Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps -Completed:

1. SAR posted for comment (April 20–May 21, 2007).
2. Revised SAR and response to comments posted.
3. Revised SAR and response to comments approved by SC (June 14, 2007).
4. SDT appointed ~~on~~ (August 18, 2007).
5. First Draft of MOD-024-2 was posted for comment January 18 – February 18, 2010. MOD-024-2 was later combined with MOD-025-1 to form MOD-025-2.
6. Posted first draft of standard for a 30 day comment period June 15 –July 15, 2011

Proposed Action Plan and Description of Current Draft:

This is the ~~first~~second draft of the proposed ~~revision to this~~ standard including Time Horizons, Data Retention, Violation Risk Factors, and Violation Severity Levels~~. This first posting~~; and is being submitted for a ~~30~~45-day concurrent formal comment period~~.~~ and initial ballot.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. ~~Post first~~Develop responses to comments and develop second version draft ~~revision of~~ standard.	~~April-May~~July 2011 – February 2012
2. Post response to comments and ~~second version draft revision of~~conduct a formal 45 day comment period with concurrent initial ballot for the revised standard.	~~July – August 2011~~March - April 2012
3. ~~Post response to comments and request authorization~~Develop responses to ballot ~~the revised standard~~comments.	~~September - October 2011~~April - June 2012
4. ~~Conduct initial~~Post response to comments and conduct successive ballot.	~~November 2011~~June 2012
5. ~~Post response~~Develop responses to ballot comments.	~~December 2011~~June - July 2012
6. ~~Conduct~~Post responses to comments and conduct recirculation ballot.	~~January~~August 2012
7. BOT adoption.	~~February~~September 2012

8. File with regulatory authorities.	~~March~~November 2012

A. Introduction

1. Title: Verification and Data Reporting of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability

2. Number: MOD-025-2

3. Purpose: To ensure ~~that planning entities have~~ accurate information on generator gross and net Real and Reactive Power capability ~~data when assessing~~and synchronous condenser Reactive Power capability is available for planning models used to assess Bulk Electric System (BES) reliability.

4. Applicability:

4.1. Functional entities

4.1.1 Generator Owner

4.1.2 Transmission Owner with synchronous condenser

4.2. Facilities:

For the purpose of this standard, the term, "applicable Facility" shall mean any one of the following:

4.2.1 Individual generating unit ~~or synchronous condenser >~~greater than 20 MVA (gross nameplate rating) ~~in a generating Facility~~directly connected ~~at the point of interconnection at 100 kV or above~~to the bulk power system.

~~4.2.1~~4.2.2 Synchronous condenser greater than 20 MVA (gross nameplate rating) directly connected to the bulk power system.

~~4.2.2~~4.2.3 Generating plant/Facility ~~>~~greater than 75 MVA (gross aggregate nameplate rating) ~~and~~directly connected ~~at~~to the ~~point of interconnection at 100 kV or above~~bulk power system.

~~**4.2.3** Blackstart units, regardless of size that are included in a Transmission Operator's restoration plan.~~

5. ~~Effective~~ Effective Date:

5.1. In those jurisdictions where regulatory approval is required:

5.1.1 By the first day of the first calendar quarter, one calendar year following applicable regulatory approval, each Generator Owner and Transmission Owner shall have verified at least 20~~%~~ percent of its applicable ~~units~~Facilities.

5.1.2 By the first day of the first calendar quarter, two calendar years following applicable regulatory approval, each Generator Owner and Transmission Owner shall have verified at least 40~~%~~ percent of its applicable ~~units~~Facilities.

5.1.3 By the first day of the first calendar quarter, three calendar years following applicable regulatory approval, each Generator Owner and Transmission Owner shall have verified at least 60% percent of its applicable unitsFacilities.

5.1.4 By the first day of the first calendar quarter, four calendar years following applicable regulatory approval, each Generator Owner and Transmission Owner shall have verified at least 80% percent of its applicable unitsFacilities.

5.1.5 By the first day of the first calendar quarter, five calendar years following applicable regulatory approval, each Generator Owner and Transmission Owner shall have verified 100% percent of its applicable unitsFacilities.

5.2. In those jurisdictions where regulatory approval is not required:

5.2.1 By the first day of the first calendar quarter, one calendar year following Board of Trustees approval, each Generator Owner and Transmission Owner shall have verified at least 20% percent of its applicable unitsFacilities.

5.2.2 By the first day of the first calendar quarter, two calendar years following Board of Trustees approval, each Generator Owner and Transmission Owner shall have verified at least 40% percent of its applicable unitsFacilities.

5.2.3 By the first day of the first calendar quarter, three calendar years following Board of Trustees approval, each Generator Owner and Transmission Owner shall have verified at least 60% percent of its applicable unitsFacilities.

5.2.4 By the first day of the first calendar quarter, four calendar years following Board of Trustees approval, each Generator Owner and Transmission Owner shall have verified at least 80% percent of its applicable unitsFacilities.

5.2.5 By the first day of the first calendar quarter, five calendar years following Board of Trustees approval, each Generator Owner and Transmission Owner shall have verified 100% percent of its applicable unitsFacilities.

5.3. Wind Farm Verification - If an entity has two wind sites, and verification of one site is complete, the entity is 50% complete regardless of the number of turbines at each site.

B. Requirements

R1. Each Generator Owner shall provide its Transmission Planner with verification of the Real Power capability of its applicable Facilities as follows: *[Violation Risk Factor: ~~Lower~~Medium] [Time Horizon: Long-term Planning]*

1.1. Verify the Real ~~and~~Power capability of its generating units in accordance with Attachment 1.

1.2. Submit a completed Attachment 2 (or a form containing the same information as identified in Attachment 2) to its Transmission Planner within 90 calendar days of either the date the data is recorded for a staged test or the date the data is selected for verification using historical operational data.

R2. Each Generator Owner shall provide its Transmission Planner with verification of the Reactive Power capability of its applicable Facilities as follows: *[Violation Risk Factor: Medium] [Time Horizon: Long-term Planning]*

~~**1.1.**~~**2.1.** Verify the Reactive Power capability of its generating units and ~~shall verify~~ the Reactive Power capability of its synchronous condenser units in accordance with Attachment 1~~—~~.

~~**1.2. Record the information on**~~Submit a completed Attachment 2 (~~-~~or ~~on the Generator Owner's~~a form ~~that contains~~containing the same information as identified in Attachment 2~~);~~

~~**1.3.**~~**2.2.** ~~Submit~~) to its Transmission Planner within 90 calendar days of either the date the data is recorded ~~to its Transmission Planner~~for a staged test or the date the data is selected for verification using historical operational data.

~~**R2.**~~**R3.** Each Transmission Owner shall provide its Transmission Planner with verification of the Rective Power capability of its applicable Facilities as follows: *[Violation Risk Factor: ~~Lower~~Medium] [Time Horizon: Long-term Planning]*

~~**2.1.**~~**3.1.** Verify the Reactive Power capability of its synchronous condenser units in accordance with Attachment 1~~;~~.

~~**2.2. Record the information on**~~Submit a completed Attachment 2 (or ~~on the Transmission Owner's~~a form ~~that contains~~containing the same information as identified in Attachment 2)

~~**2.3.**~~**3.2.** ~~Submit~~ to its Transmission Planner within 90 calendar days of either the date the ~~verification to its Transmission Planner.~~ data is recorded for a staged test or the date the data is selected for verification using historical operational data

C. Measures

M1. Each Generator Owner ~~has~~will have evidence that it performed the verification, such as a completed ~~MOD-025~~ Attachment 2 or the Generator Owner form with ~~equivalent~~the same information, and ~~has~~will have evidence that it submitted the information~~,~~ and a correction for ambient conditions, if requested, within 90 days to its Transmission

Planner; such as dated electronic mail messages ~~or,~~ mail receipts, or dated information collected and used to complete attachments, in accordance with Requirement R1.

M2. Each ~~Transmission~~Generator Owner ~~has~~will have evidence that it performed the verification, such as a completed ~~MOD-025~~ Attachment 2 or ~~Transmission~~ the Generator Owner form with ~~equivalent~~the same information, and ~~has~~will have evidence that it submitted the information~~,~~ within 90 days to its Transmission Planner; such as dated electronic mail messages ~~or,~~ mail receipts, or dated information collected and used to complete attachments, in accordance with Requirement R2.

M3. Each Transmission Owner will have evidence that it performed the verification, such as a completed Attachment 2 or the Transmission Owner form with equivalent information, and will have evidence that it submitted the information within 90 days to its Transmission Planner; such as dated electronic mail messages, mail receipts, or dated information collected and used to complete attachments, in accordance with Requirement R3.

D. Compliance

1. Compliance Monitoring Process

1.1. Compliance Enforcement Authority

Regional Entity

~~**Data**~~

1.2. Evidence Retention

The following evidence retention periods identify a period of time an entity is required to retain specific evidence to demonstrate compliance. For instances where the evidence retention specified below is shorter than the time since the last compliance audit, the Compliance Enforcement Authority may ask an entity to provide other evidence to show that it was compliant for the full time period since the last audit.

The Generator Owner and Transmission Owner shall each keep the latest data ~~or~~and evidence to show compliance as identified below, and the previous set of evidence if updated since the last compliance audit unless directed by its Compliance Enforcement Authority to retain specific evidence for a longer period of time as part of an investigation:

- The Generator Owner shall retain the latest MOD-025 Attachment 2 and the data behind Attachment 2 or Generator Owner form with equivalent information and submittal evidence for ~~Requirement 1, Measure 1~~Requirements R1 and R2, Measures M1 and M2 for the time period since the last compliance audit.
- The Transmission Owner shall retain the latest MOD-025 Attachment 2 and the data behind Attachment 2 or Transmission Owner form with equivalent information and submittal evidence for Requirement ~~2~~R3, Measure ~~2~~M3 for the time period since the last compliance audit.

If a Generator Owner or Transmission Owner is found ~~non-compliant~~noncompliant, it shall keep information related to the ~~non-compliance~~noncompliance until found compliant or for the time specified above, whichever is longer.

The Compliance Enforcement Authority shall keep the last audit records and all requested and submitted subsequent audit records.

1.3. Compliance Monitoring and Assessment Processes

Compliance ~~Audits~~Audit

Self-~~Certifications~~Certification

Spot Checking

Compliance ~~Violation Investigations~~Investigation

Self-Reporting

~~Complaints~~

Complaint

1.4. Additional Compliance Information

None

2. Violation Severity Levels

R #	Lower VSL	Moderate VSL	High VSL	Severe VSL
R1	The Generator Owner verified and recorded the Real ~~and Reactive~~ Power capability of its applicable generating unit ~~or applicable synchronous condenser~~, but submitted the data to its Transmission Planner more than 90 calendar days, but within ~~100~~120 calendar days, from the date of verification by staged test or the date of the historical operating data that was ~~recorded~~selected for verification. OR The Generator Owner verified the Real Power capability and submitted the data but was missing 1 to 33 percent of the data.	The Generator Owner verified and recorded the Real ~~and Reactive~~ Power capability of its applicable generating unit ~~or applicable synchronous condenser~~, but submitted the data to its Transmission Planner more than ~~100~~120 calendar days, but within ~~110~~150 calendar days, from the of verification by staged test or the date ~~the~~of the historical operating data that was ~~recorded~~selected for verification. OR The Generator Owner verified the Real Power capability and submitted the data but was missing 33 to 66 percent of the data.	The Generator Owner verified and recorded the Real ~~and Reactive~~ Power capability of its applicable generating unit ~~or applicable synchronous condenser~~, but submitted the data to its Transmission Planner more than ~~110~~150 calendar days, but within ~~120~~180 calendar days, of the date of verification by staged test or the date of the historical operating data that was ~~recorded~~selected for verification. OR The Generator Owner verified the Real Power capability and submitted the data but was missing 67 to 99 percent of the data.	The Generator Owner verified and recorded the Real ~~and Reactive~~ Power capability of its applicable generating unit ~~or applicable synchronous condenser~~, but submitted the data to its Transmission Planner more than ~~120~~180 calendar days from the date of verification by staged test or the date of the historical operating data that was ~~recorded~~selected for verification. OR The Generator Owner failed to verify the Real ~~and Reactive~~ Power capability of an applicable generating unit. OR The Generator Owner ~~failed to~~

	OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 66 calendar months but less than or equal to 69 months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 12 calendar months but less than or equal to 13 calendar months.	OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 69 calendar months but less than or equal to 72 months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 13 calendar months but less than or equal to 14 calendar months.	OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 72 calendar months but less than or equal to 75 months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 14 calendar months but less than or equal to 15 calendar months.	~~verify~~performed the ~~Reactive Power capability of an applicable synchronous condenser unit~~verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 75 calendar months. OR ~~The Generator Owner failed to submit its verified Real or Reactive Power capability for an applicable generating unit or an applicable synchronous condenser unit to its Transmission Planner.~~ The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 12 calendar months but less than or equal to 13 calendar months.
R2	The Generator Owner verified and recorded the Reactive Power capability	The Generator Owner verified and recorded the Reactive Power capability of	The Generator Owner verified and recorded the Reactive Power capability of its	The Generator Owner verified and recorded the Reactive Power capability of its applicable

	of its applicable generating unit or applicable synchronous condenser, but submitted the data to its Transmission Planner more than 90 calendar days, but within 120 calendar days, from the date of verification by staged test or the date of the historical operating data that was selected for verification. OR The Generator Owner verified the Reactive Power capability and submitted the data but was missing 1 to 33 percent of the data. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in	its applicable generating unit or applicable synchronous condenser, but submitted the data to its Transmission Planner more than 120 calendar days, but within 150 calendar days, from the date of verification by staged test or the date of the historical operating data that was selected for verification. OR The Generator Owner verified the Reactive Power capability and submitted the data but was missing 34 to 66 percent of the data. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 69 calendar months but less than or equal to 72 months.	applicable generating unit or applicable synchronous condenser, but submitted the data to its Transmission Planner more than 150 calendar days, but within 180 calendar days, of the date of verification by staged test or the date of the historical operating data that was selected for verification. OR The Generator Owner verified the Reactive Power capability and submitted the data but was missing 67 to 99 percent of the data. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 72 calendar months but less than or equal to 75 months.	generating unit or applicable synchronous condenser, but submitted the data to its Transmission Planner more than 180 calendar days from the date of verification by staged test or the date of the historical operating data that was selected for verification. OR The Generator Owner failed to verify the Reactive Power capability of an applicable generating unit or synchronous condenser unit. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 75 calendar months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12

	more than 66 calendar months but less than or equal to 69 months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 12 calendar months but less than or equal to 13 calendar months.	OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 13 calendar months but less than or equal to 14 calendar months.	OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 14 calendar months but less than or equal to 15 calendar months.	calendar month requirement) but did so in more than 12 calendar months but less than or equal to 13 calendar months.
~~R2~~R3	The Transmission Owner verified and recorded the Reactive Power capability of its ~~applicable~~ applicable synchronous condenser, but submitted the data to its Transmission Planner more than 90 calendar days, but within ~~100~~120 calendar days, from the date the of verification by staged test or the date of the historical	The Transmission Owner verified and recorded the Reactive Power capability of its applicable ~~applicable~~ synchronous condenser, but submitted the data to its Transmission Planner more than ~~100~~120 calendar days, but within ~~110~~150 calendar days, from the date of verification by staged test or the date of the historical	The Transmission Owner verified and recorded the Reactive Power capability of an applicable synchronous condenser unit, but submitted the data to its Transmission Planner more than ~~110~~150 calendar days, but within ~~120~~180 calendar days, of the date of verification by staged test or the date of the historical operating data that was	The Transmission Owner verified and recorded the Reactive Power capability of its applicable synchronous condenser, but submitted the data to its Transmission Planner more than 180 calendar days from the date of verification by staged test or the date of the historical operating data that was selected for verification. OR The Transmission Owner failed to

	operating data that was ~~recorded~~selected for verification. OR The Transmission Owner verified the Reactive Power capability and submitted the data but was missing 1 to 33 percent of the data. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 66 calendar months but less than or equal to 69 months. OR The Generator Owner	operating data that was ~~recorded.~~selected for verification. OR The Transmission Owner verified the Reactive Power capability and submitted the data but was missing 34 to 66 percent of the data. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 69 calendar months but less than or equal to 72 months. OR The Generator Owner performed the verification	~~recorded.~~selected for verification. OR The Transmission Owner verified the Reactive Power capability and submitted the data but was missing 67 to 99 percent of the data. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 72 calendar months but less than or equal to 75 months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for	verify the Reactive Power capability of an applicable synchronous condenser unit. OR ~~The Transmission Owner failed to submit its verified Reactive Power capability for an applicable synchronous condenser unit to its Transmission Planner.~~ The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1 or item 2 (5 year requirement) but did so in more than 75 calendar months. OR The Generator Owner performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 12 calendar months but less than or equal to 13 calendar months.

	performed the verification per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 12 calendar months but less than or equal to 13 calendar months.	per Attachment 1, "Periodicity for conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 13 calendar months but less than or equal to 14 calendar months.	conducting a new verification" item 1, 2 or 3 (12 calendar month requirement) but did so in more than 14 calendar months but less than or equal to 15 calendar months.	

E. Regional Variances

None

F. Associated Documents

Version History

Version	Date	Action	Change Tracking
Version 1	12/1/2005	1. Changed tabs in footer. 2. Removed comma after 2004 in "Development Steps Completed," #1. 3. Changed incorrect use of certain hyphens (-) to "en dash" (–) and "em dash (—)." 4. Added "periods" to items where appropriate. 5. Changed apostrophes to "smart" symbols. 6. Changed "Timeframe" to "Time Frame" in item D, 1.2. 7. Lower cased all instances of "regional" in section D.3. 8. Removed the word "less" after 94% in section 3.4. Level 4.	01/20/06
Version 2	TBD	Revised per SAR for Project 2007-09 and combined with MOD-024-1	TBD

MOD-025 -Attachment 1 – Verification of Generator Real and Reactive Power Capability and Synchronous Condenser Reactive Power Capability

~~For units of less than 20 MVA~~

Periodicity for conducting a new verification:

The periodicity for performing Real and Reactive Power capability verification is as follows:

1. For staged verification; verify each applicable Facility at least every five years (with no more than 66 calendar months between verifications), or within 12 calendar months of the discovery of a change that is expected to affect its Real Power or Reactive Power capability by more than 10 percent of the last reported verified capability and is expected to last more than six months.
2. For verification using operational data; verify each applicable Facility at least every five years (with no more than 66 calendar months between verifications), or within 12 calendar months following the discovery that its Real Power or Reactive Power capability has changed by more than 10 percent of the last reported verified capability and is expected to last more than six months. If data for different points is recorded on different days, designate the earliest of those dates as the verification date, and report that date as the verification date on MOD-025, Attachment 2 for periodicity purposes.
3. For either verification method, verify each new applicable Facility within 12 calendar months of its commercial operation date.

It is intended that Real Power testing be performed at the same time as full Load Reactive Power testing, however separate testing is allowed for this standard. For synchronous condensers, perform only the Reactive Power capability verifications as specified below. If an applicable Facility is operated in synchronous condenser mode as well as generation mode, the unit should be verified in both modes.

Verification specifications for applicable Facilities:

1. For generating units of 20 MVA or less that are part of a plant greater than 75 MVA in aggregate, record data either on an individual unit basis or as a group. Perform verification individually for every generating unit or synchronous condenser greater than 20 MVA (gross nameplate rating).

2. ~~Perform verification~~Verify with all auxiliary equipment needed for expected normal operation in service for both the Real Power and Reactive Power capability verification~~, and~~. Perform verification with the automatic voltage regulator in service for the Reactive Power capability verification~~.~~ (see Note 3 if the automatic voltage regulator is not available). Operational data from within the ~~year~~two years prior to the verification date is acceptable for the verification of either the Real Power or the Reactive Power capability, as long as ~~it~~that operational data meets the criteria in 2.1 through 2.5 below and is ~~within 20% of the expected value:~~at least 90 percent of a previously staged test that demonstrated at least 50 percent of the capability shown on

the associated D-curve. If the previously staged test was unduly restricted by unusual generation or equipment limitations (e.g., capacitor or reactor banks out of service), then the next verification shall be by another staged test, not operational data:

2.1. ~~Perform verification of~~Verify Real ~~and~~Power capability, Reactive Power capability ~~of all generating units at maximum~~ over-excited (lagging) and Reactive Power capability under-excited (leading) ~~reactive capability at rated gross~~ of all applicable Facilities at the applicable Facilities' normal (not emergency) expected maximum Real Power ~~capability~~[1] at the time of the verifications. Verify variable generating units, such as wind, solar, and run of river hydro, at the maximum Real Power output the variable resource can provide at the time of the verification. Perform verification of ~~reactive~~ Reactive Power capability of wind turbines and photovoltaic inverters with ~~ninety~~at least 90 percent of the wind turbines or photovoltaic inverters at a site on ~~-~~line. If verification of wind turbines or photovoltaic inverter Facility cannot be accomplished meeting the 90 percent threshold, document the reasons the threshold was not met and test to the full capability at the time of the test. Retest the facility within six months of being able to reach the 90 percent threshold. Maintain, as steady as ~~possible~~practical, Real and Reactive Power output during ~~verification~~verifications.

2.2. Verify Reactive Power capability of all ~~generating units~~Applicable Facilities, other than wind and photovoltaic, for maximum overexcited (lagging) and under-excited (leading) reactive capability at the minimum Real Power output at which they ~~could~~are normally ~~be~~ expected to operate. Nuclear Units are not required to perform Reactive Power verification at minimum Real Power output.

2.3. Conduct the ~~rated~~maximum Real Power and ~~overexcited~~over-excited Reactive Power verifications required in 2.1 for a minimum of one continuous hour.

2.4. ~~Record~~Collect the under-excited ~~reactive~~Reactive Power capability verification data ~~required~~identified in 2.1 and 2.2, and the over-excited ~~reactive~~Reactive Power capability verification data ~~required~~identified in 2.2 as soon as a limit is reached.

2.5. For hydrogen-cooled generators, perform the verification at normal operating hydrogen pressure.

2.6. Collect the Generator Step-Up (GSU) transformer losses if the verification measurements are taken from the high side of the GSU transformer.

3. Record the following data for the ~~verification~~ verifications specified above:

3.1. The value of the gross Real and Reactive Power generating capabilities at the end of the verification period.

3.2. The voltage schedule provided by the Transmission Operator.

[1] ~~The generating unit's normal expected maximum Real Power at the time of the verification.~~

3.3. The voltage at the high and low side of the ~~generator step-up~~GSU and/or system ~~interconnection~~Interconnection transformer(s) at the end of the verification period. If only one of these values is metered, the other may be calculated.

3.4. The ambient ~~air temperature~~conditions, if applicable, at the end of the verification period ~~and a correction factor, if any, to allow~~ the ~~Transmission~~Generator Owner requires to perform corrections to ~~correct the~~ Real Power ~~rating to a~~for different ambient conditions such as:

- Ambient air temperature
- Relative humidity
- ~~3.4.~~ Cooling water temperature ~~if needed.~~

3.5. The date and time of the verification period, including start and end time in hours and minutes.

3.6. The existing ~~generator step-up~~GSU and/or system ~~interconnection~~Interconnection transformer(s) tap setting.

3.7. The GSU transformer losses if the verification measurements were taken from the high side of the GSU transformer.

3.8. Whether the test data is a result of a staged test or if it is operational data.

4. Develop a simplified key one-line diagram (refer to MOD-025, Attachment 2) showing sources of auxiliary Real and Reactive Power and associated system connections for each unit verified. Include ~~generator step-up~~GSU and/or system ~~interconnection~~Interconnection and auxiliary transformers. Show Reactive Power flows, with directional arrows.

4.1. If metering does not exist to measure specific ~~reactive~~Reactive auxiliary ~~load~~Load(s), provide an engineering estimate and associated calculations.

~~**5.** The periodicity for performing Real and Reactive Power generating capability verification is as follows:~~

~~**5.1.** For staged verification; verify each generator and/or synchronous condenser or plant/facility at least every five years, (with no more than 66 calendar months between verifications), or within one year of the discovery of a change that is expected to affect its Real Power or Reactive Power capability by more than 10% of the last reported verified capability and is expected to last more than six months.~~

~~**5.2.** For verification using operational data; verify each generator and/or synchronous condenser or plant/facility at least every five years, within 66 calendar months between verifications, or within one year following the discovery of a change that is expected to affect its Real Power or Reactive Power capability by more than 10% of the last reported verified capability and is expected to last more than six months. If data for different points is recorded on different days, the Generator Owner shall designate one of the dates as the verification date, and report that date as the verification date on MOD-025- Attachment 2 for periodicity purposes.~~

~~5.3. For either verification method, new units shall be verified within one year of their commercial operation date.~~

Note 1: ~~The~~Under some transmission system conditions, the data points obtained by the MVAR verification required by the standard ~~may~~will not duplicate the manufacturer supplied thermal capability curve (D-curve~~) due to transmission system conditions.~~). However, the verification required by the standard ~~may be able to~~ , even when conducted under these transmission system conditions, may uncover ~~unit~~applicable Facility limitations; such as rotor thermal instability, improper tap settings, inaccurate AVR operation, etc~~.~~., which could be further analyzed for resolution. ~~For any verification limited by transmission system conditions, the~~Observe auxiliary bus voltage limits. The verified MVAR value obtained most likely will not be the value entered into the Transmission Planner's database; nor is it likely this value will agree with data required to be submitted by ~~the~~ MOD-010 ~~standard~~.

Note 2: While not required by the standard, it is desirable to perform engineering ~~analysis~~analyses to determine expected ~~unit~~applicable Facility capabilities under less restrictive system ~~conditions~~voltages than those encountered during the verification. Even though this analysis will not verify the complete MVAR capability curve, it provides a reasonable estimate of ~~unit~~applicable Facility capability that the Transmission Planner can use for modeling.

Note 3: It is desired that the automatic voltage regulator be in service when testing a generator's reactive capability. If an automatic voltage regulator is not installed on the unit to be tested, or is not available at the time of the test, exercise extra caution not to exceed the operating limits of the generator.

Note 4: The verification is intended to define the limits of the unit's capabilities. If a unit has no leading capability, then it should be reported with no leading capability; or the minimum lagging capability at which it can operate.

MOD-025 Attachment 2

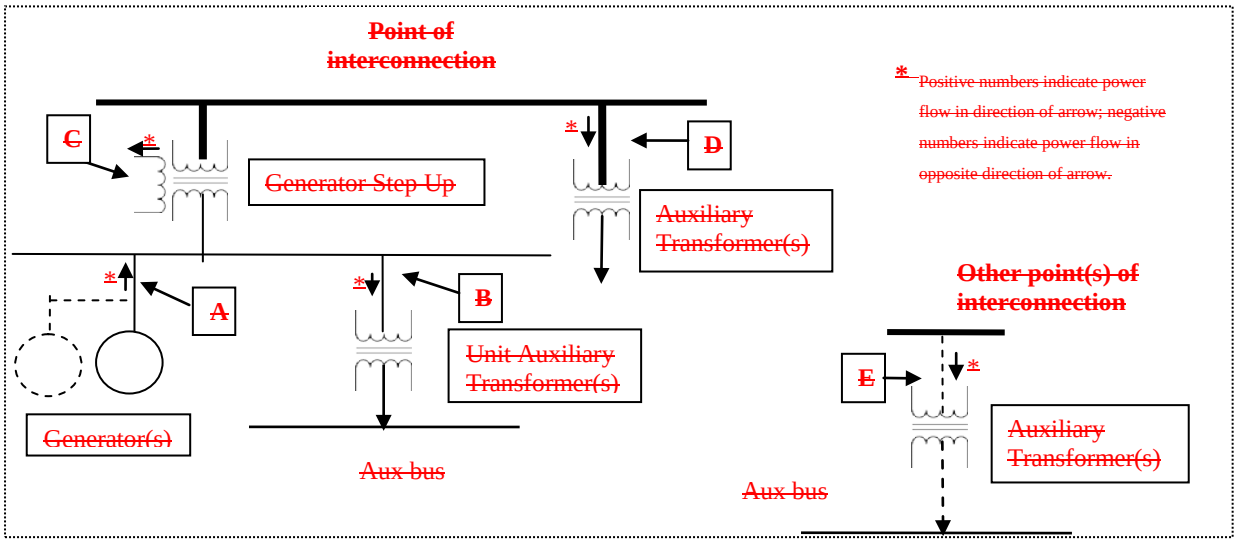
One-line Diagram, Table, and Summary for Verification Information Reporting

Note: If the configuration of the generation facilityapplicable Facility does not lend itself to the use of the diagram, tables, or summaries for reporting the required information, changes may be made to this form, provided that all required information (identified in MOD-025 Attachement, Attachment 1) is reported.

Company: **Reported By (name):**

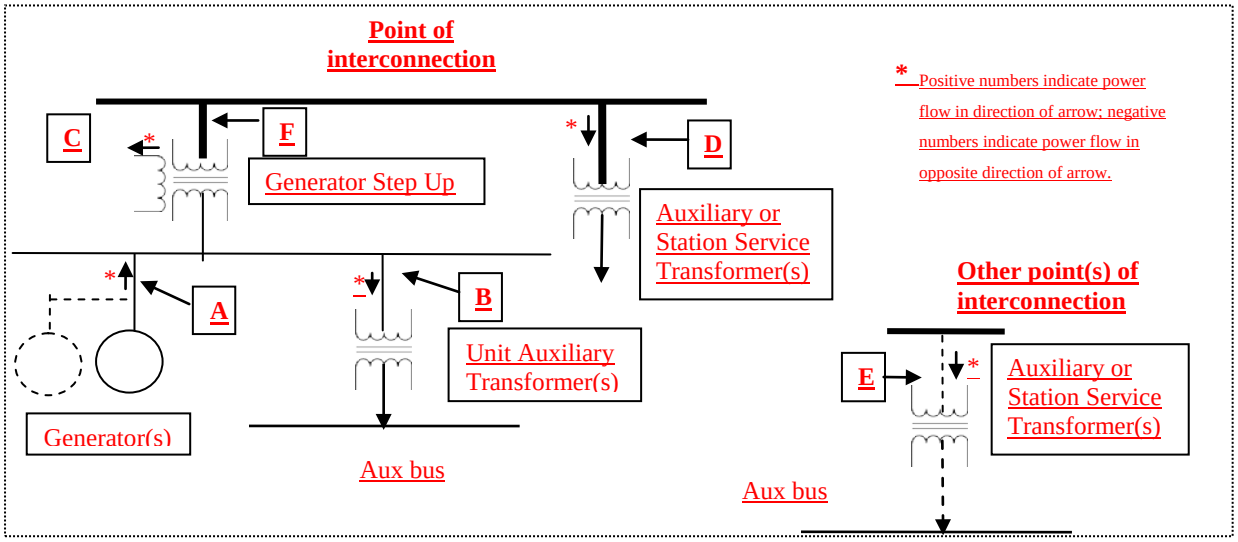
Plant: **Unit No.:** **Date of Report:**

Check all that apply:



- ☐ Over-excited Full Load Reactive Power Verification
- ☐ Under-excited Full Load Reactive Power Verification
- ☐ Over-excited Minimum Load Reactive Power Verification
- ☐ Under-excited Minimum Load Reactive Power Verification
- ☐ Real Power Verification
- ☐ Staged Test Data
- ☐ Operational Data

Simplified one-line diagram showing plant auxiliary ~~load~~Load connections and verification data:



Point	Voltage	Real Power	Reactive Power	Comment
A	**kV**	**MW**	**~~MVAR~~Mvar**	Sum multiple ~~Generators~~generators that are verified together or are part of the same unit. Report individual unit values separately whenever the verification measurements were taken at the individual unit.
Identify ~~values that are~~ calculated values, if any:				
B	**kV**	**MW**	**~~MVAR~~Mvar**	Sum multiple ~~Unit Auxiliary Transformers~~unit auxiliary transformers.
Identify ~~values that are~~ calculated values, if any:				
C	**kV**	**MW**	**~~MVAR~~Mvar**	Sum multiple tertiary ~~load~~Loads, if any.
Identify ~~values that are~~ calculated values, if any:				
D	**kV**	**MW**	**~~MVAR~~Mvar**	Sum multiple ~~Auxiliary Transformers~~auxiliary and station service transformers.
Identify ~~values that are~~ calculated values, if any:				
E	**kV**	**MW**	**~~MVAR~~Mvar**	If multiple points of ~~interconnection~~Interconnection, describe these for accurate modeling; report points individually (~~Sum~~sum multiple ~~Auxiliary Transformers~~auxiliary yransformers).
F	**kV**	**MW**	**Mvar**	Net unit capability
Identify ~~values that are~~ calculated values, if any:				

MOD-025 -Attachment 2 (continued)

Verification Data

Provide data by unit or Facility, as appropriate

Data Type	Data Recorded	Last Verification (Previous Data)
Gross Reactive Power Generating Capability (*~~MVAR~~Mvar)		
Aux Reactive Power (*~~MVAR~~Mvar)		
Net Reactive Power Capability (*~~MVAR~~Mvar) equals Gross Reactive Power Capability (*~~MVAR~~Mvar) minus Aux Reactive Power ~~(*MVAR~~connected at the same bus (*Mvar) minus tertiary Reactive Power connected at the same bus(*Mvar)		
Gross Real Power Generating Capability (*MW)		N/A
Aux Real Power (*MW)		N/A
Net Real Power Capability (*MW) equals Gross Real Power Capability (*MW) minus Aux Real Power connected at the same bus (*MW) minus tertiary Real Power connected at the same bus(*MW)		N/A
GSU losses (only required if verification measurements are taken on the high side of the GSU - Mvar)		

* Note: Enter values at the end of the verification period.

Summary of Verification

- Date of Verification _____,Verification Start Time _____, Verification End Time _____
- Scheduled Voltage _____
- Transformer Tap Settings: GSU _____, Unit Aux _____, Station Aux _____, Other Aux _____
- Ambient ~~air temperature~~conditions at the end of the verification period:

  Air temperature: _____ ~~°F Include in remarks below, any correction factor for different temperatures.~~_____

  Humidity: _____

  Cooling water temperature: _____

  Others as applicable: _____

- The recorded ~~MVAR~~Mvar values were adjusted to rated generator voltage, where applicable.

- ~~Most recent~~Generator hydrogen pressure (if applicable) _____

- Date that data shown in last verification ~~Date used~~column in table above was taken

_____

~~Check all that apply:~~

- ~~Overexcited Full Load Verification~~
- ~~Underexcited Full Load Verification~~
- ~~Overexcited Minimum Load Verification~~
- ~~Underexcited Minimum Load Verification~~
- ~~Real Power Verification~~

Remarks :

Note: If the verification value did not reach the Thermal Capability Curve (D-Curve), describe the reason.