SOP-RTMKTS.0180.0055 -

Process and Perform Reactive Capability Tests

Contents

1. Objective

The objective of this procedure is to document the process to apply for, perform, and receive data from a reactive capability audit that demonstrates the reactive capability of each ISO New England (ISO) Reactive Resource required to perform an audit.

2. Background

The ISO New England Inc. Transmission, Markets and Services Tariff (ISO Tariff), Section II, Open Access Transmission Tariff (OATT) Schedule 2 - Reactive Supply and Voltage Control Service (Schedule 2), ISO Tariff Section III.1.5.3-Reactive Capability Audits, and ISO New England Operating Procedure No. 23 - Resource Auditing (OP-23), provide governance for reactive capability audits.

Any Resource listed in OP-23, Appendix G - Reactive Resources Required to Perform Reactive Capability Auditing (OP-23G), for the ISO reactive capability auditing program must perform that auditing at least every five years. Additionally, the Resources must perform a Reactive Capability Audit following each major overhaul, rewind, or power re-rating if reactive capability changes have occurred.

Additionally, in order to receive Volt-Amp reactive (VAr) capacity payment under Schedule 2, a Reactive Resource must request to become a Qualified Reactive Resource (QRR) in the Capacity Cost Compensation Program (CCCP) in accordance with Schedule 2 and the ISO New England Ancillary Service Schedule No.2 Business Procedure (Schedule 2 BP). The Schedule 2 BP defines the criteria for QRR eligibility, payment eligibility, and all required data to be submitted to ISO prior to a Reactive Resource being designated as a QRR. A QRR is also required to perform periodic reactive capability auditing.

In addition to ISO-required auditing, some Resources may be required to perform reactive power capability verification under North American Electric Reliability Corporation (NERC) Reliability Standard MOD-025 - Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability (MOD-025).

OP-23 contains the general requirements for the submittal, collection and processing of data from ISO-required auditing. NERC-required verification details are contained in NERC MOD-025. While ISO receives data from NERC MOD-025 verification, ISO does **not** track the required testing dates for NERC MOD-025 testing.

Auditing Overview

A Reactive Resource that is required to perform reactive capability auditing, is required to meet the audit requirements as defined in OP-23. After the initial audit and on an ongoing basis, each Reactive Resource performs leading and lagging auditing at least once every five (5) years. As an alternative to performing a scheduled audit, a Reactive Resource may submit historical data that meets the auditing requirements of OP-23 in order to substantiate its reactive capability and meet its leading or lagging audit

requirement. If the Reactive Resource is a QRR and does **not** perform a valid leading or lagging audit as prescribed in Schedule 2 BP, the QRR will be suspended from the CCCP for the audit that was not performed. A Reactive Resource that is required to perform an audit assumes the responsibility for all costs incurred while performing the audit.

Leading and lagging audits may be performed at any time during the calendar year.

3. Responsibilities

NOTE

Any North American Electric Reliability Corporation (NERC) Certified System Operator, certified at the RC level, has the authority to take action(s) required to comply with NERC Reliability Standards.

The Real-Time Studies group performs the VAr Administrator duties.

1. The VAr Administrator is responsible for:

   - Receiving all audit data used to verify reactive capability from the Reactive Resource.
   - Entering data into appropriate software and producing reports as required.
   - Reviewing a Lead Market Participant (Lead MP) request to include a Resource as a QRR in order to verify that the Reactive Resource meets the requirements for compensation as prescribed in Schedule 2 and the Schedule 2 BP.
   - Reviewing the list of Reactive Resources which are required to audit in order to verify that each Reactive Resource listed has performed an audit in the proper periodicity or has been suspended from the CCCP, as appropriate.
   - Reviewing and approving all new and revised NX-12D data forms submitted by a Lead MP.

2. Real-Time Studies Engineer is responsible for monitoring submittals of audit requests and performing a voltage study for each audit request that is submitted in the ISO Outage Scheduling software for a Reactive Resource with a capability that is greater than or equal to 10 MVAr.

3. The Manager, Real-Time Studies is responsible for oversight of the proper administration of the Schedule 2 CCCP, including approving all reactive capability audit waiver requests.

4. Controls

1. Only designated personnel authorized by the Manager, Real-Time Studies are allowed to process the audit documents and access the auditing software.

NOTE

This procedure contains control steps {i.e., applicable to the American Institute of Certified Public Accountants (AICPA) Standard [Statement on Standards for Attestation Engagements (SSAE)]} that are defined as Control Activities (CA) that are included in the SSAE 18 Audit Report [(i.e., identified in the Annual Service Organization Control 1 (SOC 1) Controls Monitoring Form)] that are indicated per RSMKGT.0060.0010.

- Each procedure step that is a Control Activity is identified with "CA" and is highlighted in yellow.
    - Each specific CA included in the SOC 1 report is identified using the following format, CA: [Control Activity step]

5. Instructions

5.1 Qualified Reactive Resource Request

5.1.1 Qualify a Reactive Resource

1. Upon receipt of an application for a Reactive Resource to become a QRR, the VAr Administrator shall PERFORM the following actions:

   A. REVIEW the following and VERIFY completeness:

   - The QRR application
   - The NX-12D for the Reactive Resource
   - The supplied one-line diagram

   B. VERIFY the following:

   - There is MW, MVAr and Automatic Voltage Regulator (AVR) telemetry from the Reactive Resource to ISO and the Local Control Center (LCC)
   - The Reactive Resource is **not** included in Master/Local Control Center Procedure No.8 - Coordination of Generator Voltage Regulator and Power System Stabilizer Outages (M/LCC 8), Attachment A - Generators Exempted from AVR Requirements

NOTE

Automatic voltage regulation equipment can include but is **not** limited to: distributed control systems, wind plant power plant controllers, and flexible AC transmission system controls. Depending upon the controlling logic, these controllers may control all or some of the dynamic and static devices at a station. Technical evaluation is required to determine whether a control system reacts in a short enough timeframe for a control system to be considered equivalent to a traditional synchronous generator AVR. In general, AVR-like equipment should respond nearly instantaneously to contingencies and provide full lagging or leading capability in less than five (5) seconds; however, this is a general guideline and every installation needs to be evaluated for performance.

2. If the Reactive Resource meets all of the criteria, found in ISO New England Ancillary Service Schedule No. 2 Business Procedure Section 2.2.1.1, to be included in the CCCP, the VAR Administrator shall PERFORM the following:

   A. CONTACT the following to determine if there are any issues with including the Reactive Resource in the CCCP:

(1) Voltage Task Force Chairperson

(2) LCC Head

(3) Manager, Control Room Operations

(4) Manager, Real-Time Studies

B. CA :
PRESENT all pertinent data to the Reliability Committee for a recommendation regarding allowing the inclusion of the Reactive Resource into the CCCP.

3. The VAr Administrator shall:

A. REVIEW the recommendations regarding including the Reactive Resource in the CCCP

B. DETERMINE, based upon the recommendations, if the Reactive Resource will be included in the CCCP

4. If the Reactive Resource is to be included in the CCCP, the VAr Administrator shall PERFORM the following:

C. NOTIFY the following:

(1) Settlements of the new CCCP Asset.

(2) Lead MP that the Reactive Resource is being included in the CCCP and the required audit dates.

D. CA :
ENTER information for the Reactive Resource into the Settlement Management System (SMS) software by COMPLETING an initial QRR checklist and performing the following steps:

(1) SELECT “Add” located at the bottom of the SMS VAr User Interface (UI) screen

(2) In the “Search” box, ENTER the “Asset ID” of the Reactive Resource to be included in the CCCP

(3) On the “Asset” screen, ENTER the following data:

a. Asset Mode: Both

b. Satellite: LCC with which the Reactive Resource is associated

c. Eligibility Effective Date: first of the month following NEPOOL Reliability Committee (RC) recommendation for

inclusion

NOTE

Point of Interconnection is defined in the OATT Schedules 22 and 23.

Resources without a defined Point of Interconnection will use an equivalent point where the Resource interconnected to the administered transmission system in order to calculate losses for payment.

d. GSU Reactance: the reactance equivalent between the reactive device(s) and the Point of Interconnection or equivalent

e. S base: 100

f. Leading and lagging Effective Date: first of the month following NEPOOL Reliability Committee recommendation for inclusion

g. Leading and lagging Test Due Date (i.e., either one or the other of the following conditions is met):

- If the Reactive Resource has **not** audited within the past five (5) years: six (6) months following the Leading or Lagging Effective Date
- If the Reactive Resource has audited within the past five (5) years: December 31, five (5) years after the most recent audit date

h. As provided on the QRR request form and the NX-12D form (normal operating data if **not** audited): leading and lagging:

- P gross
- Q gross
- Station Service MW
- Station Service MVAR
- Gen Terminal Voltage

(4) SAVE the data in the SMS UI

5. If the Reactive Resource is **not** going to be included in the CCCP, the VAr Administrator shall NOTIFY the applicable Lead MP of the reason the Reactive Resource is **not** being included in the CCCP.

5.2 Track Required Audit Dates

NOTE

ISO tracks auditing data from both CCCP and OP-23G required auditing programs.

ISO receives auditing data required by NERC MOD-025; however, ISO does **not** track the required MOD-025 auditing dates.

1. At the beginning of each calendar year, the VAr Administrator shall:

   A. DETERMINE which Reactive Resources are required to perform an audit (lagging or leading) during that year for either of the following:

   - CCCP (by querying the database)
   - OP-23 reactive capability auditing program (by reviewing the OP-23G document)

   B. NOTIFY the Lead MP of each Reactive Resource that is required to perform an audit during that year.

2. Each month following the NEPOOL Reliability Committee Meeting, the VAr Administrator shall:

   A. REVIEW the RC Actions Letter on the Reliability Committee page of the ISO External Website: https://www.iso-ne.com/committees/reliability/reliability-committee

   B. DETERMINE if any approved Reactive Resource proposed plan application (PPA) would affect that Reactive Resource's reactive capability

   C. REVIEW the relevant PPA(s) to determine the proposed effective date of the reactive changes

   D. ENTER the required data on the PPA Tracking Tool worksheet found at \\Iso-ne.com\shares\tso\VAR Testing\PPA Tracking

   E. REVIEW the PPA Tracking Tool worksheet for any PPA proposed effective dates in the past

   F. CONTACT the Lead MP for any Reactive Resource with a PPA with a proposed effective date in the past

      (1) DETERMINE if the Reactive Resource modification has become effective

      (2) If the Reactive Resource modification has become effective:

a. NOTIFY the Lead MP of the Reactive Resource that the Resource is required to perform leading and lagging reactive capability testing within six (6) months of the PPA effective date

b. If the new reactive capability is less than the previous reactive capability, UPDATE the SMS UI by performing the following:

i. Leading and lagging Effective Date: The first of the month following the PPA effective date

ii. Leading and lagging Test Due Date: Six (6) months after the PPA effective date

iii. As provided on the PPA: leading and lagging

- P gross
- Q gross

iv. SAVE the data in the SMS UI

c. If the new reactive capability is greater than the previous reactive capability, UPDATE the SMS UI by performing the following:

i. Leading and lagging Effective Date: The first of the month following the PPA effective date

ii. Leading and lagging Test Due Date: Six (6) months after the PPA effective date

iii. SAVE the data in the SMS UI

d. DELETE the PPA from the PPA Tracking Tool

(3) If the Resource modification has **not** become effective,

a. OBTAIN a new proposed effective date from the Lead MP

b. UPDATE the PPA Tracking Tool with the new proposed effective date

5.3 Conduct Reactive Capability Audit

5.3.1 Initiate Reactive Capability Audit Process

NOTE

Each Lead MP is required to submit an audit request **no** later than five (5) business days prior to the day the audit is to be conducted. ISO, in consultation with the applicable LCC(s), may use discretion to allow a shorter lead time for an audit request that does **not** require an extensive study.

An application for auditing a Reactive Resource with a capability of less than 10 MVAr normally does **not** require reliability assessment by ISO.

1. The Real-Time Studies Engineer shall REVIEW each new submitted audit request as follows:

   A. PERFORM a stability study for any audit request that meets any of the following conditions:

      (1) Leading audit

         a. Nameplate leading capability is greater than or equal to 65 MVAr

         b. Resource is identified in a Stability Transmission Operating Guide

         c. Resource is located in a locally constrained area with a facility-out condition during auditing

      (2) Lagging audit

         a. None

   B. For each application for auditing of a Reactive Resource with a capability of greater than or equal to 10 MVAr, PERFORM the following:

      (1) REVIEW the reactive capability audit request form attached to the CROW application, for completeness

NOTE

Reactive Resources that share equipment such as, but **not** limited to, generator step-up transformers (GSUs), station service, collector systems/buses, and control systems may require reactive capability audits to be performed concurrently in order to determine any shared limitations on the Resources.

      (2) REVIEW the one-line diagram for the Reactive Resource and DETERMINE if the Reactive Resource is required to perform the

audit with one or more other Reactive Resources because of shared equipment.

(3) PERFORM reliability assessment for the audit request.

NOTE

NERC Standard MOD-025 and ISO-required auditing (OP-23 and CCCP) verification testing will **not** normally be denied or rescheduled unless the performance of the testing would jeopardize Real-Time reliability.

ISO or the LCC may request that a Lead MP perform Reactive Capability Auditing at certain times or load levels in order to provide the most advantageous system conditions for auditing.

C. Based upon the reliability and stability studies, DETERMINE if the application will be approved, denied, or moved.

D. UPDATE the status of each audit request in the ISO Outage Scheduling software, conforming to ISO New England Operating Procedure No. 5 – Resource Maintenance and Outage Scheduling timelines.

5.3.2 Process Reactive Capability Audit Data

NOTE

The effective date for audit data in the VAr UI is the first of the month following the date that the data was received and accepted by ISO.

1. When a MOD-025 reactive capability verification data form is received, the VAr Administrator shall ARCHIVE the data for future use.

2. After receiving a complete audit data form for OP-23 or CCCP, the VAr Administrator shall

A. CA :

VERIFY that the form was submitted less than or equal to 45 calendar days after a Reactive Resource demonstrated its reactive capability.

B. ARCHIVE on the VAr SharePoint Site both the audit data form and Attachment A - VAr Testing Checklist in order to perform the following steps:

(1) OPEN a new VAr Testing Checklist.

(2) SAVE an individual checklist for each audit performed.

NOTE

Audit data verification sources may include, but are **not** limited to, the plant

information (PI) system or LCC data archives.

(3) CA :

REVIEW the audit data form by performing each step of the "Submitted Data Validation" section of the checklist.

C. CA :
If the VAr Administrator determines that there is a discrepancy with the submitted audit data, the VAr Administrator shall:

(1) CONTACT the Lead MP

(2) INVESTIGATE the cause of the discrepancy

(3) RESOLVE the issue

(4) ACCEPT or REJECT the audit data based upon the resolution

NOTE

The VAr Administrator can take discretionary action in response to a variety of situations, including minor errors made by the Lead MP, that are caused by a unique and unforeseen situation such as, but **not** limited to, a unit fire, illness, strike, etc.

The discretionary action should be exercised only in situations creating an unjustifiable burden on the Reactive Resource and there is **no** feasible remedy.

D. The VAr Administrator shall MAINTAIN a record of each discretionary action taken by entering comments into the "Notes" field in the SMS UI.

E. If the discrepancy **cannot** be resolved, the VAr Administrator shall EMAIL the Lead MP stating both of the following:

(1) The audit data has been rejected

(2) The applicable test due date for the audit

F. CA :
After the audit data has been verified as correct using appropriate data sources (e.g., PI), the VAr Administrator shall:

(1) Using the "SMS Data Entry" section of the checklist, ENTER data from each completed and approved audit into the SMS software and SAVE the data

(2) CA :
A second Analyst shall PERFORM selected steps of the checklist

(as indicated on the checklist) and VERIFY proper data entry into the SMS software

NOTE

The VAr audit results are reviewed by the Voltage Task Force in a separate process.

G. Upon review of the audit data, the Chairperson of the Voltage Task Force shall NOTIFY the VAr Administrator if further auditing is required for OP-23 reliability auditing.

H. The VAr Administrator shall PROVIDE any required feedback to the applicable Lead MP.

5.3.3 Review Monthly Audit Data

1. At the beginning of each calendar month, the VAr Administrator shall PERFORM the following:

NOTE

Each QRR is required to perform an Audit for each of the following conditions:

- Within six months of entering the CCCP (unless a valid audit has been performed within the five (5) year periodicity prior to enter the CCCP)
- Within six (6) months of notification that a new audit is required
- No later than five (5) calendar years following the most recent valid audit

A. VERIFY that all audits received for the previous month have been either accepted or rejected.

B. REVIEW the automatically generated Oracle Business Intelligence report for the following:

(1) DETERMINE which Reactive Resource(s) had a change to VAr compensation the previous month.

(a) VERIFY that all required checklists for the audits received for the previous month have been completed.

(b) VERIFY the applicable Lead MP has submitted an updated NX-12D for each approved audit.

(c) RESOLVE any issues determined on the verified checklists and NX-12D forms.

(2) DETERMINE if any Reactive Resource did not perform a required audit.

(a) For each QRR that did **not** perform the audit:

(i) CA :

UPDATE the SMS software to suspend payments to the QRR for **not** performing the required audit by performing the following in the SMS UI:

- SELECT the Reactive Resource that failed to perform a reactive capability audit
- ENTER an Effective Date for the applicable mode (leading or lagging) of the first day of the month following the end of the auditing period.
- ENTER a Program Status of "Suspended" for the applicable mode (leading or lagging).
- In the "Notes" section, ENTER comments stating that the Reactive Resource failed to audit, the date that the entry was made, and the initials of the person who entered the suspension.

(ii) EMAIL the Lead MP that the Reactive Resource has been suspended from the CCCP

(3) For each Reactive Resource listed in OP-23G that did **not** perform the audit:

(a) NOTIFY the Reliability & Operations Compliance (ROC) group of each Reactive Resource that did **not** perform required auditing for the OP-23G reactive capability auditing program.

(b) EMAIL the Lead MP that the Reactive Resource failed to perform an audit for OP-23 reactive capability audit program

5.4 Reactive Capability Audit Waiver Consideration Process

NOTE

The Lead MP may submit an audit waiver request for OP-23, CCCP, or both.

1. Within 30 days of receiving an auditing waiver request, the VAr Administrator shall:

   A. Based on the Schedule 2 BP or OP-23 requirements, EVALUATE the validity of the waiver request.

   B. CONTACT and REQUEST a recommendation for either acceptance or rejection of the waiver request from each of the following:

   - The Voltage Task Force Chairperson
   - Applicable LCC Head
   - Manager, Control Room Operations

   C. PRESENT the waiver request and the results of the recommendations received for either acceptance or rejection of the waiver request to the Manager, Real-Time Studies.

2. The Manager, Real-Time Studies shall APPROVE or REJECT each auditing waiver request.

3. CA:

   If the waiver request is approved, the VAr Administrator shall:

   A. In the UI, for the appropriate Leading or Lagging mode:

      (1) SELECT the Program Status as “Waiver Granted”

      (2) ENTER the Effective Date as the 1st of the month following waiver approval

      (3) ENTER the Test Due Date as December 31st of the year the waiver expires

      (4) SAVE the record

   B. EMAIL a letter summarizing the waiver request determination to the applicable Lead MP.

5.5 Notification of Reactive Capability Auditing Results

1. At least once each year, the VAr Administrator shall PERFORM the following:
   A. COMPILE a summary of Reactive Resources in the CCCP that have demonstrated reactive capability and Reactive Resources that are in the CCCP that have **not** done so.
   B. EMAIL the summary to the Secretaries of the RC and Transmission Committee for distribution.

5.6 Conduct AVR Spot Checks

1. On the last week of each month, the VAr Administrator shall PERFORM the following actions:

   A. REVIEW the ISO Generation Outage Scheduling software for Generators with AVR issues by performing the following:

      (1) OPEN the ISO Outage Scheduling software (CROW) application

      (2) FILTER Generation Outage Requests for all Approved and Implemented outages with a Constraint of "AVR"

   B. Perform a Real-Time AVR audit in accordance with SOP-RTMKTS.0180.0056

   C. DETERMINE each Reactive Resource that is in-service, and that is also known to have an AVR issue

   D. EMAIL each Lead MP for such Reactive Resource to provide the following notification:

      - ISO New England Operating Procedure No. 12 – Voltage and Reactive Control Section IV states the requirements for Reactive Resource automatic voltage regulation. Your Reactive Resource has been identified as part of a routine status check conducted on MMDDYY at HH:MM to have had its AVR in an unauthorized mode. Please inform the VAr Administrator at ISO, via mvarcaptest@iso-ne.com, of the reason for the AVR status and the estimated time for repair/return to automatic voltage control mode. Failure to respond may result in further investigation and possible suspension from the VAr Capacity Cost Compensation Program.

   E. MAINTAIN a complete file of all materials required for further verification and for use if suspension of compensation is required

5.7 Perform Annual PSS Operational Status Verification

1. Annually as part of the NX-12D Annual Certification, the VAr Administrator shall:

   A. CONTACT the Lead MP of the each Generator listed in M/LCC 8, Attachment B - Generators Requiring PSS Devices In/Out of Service

   B. VERIFY that the Generator PSS is operating in the required operating mode

2. If this verification identifies any discrepancies, the VAr Administrator shall NOTIFY all of the following of the discrepancy:

   - Manager, Real-Time Studies
   - The Voltage Task Force Chairperson

6. Performance Measures

None

7. References

North American Electric Reliability Corporation (NERC) Reliability Standard MOD-025 - Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability (MOD-025)

ISO New England Inc. Transmission, Markets, and Services Tariff (ISO Tariff), Section II, Open Access Transmission Tariff (OATT) Schedule 2 - Reactive Supply and Voltage Control Service (Schedule 2)

ISO New England Ancillary Service Schedule 2 Business Procedure (Schedule 2 BP)

ISO New England Operating Procedure No. 14 - Technical Requirements for Generators, Demand Response Resources, Asset Related Demands and Alternative Technology Regulation Resources (OP-14)

ISO New England Operating Procedure No. 16 - Transmission System Data (OP-16)

ISO New England Operating Procedure No. 23 - Resource Auditing (OP-23)

ISO New England Operating Procedure No. 23 - Resource Auditing (OP-23), Appendix G (App G) - Reactive Resources Required to Perform Reactive Capability Auditing

Master/Local Control Center Procedure No. 8 - Coordination of Generator Voltage Regulator and Power System Stabilizer Outages (M/LCC 8), Attachment A - Generators Exempted from AVR Requirements

Master/Local Control Center Procedure No. 8 - Coordination of Generator Voltage Regulator and Power System Stabilizer Outages (M/LCC 8), Attachment B - Generators Requiring PSS Devices In/Out of Service

SOP-RTMKTS.0180.0056 - Perform and Process a Real-Time AVR Audit

IAUDITS.0030.0040 - Manage the SSAE 18 Report, SSAE 18 Audit Report (Annual Service Organization Control 1 (SOC 1) Controls Monitoring Form)

RSKMGT.0060.0010 Manage Business Process Documentation Changes

American Institute of Certified Public Accountants (AICPA) Standard #18, [Statement on Standards for Attestation Engagements (SSAE 18)]

8. Revision History

Rev No.	Date	Reason	Contact
--	12/02/16	For previous revision history, refer to Rev 10 available through Ask ISO;	Kory Haag
11	01/15/10	Biennial review by procedure owner; Changed Header Approved By from Dir, Operations to Dir. Operations Support Services; Replaced 1st paragraph in Section 3. Responsibilities NOTE; Added responsibilities and functions for the Transmission Operations Technical Studies Engineer and the Manager of System Operations Support in Section 3; Moved 1st 2 paragraphs from NOTE prior to step 5.1.1.8 to be a new NOTE prior to step 3.2.; Added "…(≥ 25 MW capability)." to step 3.5; Updated "MVAr" to "MVAR", inserted defined term "QRR"; Step 5.1.1 - Improved process for the review and approval of new NX12D information and improved communication paths between Transmission Operations Technical Studies Engineer and the VAR Administrator ; Added new Section 5.3 – Waiver Consideration; Steps 5.1, 5.2 & 5.3 provided linkage to updating Settlements VAR software; New NOTE prior to Step 5.1.1.10 & new step 5.1.1.11 and sub-steps	Crystal Jackson
12	02/25/11	Header updated the Procedure owner; Footer replaced page numbers with Page X of Y format; Globally modified responsibilities and job titles associated with Reactive Capability testing; Added new Section 5.5; Added new section 5.6 Section 7 References, Corrected title for The Ancillary Service Schedule 2 Business Procedure and added M/LCC 8 & SOP-RTMKTS.0125.0040	Kory Haag

Rev No.	Date	Reason	Contact
13	12/09/11	Biennial review by procedure owner; Removed reference to OP-3A,; Globally replace VAR/MVAr with reactive; Minor edits for grammar and clarification; Section 2 and globally: added reference for OP-12, deleted use of "MVAr" and replaced with consistent use of terms "reactive capability testing and use of "reactive resource" as applicable, editorial changes to improve grammar and clarify information and remove unnecessary verbiage; Section 2 and globally; removed reference to single point testing and alternative demonstrations.; Section 3: clarified information in 1st paragraph, deleted the NOTE prior to step 3.2,, removed reference to OP-3 Appendix A and included information in NOTE in the applicable responsibility step, replaced step 3.10 with new step and sub-steps, added new steps 3.11, & 3.12 (and sub-steps); clarified responsibilities in step 3.1.3 Section 5.1: Re-titled the section and sub-section 5.1.1, deleted former step 5.1.1.1, 5.1.1.2 & 5.1.1.3, added new NOTE prior to step 5.1.1.1, reworded former step 5.1.1.4 as new step 5.1.1.1 and re-numbered remaining steps, added new NOTE prior to step 5.1.1.2, added new NOTE prior to step 5.1.1.4 and reworded new steps 5.1.1.4 & 5.1.1.5, added new NOTE prior to step 5.1.1.8, added new step 5.1.1.10, replaced former steps 5.1.1.13 & 14 with new step 5.1.1.12 and sub-steps; Section 5.1.2: re-titled the section, re[wrote the former NOTE and 1st step with a new NOTE prior to step 5.1.2.1, a new step 5.1.2.1 and new NOTE prior to step 5.1.2.2, re-wrote step 5.1.2.2, added new step 5.1.2.3 by adding process to second check data which affects settlements, re-wrote step 5.1.2.4; Section 5.2: re-titled this section, modified step 5.2.1, the following NOTE, step 5.2.2, 5.2.3, 5.2.4, added new step 5.2.5; Section 5.3: Re-titled this section, modified step 5.3.1, the following NOTE, step 5.3.2, 5.3.3, 5.3.4, added new step 5.3.5; Section 5.4: re-titled this section, modified step 5.4.1, 5.4.2, 5.4.3, the following NOTE modified step 5.4.4; Section 5.5: Modified step 5.5.1.A, added new step 5.5.1.B, modified step 5.5.1.C, 5.5.1.D and step 5.4.1.E ; Section 5.6; re-titled this section, new step 5.6.1, deleted remaining steps ; References : deleted OP-3, added OP-12 and added M/LCC #8 Att B	Kory Haag
14	12/09/13	Biennial review by procedure owner; Globally modified the grammar used for task performance to be consistent with current practices and management expectations; Added steps regarding checklist for receiving data from participants and entering data into the user interface. Added Appendix A checklist	Kory Haag

Rev No.	Date	Reason	Contact
15	12/15/14	Globally defined various acronyms at each 1st use and used the appropriate acronym in all subsequent uses; Section 5.2 and Section 7, added Reliability Standard MOD-025; Section 2 corrected NX-12D form title; Section 3 and Section 7, updated OP-14 title; Globally updated to reflect SOC control activities; Added new Sections 5.1 & 5.2 and applicable sub-sections and steps; Added new step 5.3.2.6 and sub-steps; Added new Section 5.6 and applicable sub-sections and steps; Where applicable updated to have monthly check of checklists; Where applicable updated to reflect use of SharePoint site; Section 7 added MOD-25, corrected OATT Schedule 2 & OP-14 titles ; Updated Att A checklist	Kory Haag
16	12/02/16	Biennial review completed by the procedure owner; Globally added required corporate document identity to all footers; Globally, deleted all references to OP-12 and as applicable replaced or added new reference to OP-23 and OP-23G; Globally added new additional detail to steps, made required editorial and grammar changes to make task statements be in the present tense, and to be consistent with current practices and management expectations; Globally, updated to reflect changes to IPR testing; Section 7 added reference M/LCC Attachment A; Truncated the Revision History per SOP-RTMKTS.0210.0010 Section 5.6;	Kory Haag
17	11/28/18	Biennial review completed by the procedure owner; Globally changed capitalization and word usage for readability and grammar and made editorial changes to be consistent with current practices and management expectations; Modified responsibility section from Transmission Operations Technical Studies Engineer to Real-Time Studies Engineer; Modified NX-12D responsibility from Real-Time Engineer to VAr Administrator; Section 5.1., added a NOTE prior to step 5.1.1.2; Section 5.3, modified step 5.3.1.1.B and added sub-steps and a NOTE; Section 7, updated OP-14 title;	Kory Haag
18	04/30/19	Update SOC 1 Control Activity numbering to reflect SOC 1 report;	Kory Haag
19	11/23/20	Document periodic review and update	Kory Haag
19.1	11/15/22	Biennial review completed by the procedure owner with no changes required.	Kory Haag
20	10/05/23	Removed voltage tolerance band checks from checklist.	Kory Haag

9. Attachments

Attachment A - VAr Testing Checklist

Attachment A - VAr Testing Checklist

I. Non-IPR

Run 1st Check Validations

Run 2nd Check Validations

Primary Analyst	Secondary Analyst

Enter Asset ID	
Asset Name	**Enter Valid Asset ID Above**
Enter date of the Test	
Enter date of Test Data Submittal	
Choose Type of Test (Leading or Lagging)	
Is unit Ambient Limited Generator that could not reach S-SCC because of ambient conditions during the Test? (Y/N)	

Tasks

1st Check Completed	CA 2nd Check Completed

Administration		
Submittal email moved into "_Under Review" Folder in MVARCapTest Inbox		MZ - 07/19/2016, 14:08:27
Send completion letter to Lead Market Participant		

CA Submitted Data Validation		
Date of Data Submittal is within 45 days of Date of Test **		
Data is submitted on correct version of Testing Excel Spreadsheet **		
Verify that Gross MW, Gross MVAr, Nominal Voltage, Actual Voltage, Station Service MW, and Station Service MVAr are provided on Test sheet		
Verify that AVR was in-service during Testing unless otherwise approved by ISO		
Verify that all units at a composite unit were tested at the same time unless otherwise approved by ISO		
Verify MW and MVAR match to Plant Information (PI) System data during Testing period		

Lagging Test Validation		
Verify that all 13 Generator Net MW within 5% (+/-) of Summer SCC (Net MW is Generator Gross MW - Station Service MW) **		
(Ambient-Limited Generator that was not within 5% (+/-) of S-SCC) - Verify that all 13 Generator Net MW within 5% (+/-) of initial output during the Test		

Leading Test Validation		
Verify that all 13 Generator Net MW within 5% (+/-) of EcoMin (Net MW is Generator Gross MW - Station Service MW) **		

CA SMS Data Entry		
Verify GSU data from NX-9 (second check required if modified)		
Verify that S Base is 100		
Select the proper Program Status (second check required if modified)		
Enter Effective Date (1st of month following Test data submittal)		
Enter Test Due Date (see "Next Test Due Dates")		
Enter Average Generator MW Output (Gross) into P Gross *		
(Ambient-Limited Generator that was not within 5% (+/-) of S-SCC) - Enter S-SCC MW value from CCAT		
Enter Average Gen Terminal MVAR into Q gross *		
(Ambient-Limited Generator that was not within 5% (+/-) of S-SCC) - (1) Subtract tested MVAR value at tested MW from reactive capability curve at tested MW. (2) Determine reactive capability curve MVAR value at S-SCC MW value. (3) Enter MVAR value equal to (2) - (1)		
Enter average Station Service MW		
Enter average Station Service MVAR (use estimated if metering not available)		
Enter average Actual Gen Terminal Voltage into Gen. Terminal Voltage		
Enter comment into Notes as applicable		
Save data into SMS database		

* If any gross MVAR is less than 75% of Average gross MVAR then enter P and Q such that Qualified MVAR is equal to the lowest MVAR value during Testing

** Denotes Test Data Rejection

II. IPR

Run 1st Check Validations

Run 2nd Check Validations

Primary Analyst	Secondary Analyst

Enter Asset ID	
Asset Name	**Enter Valid Asset ID Above**
Enter date of the Test	
Enter date of Test Data Submittal	
Choose Type of Test (Leading or Lagging)	

Tasks

1st Check Completed	CA 2nd Check Completed

Administration		
Submittal email moved into "_Under Review" Folder in MVARCapTest Inbox		[redacted]
Send Test data to Real-Time Studies		[redacted]
Send completion letter to Lead Market Participant	[redacted]	

CA Submitted Data Validation		
Date of Data Submittal is within 45 days of Date of Test **		
Data is submitted on correct version of Testing Excel Spreadsheet **		
Verify that Gross MW, Gross MVAr, Nominal Voltage, Actual Voltage, Station Service MW, and Station Service MVAr are provided on Test sheet		
Verify that AVR was in service during Testing unless otherwise approved by ISO		
Verify that all units at a composite unit were tested at the same time unless otherwise approved by ISO		
Verify that at least 90% of the power generating units were online at the time of the Test		
Verify MW and MVAR match to Plant Information (PI) System data during Testing period		

Lagging Test Validation		
Verify that all 13 Generator Net MW are within 10% (+/-) of the initial output during the Test		

Leading Test Validation		
Verify that all 13 Generator Net MW are within 10% (+/-) of the initial output during the Test		

CA SMS Data Entry		
Verify GSU data from NX-9 (second check required if modified)		
Verify that S Base is 100		
Select the proper Program Status (second check required if modified)		
Enter Effective Date (1st of month following Test data submittal)		
Enter Test Due Date (see "Next Test Due Dates")		
Enter MW equal to 90% of Summer Network Resource Capability (from NX-12)		
(1) Subtract tested MVAR value at tested MW from reactive capability curve at tested MW. (2) Determine reactive capability curve MVAR value at 90% Summer Network Resource Capability MW value. (3) Enter MVAR value equal to (2) - (1).		
Enter average Station Service MW		
Enter average Station Service MVAR (use estimated if metering not available)		
Enter average Actual Gen Terminal Voltage into Gen. Terminal Voltage		
Enter comment into Notes as applicable		
Save data into SMS database		N/A

* If any gross MVAR is less than 75% of Average gross MVAR then enter P and Q such that Qualified MVAR is equal to the lowest MVAR value during Testing

** Denotes Test Data Rejection