

Reliability Standard Audit Worksheet¹

PRC-026-1 – Relay Performance During Stable Power Swings

This section to be completed by the Compliance Enforcement Authority.

Audit ID: Audit ID if available; or REG-NCRnnnnn-YYYYMMDD
Registered Entity: Registered name of entity being audited
NCR Number: NCRnnnnn
Compliance Enforcement Authority: Region or NERC performing audit
Compliance Assessment Date(s)²: Month DD, YYYY, to Month DD, YYYY
Compliance Monitoring Method: [On-site Audit | Off-site Audit | Spot Check]
Names of Auditors: Supplied by CEA

Applicability of Requirements *[RSAW developer to insert correct applicability]*

	BA	DP	GO	GOP	IA	LSE	PC	PSE	RC	RP	RSG	TO	TOP	TP	TSP
R1							X		X					X	
R2			X									X			
R3			X									X			
R4			X									X			

Legend:

Text with blue background:	Fixed text – do not edit
Text entry area with Green background:	Entity-supplied information
Text entry area with white background:	Auditor-supplied information

¹ 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.

² Compliance Assessment Date(s): The date(s) the actual compliance assessment (on-site audit, off-site spot check, etc.) occurs.

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Findings

(This section to be completed by the Compliance Enforcement Authority)

Req.	Finding	Summary and Documentation	Functions Monitored
R1			
R2			
R3			
R4			

Req.	Areas of Concern

Req.	Recommendations

Req.	Positive Observations

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Subject Matter Experts

Identify the Subject Matter Expert(s) responsible for this Reliability Standard.

Registered Entity Response (Required; Insert additional rows if needed):

SME Name	Title	Organization	Requirement(s)

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R1 Supporting Evidence and Documentation

R1. Each Planning Coordinator, Reliability Coordinator, and Transmission Planner shall, within the first month of each calendar year, identify and provide notification to the respective Generator Owner and Transmission Owner of each Element that meets one or more of the following criteria, if any:

Criteria:

1. An Element that is located or terminates at a generating plant, where a generating plant stability constraint exists and is addressed by an operating limit or a Special Protection System (SPS) (including line-out conditions).
2. An Element that is associated with a System Operating Limit (SOL) that has been established based on stability constraints identified in system planning or operating studies (including line-out conditions).
3. An Element that has formed the boundary of an island within an angular stability planning simulation where the system Disturbance(s) that caused the islanding condition continues to be a credible event.
4. An Element identified in the most recent Planning Assessment where relay tripping occurred for a power swing during a Disturbance.

M1. Each Planning Coordinator, Reliability Coordinator, and Transmission Planner shall have dated evidence that demonstrates identification and the respective notification of the Element(s), if any, which meet one or more of the criteria in Requirement R1. Evidence may include, but is not limited to, the following documentation: emails, facsimiles, records, reports, transmittals, lists, or spreadsheets.

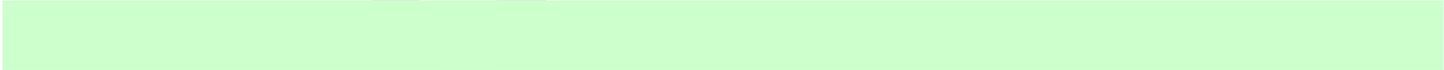
Registered Entity Response (Required):

Question: Have any Elements (i.e., generator, transformer, or transmission line) that met one or more of the criteria of Requirement R1 been identified within the entity’s area each January, since the last audit?

- Yes, this entity has identified such Elements, if any, within its area each January, since its last audit.
- No, this entity has not identified any such Elements within its area in any calendar year, since its last audit.
- Other: [Provide explanation below]

Note to Auditor: Even if the entity has not identified any Elements (i.e., generator, transformer, or transmission line) meeting one or more of the criteria of Requirement R1 in any calendar year, since its last audit, continue with auditing compliance with Requirement R1 to ensure that the entity took appropriate action to identify such Elements.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]



Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.



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Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation covering the entity’s methods for identifying Elements (i.e., generator, transformer, or transmission line) meeting one or more of the criteria of Requirement R1. Documentation must be provided for all methods used in each January since the last audit.
Documentation validating the entity’s use of its methods of identifying Elements (i.e., generator, transformer, or transmission line) to identify Elements meeting one or more of the criteria of Requirement R1. Documentation must be provided for each January since the last audit.
Dated lists for each January since the last audit, of Elements (i.e., generator, transformer, or transmission line) that met one or more of the criteria of Requirement R1. (These will be considered as “identified Elements.”)
Dated evidence since the last audit, that the entity notified the respective Generator Owner or Transmission Owner within the first month of each calendar year, of the identified Element(s) that met one or more of the criteria in Requirement R1.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.					
File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to PRC-026-1, R1

This section to be completed by the Compliance Enforcement Authority

	(R1) Review documentation covering entity’s methods for determining identified Element(s) according to the criteria in Requirement R1 for each January since the last audit. These should be reviewed regardless of whether any identified Element(s) were identified by the entity.
	(R1) Validate that the entity used its methods for determining identified Element(s) according to the criteria in Requirement R1 for each January since the last audit. This validation should be performed regardless of whether any identified Element(s) were identified.
	(R1) Review entity’s dated lists of identified Element(s), for each January since the last audit.
	(R1) Validate that all, or a sample, of the identified Element(s) were identified within each January since the last audit.
	(R1) Validate that all, or a sample, of the identified Element(s) appearing on the lists developed by the entity in each year since the last audit meet at least one of the four numbered criteria in R1.

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(R1) Validate by reviewing dated evidence that the entity notified the respective Transmission Owners and Generator Owners of all identified Element(s) in the first month of each year since the last audit.

Note to Auditor: Auditors should use their professional judgment in selecting BES Elements for testing. Sources for identifying BES Elements could include entity lists or auditor’s knowledge of generation plants or transmission systems. In order to determine if entity notified the respective Generator Owner and Transmission Owner (in accordance with Requirement R1) auditor should seek evidence, as provided in Measure M1 associated with identified BES Element.

Auditor Notes:

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R2 Supporting Evidence and Documentation

R2. Each Generator Owner and Transmission Owner shall, once each calendar year, identify each Element for which it applies a load-responsive protective relay at a terminal of an Element that meets either of the following criteria, if any:

Criteria:

1. An Element that has tripped since January 1, 2003, due to a power swing during an actual system Disturbance where the Disturbance(s) that caused the trip due to a power swing continues to be credible.
2. An Element that has formed the boundary of an island since January 1, 2003, during an actual system Disturbance where the Disturbance(s) that caused the islanding condition continues to be credible.

M2. Each Generator Owner and Transmission Owner shall have dated evidence that demonstrates identification of the Element(s), if any, which meet either of the criteria in Requirement R2. Evidence may include, but is not limited to, the following documentation: emails, facsimiles, records, reports, transmittals, lists, or spreadsheets.

Registered Entity Response (Required):

Question: Have any Elements (i.e., generator, transformer, or transmission line) to which the entity applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2 been identified, in any calendar year, since the last audit?

- Yes, this entity has identified such Elements in one or more calendar years, since its last audit,
- No, this entity has not identified any such Elements in any calendar year, since its last audit.
- Other: [Provide explanation below]

Note to Auditor: Even if the entity has not identified applicable Elements meeting one or more of the criteria of Requirement 2, in any calendar year, inclusive, continue with auditing compliance with R2 to ensure that the entity took appropriate action to identify such Elements.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.

Documentation covering the entity's methods for identifying each Element for which it applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2. Documentation should be provided for all methods used in every calendar year since the last audit.

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Documentation validating the entity’s use of its methods for identifying each Element for which it applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2. Documentation should be provided for every calendar year since the last audit.

Dated lists for each calendar year since the last audit, of Elements for which the entity applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to PRC-026-1, R2

This section to be completed by the Compliance Enforcement Authority

	(R2) Review entity’s methods for identifying Elements for which it applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2. The process(es) used in every calendar year since the last audit, should be reviewed. The process(es) should be reviewed regardless of whether any identified Elements were identified.
	(R2) Validate that the entity used its methods for identifying Elements for which it applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2. The entity’s use of its method for identifying such Elements should be validated for every calendar year, since the last audit. This validation should be performed regardless of whether any identified Elements were identified by the entity.
	(R2) Review entity’s dated lists, for each calendar year since the last audit, inclusive, of Elements for which it applied a load-responsive protective relay at a terminal of an Element that met either of the criteria of Requirement R2.

Note to Auditor: Ensure that when the entity reviewed its system to identify each Element for which it applied a load-responsive protective relay at a terminal of an Element that meets either of the numbered criteria of R2, the review included identification of such Elements with load responsive relays at all terminals of the Element meeting the numbered criteria of R2. As an example, assume Line 1 terminates at Bus X at one station, and Bus Y at another, and that Line 1 tripped at Bus X, due to a power swing, during an actual system Disturbance, since January 1, 2003, where the Disturbance(s) that caused the trip due to a power swing continues to be credible. Line 1 therefore meets Criterion 1 of R2. Ensure that the entity reviewed all

elements terminating at both Bus X and Bus Y to identify each Element for which it applied a load-responsive protective relay. Note that although tripping due to the swing occurred only at Bus X, both buses X and Y are “terminal[s] of an Element that meets ... [one] ... of the ... criteria”. The same logic applies to those Elements meeting Criterion 2 (An Element that has formed the boundary of an island since January 1, 2003, during an actual system Disturbance where the Disturbance(s) that caused the islanding condition continues to be credible.)

Auditors should use their professional judgment in selecting BES Elements for testing. Sources of such trips or islanding could include entity lists or auditor’s knowledge of events occurring on the entity’s system. In order to determine if entity identified the BES Elements (i.e., generator, transformer, or transmission line) in accordance with Requirement R2. The auditor should seek evidence, such as that provided in Measure M2.

Auditor should identify instances where an entity identified a BES Element but did not make the identification within each calendar year.

Auditor Notes:

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R3 Supporting Evidence and Documentation

- R3.** Each Generator Owner and Transmission Owner shall, once each calendar year, perform one of the following for each Element identified pursuant to Requirement R1 or R2:
- Demonstrate that the existing Protection System is not expected to trip in response to a stable power swing based on the criterion below.
 - Demonstrate that the existing Protection System is not expected to trip in response to a stable power swing because power swing blocking is applied.
 - Develop a Corrective Action Plan (CAP) to modify the Protection System so that the Protection System is not expected to trip in response to a stable power swing based on the criterion below or by applying power swing blocking.
 - If none of the options above results in dependable fault detection or dependable out-of-step tripping:
 - a. obtain agreement from the respective Planning Coordinator, Reliability Coordinator, and Transmission Planner of the Element that the existing Protection System design and settings are acceptable, or
 - b. obtain agreement from the respective Planning Coordinator, Reliability Coordinator, and Transmission Planner of the Element that a modification of the Protection System design, settings, or both are acceptable, and develop a CAP for this modification of the Protection System.

Criterion:

A distance relay impedance characteristic, used for tripping, that is completely contained within the lens characteristic formed in the impedance (R-X) plane that connects the endpoints of the total system impedance by varying the sending end and receiving end voltages from 0 to 1.0 per unit, while maintaining a constant system separation angle across the total system impedance where:

1. The system separation angle is:
 - At least 120 degrees where power swing blocking is not applied, or
 - An angle less than 120 degrees as agreed upon by the Planning Coordinator, Reliability Coordinator, and Transmission Planner where power swing blocking is not applied.
2. All generation is in service and all transmission Elements are in their normal operating state.
3. Sub-transient reactance is used for all machines.

- M3.** Each Generator Owner and Transmission Owner shall have dated evidence that demonstrates one of the options was performed according to Requirement R3. Evidence may include, but is not limited to, the following documentation: apparent impedance characteristic plots, email, design drawings, facsimiles, R-X plots, software output, records, reports, transmittals, lists, settings sheets, or spreadsheets.

Registered Entity Response (Required):

Question: Does the entity have any identified any Elements pursuant to Requirements R1 and R2 in any calendar year, since its last audit?

- Yes, this entity has such Elements, in one or more calendar years, since its last audit.
- No, this entity does not have any such Elements, in any calendar year, since its last audit.
- Other: [Provide explanation below]

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Note to Auditor: If the entity does not have any identified Elements pursuant to Requirements R1 and R2 in any calendar year, since its last audit, auditing of Requirement R3 is not required.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested¹:

Provide the following evidence, or other evidence to demonstrate compliance.
Lists of all Elements identified pursuant to Requirements R1 and R2 in each year since the last audit.
Evidence, for each year since the last audit, that demonstrates that for all Elements identified pursuant to Requirements R1 and R2, the entity's load-responsive protection relay(s) either: <ul style="list-style-type: none"> • met the criterion (not expected to trip). • has power swing blocking applied (not expected to trip). • Was, will be, or is being modified under a CAP to modify the Protection System so that the Protection System is not expected to trip in response to a stable power swing based on the Requirement R3 Criterion or by applying power swing blocking. Or, if none of the options above resulted in dependable fault detection or dependable out-of-step tripping, evidence that the entity: <ul style="list-style-type: none"> ○ Obtained agreement from the respective PC, RC, and TP that the existing Protection System design or settings was acceptable, or ○ Obtained agreement from the respective PC, RC, and TP that a modification Protection System design, settings or both were acceptable.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.					
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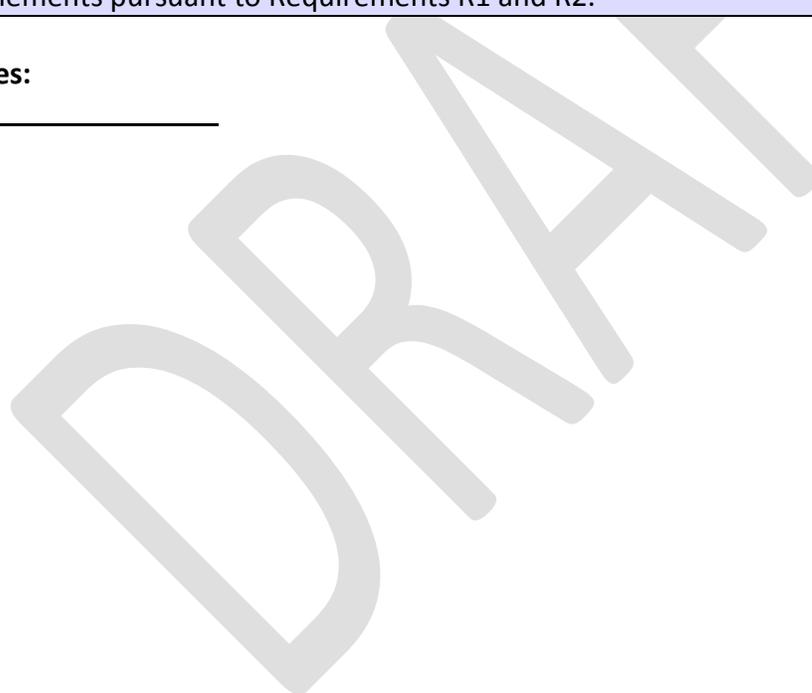
Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to PRC-026-1, R3

This section to be completed by the Compliance Enforcement Authority

<i>The RSAW Developer will complete this section with a set of detailed steps for the audit process. See the RSAW Developer's Guide for more information.</i>	
	Select all, or a sample, of the system Elements identified pursuant to Requirements R1 and R2, in each calendar year since the last audit.
	Validate that the load-responsive protective relay associated with each selected Element meets or met the protection tripping dependability, and security against tripping in response to a stable power swing characteristics of Requirement R3, for each calendar year since the last audit.
Note to Auditor: Auditors should use their professional judgment in selecting load-responsive protective relays of an identified BES Element for audit testing. Sources of load-responsive protective relays for audit testing should be obtained from information learned by, or provided to, the auditor from testing of identified Elements pursuant to Requirements R1 and R2.	

Auditor Notes:



R4 Supporting Evidence and Documentation

- R4.** Each Generator Owner and Transmission Owner shall implement each CAP developed pursuant to Requirement R3, and update each CAP if actions or timetables change, until all actions are complete.
- M4.** The Generator Owner and Transmission Owner shall have dated evidence that demonstrates implementation of each CAP according to Requirement R4, including updates to actions or timetables. Evidence may include, but is not limited to, the following documentation: corrective action plans, maintenance records, settings sheets, project or work management program records, or work orders.

Registered Entity Response (Required):

Question: Does the entity have any identified Elements pursuant to Requirements R1 and R2 in any calendar year since its last audit?

- Yes, this entity has identified Elements, in one or more calendar years, since its last audit.
- No, this entity does not have any identified Elements, in one or more calendar year, since its last audit.
- Other: [Provide explanation below]

Note to Auditor: If the entity does not have any identified Elements pursuant to Requirements R1 and R2 in any calendar year, since its last audit, auditing of Requirement R4 is not required.

[Note: A separate spreadsheet or other document may be used. If so, provide the document reference below.]

Registered Entity Response (Required):

Compliance Narrative:

Provide a brief explanation, in your own words, of how you comply with this Requirement. References to supplied evidence, including links to the appropriate page, are recommended.

Evidence Requested:

Provide the following evidence, or other evidence to demonstrate compliance.
Documentation covering all CAPs, pursuant to Requirement R3, developed, in progress, or completed since the last audit. Documentation should include all original and updated timetables, and all original and updated plan actions.

Registered Entity Evidence (Required):

The following information is requested for each document submitted as evidence. Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

File Name	Document Title	Revision or Version	Document Date	Relevant Page(s) or Section(s)	Description of Applicability of Document

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Audit Team Evidence Reviewed (This section to be completed by the Compliance Enforcement Authority):

Compliance Assessment Approach Specific to PRC-026-1, R4

This section to be completed by the Compliance Enforcement Authority

<i>The RSAW Developer will complete this section with a set of detailed steps for the audit process. See the RSAW Developer's Guide for more information.</i>	
	Review the CAP documentation to ensure that materials covering all CAPs identified in Requirement R3 for all calendar years since the last audit have been provided.
	Review the documentation to ensure that actions and timetables were updated on all CAPs, developed in progress, or completed since the last audit.
Note to Auditor: Auditors should use their professional judgment in selecting CAPs for audit testing. Sources of CAPs for audit testing should be obtained from information learned by, or provided to, the auditor in Requirement R3. In checking for implementation, auditors should verify evidence (such as described in Measure M4) that the actions or activities prescribed by the CAP were actually performed by the entity. Items, such as work management records, supporting the implementation of actions and timetables to implement the CAP are alternatives to a written document.	

Auditor Notes:

Additional Information:

Reliability Standard

The RSAW developer should provide the following information without hyperlinks. Update the information below as appropriate.

The full text of PRC-026-1 may be found on the NERC Web Site (www.nerc.com) under “Program Areas & Departments”, “Reliability Standards.”

In addition to the Reliability Standard, there is an applicable Implementation Plan available on the NERC Web Site.

In addition to the Reliability Standard, there is background information available on the NERC Web Site.

Capitalized terms in the Reliability Standard refer to terms in the NERC Glossary, which may be found on the NERC Web Site.

Sampling Methodology [If developer deems reference applicable]

Sampling is essential for auditing compliance with NERC Reliability Standards since it is not always possible or practical to test 100% of either the equipment, documentation, or both, associated with the full suite of enforceable standards. The Sampling Methodology Guidelines and Criteria (see NERC website), or sample guidelines, provided by the Electric Reliability Organization help to establish a minimum sample set for monitoring and enforcement uses in audits of NERC Reliability Standards.

Regulatory Language [Developer to ensure RSAW has been provided to NERC Legal for links to appropriate Regulatory Language – See example below]

E.g. FERC Order No. 742 paragraph 34: “Based on NERC’s.....”

E.g. FERC Order No. 742 Paragraph 55, Commission Determination: “We affirm NERC’s.....”

Selected Glossary Terms [If developer deems applicable]

The following Glossary terms are provided for convenience only. Please refer to the NERC web site for the current enforceable terms.

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Revision History for RSAW

Version	Date	Reviewers	Revision Description
1.0	05/23/2014	RSAW Task Force	New RSAW

ⁱ Items in the Evidence Requested section are suggested evidence that may, but will not necessarily, demonstrate compliance. These items are not mandatory and other forms and types of evidence may be submitted at the entity's discretion.

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