and Balancing Authority personnel identified as being familiar with the purpose and limitations of Protection System schemes applied in their area? Please provide the job titles of identified personnel.

**Registered Entity Response (Required):**

# R1 Supporting Evidence and Documentation

**Response: *(Registered Entity Response Required)***

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***This section must be completed by the Compliance Enforcement Authority.***

**Compliance Assessment Approach Specific to PRC-001-1.1(ii) R1.**

\_\_\_ Verify the identified personnel are familiar with:

\_\_\_ The purpose of relay protection schemes applied in its area.

\_\_\_ The limitations of relay protection schemes applied in its area.

(Protection System schemes shall include, but are not limited to, Special Protection Systems within its area.)

Note to auditor: Auditors shall use their professional judgment to determine whether identified personnel are familiar with the purpose and limitations of Protection System schemes applied in its area. Identified Generator Operator personnel should be familiar with the purpose and limitations of its generator protection system and any associated generator interconnection Facilities. In general, the purpose of relay protection schemes relates to what type of fault the protection system will detect (ground fault, phase to phase fault, failure to clear fault, backup etc.) and how the detection is accomplished (measure impedance of fault, differential measurement, etc.). Examples of limitations could include, but are not limited to, a Zone 1 relay typically being set to detect faults up to about 80% of a line, or a transformer differential relay only detecting a fault between two current transformers on each side of the transformer bank. Evidence may include, but is not limited to, training records and personnel interviews, training with an overview of the different types of protection used on the system for generators, transmission line(s), and transformers on the entity’s system. Also, an overview of the zones of protection, fault locations and which relay would operate based on the location is desirable. If the entity has Special Protection Systems (SPSs), any training could include an overview of the SPS’s operation, arming and disarming of the SPS and how to verify which mode is in service. Documentation of any training provided should be specific training on the purpose of protection systems and limitations associated with the entity’s system. Auditors need reasonable assurance that the required familiarity exists at the functional level (TOP, BA, GOP) of the entity. An interview of all identified personnel, or a statistical sample thereof, may be performed, but is not required.

**Auditor’s Detailed Notes:**

1. Each Generator Operator and Transmission Operator shall notify reliability entities of relay or equipment failures as follows:
   1. If a protective relay or equipment failure reduces system reliability, the Generator Operator shall notify its Transmission Operator and Host Balancing Authority. The Generator Operator shall take corrective action as soon as possible.
   2. If a protective relay or equipment failure reduces system reliability, the Transmission Operator shall notify its Reliability Coordinator and affected Transmission Operators and Balancing Authorities. The Transmission Operator shall take corrective action as soon as possible.

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

***Response Required)***

**Question** – Did you have an equipment or relay failure during the audit period which reduced system reliability? If yes, provide evidence you notified the proper entities.

**Entity** **Response: *(Registered Entity Response Required)***

# R2 Supporting Evidence and Documentation

**Response: *(Registered Entity Response Required)***

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***This section must be completed by the Compliance Enforcement Authority.***

**Compliance Assessment Approach Specific to PRC-001-1.1(ii) R2.**

\_\_\_ Verify the entity took the following actions related to a relay or equipment failure that reduced system reliability:

\_\_\_ (R2.1) Generator Operator notified its Transmission Operator and Host Balancing Authority and

\_\_\_ Generator Operator took corrective action as soon as possible.

\_\_\_

\_\_\_ (R2.2) Transmission Operator notified its Reliability Coordinator and affected Transmission Operators and Balancing Authorities and

\_\_\_ Transmission Operator took corrective action as soon as possible.

**Auditor’s Detailed notes:**

1. A Generator Operator or Transmission Operator shall coordinate new protective systems and changes as follows.
   1. Each Generator Operator shall coordinate all new protective systems and all protective system changes with its Transmission Operator and Host Balancing Authority.

* Requirement R3.1 is not applicable to the individual generating units of dispersed power producing resources identified through Inclusion I4 of the Bulk Electric System definition.
  1. Each Transmission Operator shall coordinate all new protective systems and all protective system changes with neighboring Transmission Operators and Balancing Authorities.

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

***Response Required)***

**Question:** Have you made changes to new or added new protective systems during the audit period? If yes, provide evidence you coordinated with the appropriate entities.

**Entity** **Response: *(Registered Entity Response Required)***

# R3 Supporting Evidence and Documentation

**Response: *(Registered Entity Response Required)***

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***This section must be completed by the Compliance Enforcement Authority.***

**Compliance Assessment Approach Specific to PRC-001-1.1(ii) R3.**

\_\_\_ Verify the entity coordinated new protective systems and changes as follows:

\_\_\_ Each Generator Operator coordinated with its Transmission Operator and Host Balancing Authority.

\_\_\_ Each Transmission Operator coordinated with neighboring Transmission Operators and Balancing Authorities.

**Auditor’s Detailed notes:**

1. Each Transmission Operator shall coordinate Protection Systems on major transmission lines and interconnections with neighboring Generator Operators, Transmission Operators, and Balancing Authorities.

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

***Response Required)***

# R4 Supporting Evidence and Documentation

**Response: *(Registered Entity Response Required)***

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***This section must be completed by the Compliance Enforcement Authority.***

**Compliance Assessment Approach Specific to PRC-001-1.1(ii) R4.**

\_\_\_Verify each Transmission Operator coordinated Protection Systems on major transmission lines and interconnections with neighboring Generator Operators, Transmission Operators, and Balancing Authorities.

**Auditor’s Detailed notes:**

1. A Generator Operator or Transmission Operator shall coordinate changes in generation, transmission, load or operating conditions that could require changes in the Protection Systems of others:
   1. Each Generator Operator shall notify its Transmission Operator in advance of changes in generation or operating conditions that could require changes in the Transmission Operator’s Protection Systems.
   2. Each Transmission Operator shall notify neighboring Transmission Operators in advance of changes in generation, transmission, load, or operating conditions that could require changes in the other Transmission Operators’ Protection Systems.

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

***Response Required)***

**Question:** Did you experience changes in operating conditions that could require changes of Protection Systems of other entities? If yes, provide evidence of coordination.

**Entity** **Response: *(Registered Entity Response Required)***

# R5 Supporting Evidence and Documentation

**Response: *(Registered Entity Response Required)***

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|  | **Provide the following:**  **Document Title and/or File Name, Page & Section, Date & Version** | | |
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***This section must be completed by the Compliance Enforcement Authority.***

**Compliance Assessment Approach Specific to PRC-001-1.1(ii) R5.**

\_\_\_ Verify each Generator Operator or Transmission Operator coordinated changes in generation, transmission, load or operating conditions that could require changes in the Protection Systems of others.

\_\_\_ Verify the Generator Operator notified its Transmission Operator in advance of changes in generation or operating conditions that could require changes in the Transmission Operator’s Protection Systems.

\_\_\_ Verify the Transmission Operator notified neighboring Transmission Operators in advance of changes in generation, transmission, load, or operating conditions that could require changes in the other Transmission Operators’ Protection Systems.

**Auditor’s Detailed notes:**

1. Each Transmission Operator and Balancing Authority shall monitor the status of each Special Protection System in their area, and shall notify affected Transmission Operators and Balancing Authorities of each change in status.

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

***Response Required)***

# R6 Supporting Evidence and Documentation

**Response: *(Registered Entity Response Required)***

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***This section must be completed by the Compliance Enforcement Authority***

**Compliance Assessment Approach Specific to PRC-001-1.1(ii) R6.**

\_\_\_ Verify the entity monitors the status of each Special Protection System in its area.

\_\_\_ Verify the entity notified affected Transmission Operators and Balancing Authorities of each change in status.

**Auditor’s Detailed notes:**

# Supplemental Information

**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)

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| **Req.** | **NF** | **PV** | **OEA** | **NA** | **Statement** |
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**Excerpts from FERC Orders -- For Reference Purposes Only**

**Updated Through March 31, 2009**

**PRC-001-1**

**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 1419. PRC-001-1ensures that protection systems are coordinated among operating entities by requiring transmission and generator operators to notify appropriate entities of relay or equipment failures that could affect system reliability. In addition, transmission and generator operators must coordinate with appropriate entities when new protection systems are installed, or when existing protection systems are modified.

P 1433. The Commission approves PRC-001-1 as mandatory and enforceable….

P 1435. Protection systems on Bulk-Power System elements are an integral part of reliable operations. They are designed to detect and isolate faulty elements on a power system, thereby limiting the severity and spread of disturbances and preventing possible damage to protected elements. If a protection system can no longer perform as designed because of a failure of its relays, system reliability is reduced or threatened. In deriving SOLs and IROLs, moreover, the functions, settings, and limitations of protection systems are recognized and integrated. Systems are only reliable when protection systems perform as designed. This is what PRC-001-1 means in linking a reduction in system reliability with a protection relay failure or other equipment failure.

P 1436. … we note that while the PRC Reliability Standards do not specifically require protection systems consisting of redundant and independent protection groups for each critical element in the Bulk-Power System, such requirements are included as one potential solution in the TPL Reliability Standards.

P 1438. In the case, … of a system element protected by a single protection System with a failed relay that threatens system reliability, that scenario would require the use of appropriate operating solutions including removing a system element from service. Another possible solution is to operate a system at a lower SOL or IROL that recognizes the degraded protection performance.

P 1439. Corrective actions taken by transmission operators to return a system to a secure operating state when a protective relay or equipment failure reduces system reliability normally refer to “operator control actions”, consisting of operator actions such as removing the facility without protection from service, generation redispatch, transmission re-configuration, etc. Corrective action must be completed as soon as possible, but no longer than 30 minutes after a notice of protection system failure. Failure to complete corrective action within 30 minutes will be considered a violation of the relevant IROL or TOP Reliability Standards. In contrast, troubleshooting or replacing failed relays or equipment are performed by field maintenance personnel and normally take hours or even days to complete. These actions are not normally considered corrective actions in the context of real-time operation of the Bulk-Power System.

P 1440. We believe that “[t]he transmission operator shall take corrective action as soon as possible” refers to transmission operators taking operator control actions. It does not refer to troubleshooting, repairing or replacing failed relays or equipment, etc., since these time-consuming corrective actions would prolong the risk of cascading failures to the Bulk-Power System.

P 1442. We agree … that generator operators do not have the same ability as transmission operators to take corrective control actions on the Bulk-Power System…

P 1443. As explained above, the requirement for system operators to take corrective control action when protective relay or equipment failure reduces system reliability should be treated the same as the requirement for returning a system to a secure and reliable state after an IROL violation, i.e., as soon as possible, but no longer than 30 minutes after a violation. A longer time limit would place an entity in violation of relevant IROL or TOP Reliability Standards.

P 1448. … The time allowed for mitigating actual IROL violations is very clear: as soon as possible and within 30 minutes. We clarify that our concern is not about “field protection and control personnel not being alerted about failure of relays and protection systems on critical elements.” Our focus, rather, is that upon detection of failure of relays and protection systems on critical elements, field personnel must report the failures promptly to the transmission operators so that corrective operator control actions can be taken as soon as possible and within 30 minutes… with respect to …[concerns] that our proposed directives would result in local-level personnel undermining or not following the instructions of reliability coordinator personnel at a time when the system is unstable, we do not understand how local level personnel, who have no operating control of a transmission operator’s system or a reliability coordinator’s system could do so.

P 1449. The Commission approves Reliability Standard PRC-001-1 as mandatory and enforceable. …

**June 8, 2007 Order Approving Regional Reliability Standards for the Western Interconnection and Directing Modifications, Docket No. RR07-11-000**

P 87. We note that upon failure of protective relays, NERC Reliability Standard PRC-001-1 requires transmission operators and generator operators to take corrective actions as soon as possible (within thirty minutes as directed by Order No. 693). Order No. 693 clarifies that “corrective actions” do not refer to the repair of protective relays, but instead to actions that ensure the reliability of the system, such as lowering IROLs and SOLs. The proposed regional Reliability Standard does not relieve compliance with this requirement but, rather, adds more stringency by defining a maximum timeframe for removal and repair of protective equipment.

**February 3, 2012 Order Approving Revised Definition of Protection System, Docket No. RD11-13-000**

P 5. The current definition of Protection System includes protective relays, associated communication systems, voltage and current sensing devices, station batteries and DC control circuitry.The revised definition with the proposed modification states:

“Protection System –

* 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 station batteries, battery chargers, and non-battery-based dc supply), and
* Control circuitry associated with protective functions through the trip coil(s) of the circuit breaker or other interrupting devices.”

P 9. The Commission finds that the ERO’s modification to the definition of Protection System is just, reasonable, not unduly discriminatory or preferential, and in the public interest.As explained by NERC, battery chargers are essential to assure that batteries used to operate protection systems are in a continuous state of readiness. Therefore, it is appropriate that battery chargers be included in the definition of Protection System. The modified definition removes any uncertainty as to whether battery chargers should be included in a responsible entity’s maintenance and testing program and, therefore, closes a reliability gap identified by NERC.

***North American Electric Reliability Corp.,* 151 FERC ¶ 61,186 (2015)**

[May 29, 2015 Letter Order in Docket No. RD15-3-000](http://www.nerc.com/FilingsOrders/us/FERCOrdersRules/Letter%20Order%20Approving%20DGR%20Reliability%20Standards.pdf)

P 2. The Commission-approved definition of “bulk electric system,” inclusion I4, provides:

Dispersed power producing resources that aggregate to a total capacity greater than 75 MVA (gross nameplate rating), and that are connected through a system designed primarily for delivering such capacity to a common point of connection at a voltage of 100 kV or above.

Thus, under inclusion I4, the elements designated as bulk electric system are: (i) the individual resources; and (ii) the system designed primarily for delivering capacity from the point where those resources aggregate to greater than 75 MVA to a common point of connection at a voltage of 100 kV or above.

P 4. NERC explains that the design and operational characteristics of dispersed power producing resources are different than traditional generation. In particular, dispersed power producing resources are typically comprised of many individual generating units and, in most instances the units are similar in design and produced by the same manufacturer. The aggregated capability of the facility may contribute significantly to the reliability of the Bulk-Power System, and therefore, the equipment utilized to aggregate the individual units to a common point of interconnection with the transmission system should be operated and maintained as required by the NERC Reliability Standards subject to these petitions. Thus, NERC proposes to modify each of the identified Reliability Standards to include applicability language in provisions pertaining to generator owners and generator operators of resources identified through inclusion I4 of the bulk electric system definition.

P 16. The revisions to eight Reliability Standards, approved in this order, are designed to clarify the applicability to owners of dispersed power producing resources. These entities comprise a subset of the generator owners in the NERC Compliance Registry.

**Revision History**

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| **Version** | **Date** | **Reviewers** | **Revision Description** |
| 1 | October 2009 | RSAW Working Group | New Document. |
| 1 | December 2010 | QRSAW WG | Revised Findings Table, modified Supporting Evidence tables, and added Revision History. |
| 1 | January 2011 | Craig Struck | Reviewed for format consistency and content. |
| 1.1 | September 2011 | Craig Struck | Format changes for 2012. |
| 1.2 | October 2013 | ECEMG | Clarified auditor guidance for R1 and R3. Other minor changes to format and wording. |
| 1.3 | February 2014 | ECEMG | Clarified auditor guidance for R1. |
| 1.4 | April 2014 | RSAWTF | Errata associated with Project 2007-17 regarding revised definition of “Protection System.” |
| 1.5 | June 2015 | NERC Compliance Assurance, RSAWTF | Revised to reflect changes to the applicability for dispersed generation resources associated with Project 2014-01. Other minor changes to format and wording. |