

DRAFT Reliability Standard Audit Worksheet¹

VAR-002-3 – Generator Operation for Maintaining Network Voltage Schedules

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: Audit
Names of Auditors: Supplied by CEA

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

	BA	DP	GO	GOP	IA	LSE	PA	PSE	RC	RP	RSG	TO	TOP	TP	TSP
R1				X											
R2				X											
R3				X											
R4				X											
R5			X												
R6			X												

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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Subject Matter Experts

Identify Subject Matter Expert(s) responsible for this Reliability Standard. (Insert additional rows if necessary)

Registered Entity Response (Required):

SME Name	Title	Organization	Requirement(s)

DRAFT

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R1 Supporting Evidence and Documentation

- R1.** The Generator Operator shall operate each generator connected to the interconnected transmission system in the automatic voltage control mode (with its automatic voltage regulator (AVR) in service and controlling voltage) unless the Generator Operator 1) is exempted by the Transmission Operator, or 2) has notified the Transmission Operator of one of the following:
- That the generator is being operated in start-up,³ shutdown,⁴ or testing mode pursuant to a Real-time communication or a procedure that was previously provided to the Transmission Operator; or
 - That the generator is not being operated in the automatic voltage control mode for a reason other than start-up, shutdown, or testing.
- M1.** The Generator Operator shall have evidence to show that it notified its associated Transmission Operator any time it failed to operate a generator in the automatic voltage control mode as specified in Requirement R1. If a generator is being started up or shut down with the automatic voltage control off, or is being tested, and no notification of the AVR status is made to the Transmission Operator, the Generator Operator will have evidence that it notified the Transmission Operator of its procedure for placing the unit into automatic voltage control mode. Such evidence must include, but is not limited to, dated evidence of transmittal of the procedure such as an electronic message or a transmittal letter with the procedure included or attached. If exempted, the Generator Operator shall also have evidence that it is exempted from being in automatic voltage control mode (with its AVR in service and controlling voltage).

Registered Entity Response to Question (Required):

Registered Entity Response to General Compliance with this Requirement (Required):

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

Evidence Requested⁵:

Provide the following evidence, or other evidence to demonstrate compliance. If the provisioning of this evidence is burdensome or otherwise unreasonable, contact your CEA to arrange for sampling or other means of reduction of the quantity of evidence submitted.

³ Start-up is deemed to have ended when the generator is ramped up to its minimum continuously sustainable load and the generator is prepared for continuous operation.
⁴ Shutdown is deemed to begin when the generator is ramped down to its minimum continuously sustainable load and the generator is prepared to go offline.
⁵ 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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See M1.

Registered Entity Evidence (Required):

The following information is recommended for all evidence submitted:
File Name, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description
Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

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

Compliance Assessment Approach Specific to VAR-002-3, R1

This section to be completed by the Compliance Enforcement Authority

	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.
	For instances where entity did not operate a generator in automatic voltage control mode, ensure notification was given to the Transmission Operator in accordance with Requirement R1.

Note to Auditor: Auditors can identify instances where entities operated generators outside of automatic voltage control mode through their general knowledge of the interconnected transmission system in the entity’s area. Auditor knowledge is obtained through activities such as conversations with the entity under audit or the Transmission Operator, and an awareness of events occurring on the interconnected transmission system. In situations where the entity’s compliance with this requirement poses little risk to the BES, conversations with other entities, such as Transmission Operators, is most likely not necessary.

Auditor Notes:

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R2 Supporting Evidence and Documentation

- R2.** Unless exempted by the Transmission Operator, each Generator Operator shall maintain the generator voltage or Reactive Power schedule⁶ (within each generating Facility's capabilities⁷) provided by the Transmission Operator, or otherwise shall meet the conditions of notification for deviations from the voltage schedule provided by the Transmission Operator.
- 2.1.** When a generator's AVR is out of service or the generator does not have an AVR, the Generator Operator shall use an alternative method to control the generator reactive output to meet the voltage or Reactive Power schedule directed by the Transmission Operator.
 - 2.2.** When directed to modify voltage, the Generator Operator shall comply or provide an explanation of why the schedule cannot be met.
 - 2.3.** Generator Operators that do not monitor the voltage at the location specified in their voltage schedule shall have a methodology for converting the scheduled voltage specified by the Transmission Operator to the voltage point being monitored by the Generator Operator.
- M2.** In order to identify when a unit is deviating from its schedule, the Generator Operator will monitor voltage based on existing equipment at its Facility. The Generator Operator shall have evidence to show that the generator maintained the voltage or Reactive Power schedule provided by the Transmission Operator, or shall have evidence of meeting the conditions of notification for deviations from the voltage schedule provided by the Transmission Operator. Evidence may include, but is not limited to, operator logs, SCADA data, phone logs, and any other notifications that would alert the Transmission Operator or otherwise demonstrate that the Generator Operator complied with the Transmission Operator's instructions for addressing deviations from the voltage schedule.

For part 2.1, when a generator's AVR is out of service or the generator does not have an AVR, a Generator Operator shall have evidence to show an alternative method was used to control the generator reactive output to meet the voltage or Reactive Power schedule directed by the Transmission Operator.

For part 2.2, the Generator Operator shall have evidence that it complied with the Transmission Operator's directions to modify its voltage or provided an explanation to the Transmission Operator of why the Generator Operator was unable to comply with the direction. Evidence may include, but is not limited to, operator logs, SCADA data, and phone logs.

For part 2.3, for units that do not monitor the voltage at the location specified on the voltage schedule, the Generator Operator shall document or be able to demonstrate the method of conversion from the voltage level monitored to the voltage level specified on the voltage schedule.

Question: As a Generation Operator, have you operated the generator with the AVR out of service?

⁶ The voltage or Reactive Power schedule is a target value with a tolerance band or a voltage or Reactive Power range communicated by the Transmission Operator to the Generator Operator.

⁷ Generating Facility capability may be established by test or other means, and may not be sufficient at times to pull the system voltage within the schedule tolerance band. Also, when a Generator is operating in manual control, reactive power capability may change based on stability considerations.

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Registered Entity Response to Question (Required):

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Registered Entity Response to General Compliance with this Requirement (Required):

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

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Evidence Requested⁸:

Provide the following evidence, or other evidence to demonstrate compliance. If the provisioning of this evidence is burdensome or otherwise unreasonable, contact your CEA to arrange for sampling or other means of reduction of the quantity of evidence submitted.
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See M2.

Any written policies, procedures or protocols describing how the entity maintains the generator voltage or Reactive Power schedule provided by Transmission Operator, if the entity has such documents.

Generator voltage or Reactive Power schedule provided to entity by Transmission Operator, or entity's record thereof, for timeframes selected by the auditor.

Registered Entity Evidence (Required):

The following information is recommended for all evidence submitted:
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File Name, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description

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):

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Compliance Assessment Approach Specific to VAR-002-3, R2

This section to be completed by the Compliance Enforcement Authority

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.
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⁸ 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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	Interview entity staff and/or review documentation provided by the entity to understand how they maintain the generator voltage or Reactive Power schedule or authorized exemption per Requirement R2.
	Read entity’s response to compliance Question above and understand how entity complies with Requirement R2, when they operate a generator with AVR in not in service.
	Select a sample of timeframes during the audit period and have entity walkthrough how they complied with Requirement R2 for those timeframes.

Note to Auditor: Based on the risk of the entity’s compliance with this requirement on the Bulk Electric System (BES) and the auditor’s assessment of the entity’s management practices (or internal controls) over compliance with this Requirement, auditors will determine the extent of the above audit procedures to apply. In cases where risk to the BES is low and the entity’s management practices, gleaned by the auditor through walkthroughs or documentation review, are sound only limited audit testing is necessary. In cases where risk is higher and controls are less effective, an auditor should sample enough timeframes, per above, to gain reasonable assurance that entity is complying with Requirement R2.

For part 2.3, the entity should be able to provide documentation that identifies the voltage number being monitored and the calculation demonstrating how it equates to the schedule provided by the Transmission Operator. The measure for VAR-002-3 Requirement R2, part 2.3 is clear on what evidence should be able to demonstrate this during an audit. The entity can only be responsible for maintaining the schedule provided by the Transmission Operator based on existing facility equipment. In the event that an entity does not have the equipment to have visibility of high-side system voltage, the entity will not have the ability to adjust VARs to maintain system voltage. An auditor is not to determine that, where the entity does not have the high side monitoring equipment and where the AVR is set appropriately based on existing facility equipment, the entity is non-compliant. However, if the Transmission Operator provides a new directive or schedule, the entity is required to follow the new directive. This directive can include modifying an AVR setting or providing more voltage support, and the entity is expected to comply pursuant to VAR-002-3.

Auditor Notes:

R3 Supporting Evidence and Documentation

- R3.** Each Generator Operator shall notify its associated Transmission Operator of a status change on the AVR, power system stabilizer, or alternative voltage controlling device within 30 minutes of the change. If the status has been restored within the first 15 minutes of such change, then there is no need to notify the Transmission Operator.
- M3.** The Generator Operator shall have evidence it notified its associated Transmission Operator within 30 minutes of the change identified in Requirement R3. If the status has been restored within the first 15 minutes, no notification is necessary; therefore, if a status change lasts more than 15

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minutes, the GOP must notify its associated Transmission Operator within 30 minutes of when the change first occurred.

Registered Entity Response to General Compliance with this Requirement (Required):

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

Evidence Requested⁹:

Provide the following evidence, or other evidence to demonstrate compliance. If the provisioning of this evidence is burdensome or otherwise unreasonable, contact your CEA to arrange for sampling or other means of reduction of the quantity of evidence submitted.

Any written policies, procedures or protocols describing how the entity responds to a status change on AVR, if the entity has such documents. An example of entity's response to a status change on AVR provided by entity, if applicable.

Auditor may select certain instances where entity had a status change on AVR. In such instances, provide associated evidence of awareness and resolution/notification.

Evidence as outlined in M3.

Registered Entity Evidence (Required):

The following information is recommended for all evidence submitted:

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

Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

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

Compliance Assessment Approach Specific to VAR-002-3, R3

This section to be completed by the Compliance Enforcement Authority

	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.
	Interview entity staff and/or review documentation provided by the entity to understand how they

⁹ 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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	respond to status changes on AVR.
	Review evidence provided to determine if entity responded to status change on AVR in accordance with Requirement R3.

Note to Auditor: Based on the risk of the entity's compliance with this requirement on the Bulk Electric System (BES) and the auditor's assessment of the entity's management practices (or internal controls) over compliance with this Requirement, auditors will determine the extent of the above audit procedures to apply. In cases where risk to the BES is low and the entity's management practices, gleaned by the auditor through walkthroughs or documentation review, are sound only limited audit testing is necessary. In cases where risk is higher and controls are less effective, an auditor should sample enough timeframes, per above, to gain reasonable assurance that entity is complying with Requirement R3.

Auditor Notes:

R4 Supporting Evidence and Documentation

- R4.** Each Generator Operator shall notify its associated Transmission Operator within 30 minutes after becoming aware of a change in reactive capability due to factors other than a status change described in Requirement R3. If the capability has been restored within the first 15 minutes of such change, then there is no need to notify the Transmission Operator.
- M4.** The Generator Operator shall have evidence it notified its associated Transmission Operator within 30 minutes of the recognition of a reactive capability change identified in Requirement R4. If the capability has been restored within the first 15 minutes, no notification is necessary; therefore, if a capability change lasts more than 15 minutes, the Generator Operator must notify its associated Transmission Operator within 30 minutes of when the change first occurred.

Registered Entity Response to General Compliance with this Requirement (Required):

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

Evidence Requested¹⁰:

Provide the following evidence, or other evidence to demonstrate compliance. If the provisioning of this evidence is burdensome or otherwise unreasonable, contact your CEA to arrange for sampling or other means

¹⁰ 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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of reduction of the quantity of evidence submitted.

Any written policies, procedures or protocols describing how the entity responds to a change in reactive capability, if the entity has such documents. An example of entity's response to a change in reactive capability provided by entity, if applicable.

Auditor may select certain instances where entity should have been aware of a status change in reactive capability. In such instances, provide associated evidence of awareness and resolution/notification. See Note to Auditor for additional details.

Evidence as outlined in M4.

Registered Entity Evidence (Required):

The following information is recommended for all evidence submitted:

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

Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

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

Compliance Assessment Approach Specific to VAR-002-3, R4

This section to be completed by the Compliance Enforcement Authority

	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.
	Interview entity staff and/or review documentation provided by the entity to understand how they respond to change in reactive capability.
	Review evidence provided to determine if entity responded to change in reactive capability in accordance with Requirement R4.

Note to Auditor: It is clear that VAR-002-3, Requirement R4 will only be a violation if the change is not reported after 30 minutes of becoming aware of the status change in reactive capability. An auditor will ask an entity for evidence to demonstrate when it became aware of the change. This will not be purely subjective; there are technical instances (e.g. unit trips, ramping, equipment/AVR failures) where it will be clear that an entity would have been made aware of the change in reactive capability. For example, one instance is where a unit is ramping to an expected VAR output, and it cannot reach it; a reactive capability change has occurred.

Auditor Notes:

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R5 Supporting Evidence and Documentation

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- R5.** The Generator Owner shall provide the following to its associated Transmission Operator and Transmission Planner within 30 calendar days of a request.
 - 5.1.** For generator step-up transformers and auxiliary transformers with primary voltages equal to or greater than the generator terminal voltage:
 - 5.1.1.** Tap settings.
 - 5.1.2.** Available fixed tap ranges.
 - 5.1.3.** Impedance data.
- M5.** The Generator Owner shall have evidence it provided its associated Transmission Operator and Transmission Planner with information on its step-up transformers and auxiliary transformers as required in Requirements R5 part 5.1.1 through part 5.1.3.

Registered Entity Response to General Compliance with this Requirement (Required):

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

Evidence Requested¹¹:

Provide the following evidence, or other evidence to demonstrate compliance. If the provisioning of this evidence is burdensome or otherwise unreasonable, contact your CEA to arrange for sampling or other means of reduction of the quantity of evidence submitted.
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Evidence as outlined in M4. Evidence of transmittal of the data could include, but is not limited to, items such as an electronic message or a transmittal letter with the information included or attached.
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Registered Entity Evidence (Required):

The following information is recommended for all evidence submitted: File Name, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

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

¹¹ 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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Compliance Assessment Approach Specific to VAR-002-3, R5

This section to be completed by the Compliance Enforcement Authority

	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.
	Review evidence (documented date of request and reply) to determine if entity responded to information request(s) as required in Requirement R5 within 30 days of receiving a request from associated Transmission Operator.
Note to Auditor: Based on the auditors professional judgment, he or she may confirm with Transmission Operators to determine if requests for data were made or simply confirm the existence of such requests with the entity under audit.	

Auditor Notes:

R6 Supporting Evidence and Documentation

- R6.** After consultation with the Transmission Operator regarding necessary step-up transformer tap changes, the Generator Owner shall ensure that transformer tap positions are changed according to the specifications provided by the Transmission Operator, unless such action would violate safety, an equipment rating, a regulatory requirement, or a statutory requirement.
 - 6.1.** If the Generator Operator cannot comply with the Transmission Operator's specifications, the Generator Operator shall notify the Transmission Operator and shall provide the technical justification.
- M6.** The Generator Owner shall have evidence that its step-up transformer taps were modified per the Transmission Operator's documentation as identified in Requirement R6. The Generator Operator shall have evidence that it notified its associated Transmission Operator when it could not comply with the Transmission Operator's step-up transformer tap specifications as identified in Requirement R6 part 6.1.

Registered Entity Response to General Compliance with this Requirement (Required):

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

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Evidence Requested¹²:

Provide the following evidence, or other evidence to demonstrate compliance. If the provisioning of this evidence is burdensome or otherwise unreasonable, contact your CEA to arrange for sampling or other means of reduction of the quantity of evidence submitted.

See M6.

Registered Entity Evidence (Required):

The following information is recommended for all evidence submitted:
File Name, Document Title, Revision, Date, Page(s), Section(s), Section Title(s), Description
Also, evidence submitted should be highlighted and bookmarked, as appropriate, to identify the exact location where evidence of compliance may be found.

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

Compliance Assessment Approach Specific to VAR-002-3, R6

This section to be completed by the Compliance Enforcement Authority

	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.
	Review evidence (documented date of request and response) to determine if entity responded to change(s) as required in Requirement R6.

Note to Auditor: Based on the auditors professional judgment, he or she may confirm with Transmission Operators to determine if requests for changes to transformer tap positions were made or simply confirm the existence of such requests with the entity under audit.

Auditor Notes:

Revision History

Version	Date	Reviewers	Revision Description
1	11/XX/2013	NERC compliance,	New Document

¹² 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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		Standards	

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