Comparison Rationale Matrix

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AESO AUTHORITATIVE DOCUMENT PROCESS

Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
Purpose To ensure generators provide reactive support and voltage control, within generating Facility capabilities, in order to protect equipment and maintain reliable operation of the Interconnection.	**Purpose** To ensure **generating units** and **aggregated generating facilities** provide reactive support and voltage control, within generating facility capabilities, in order to protect equipment and maintain reliable operation of the **Interconnection**.	**Purpose** The purpose of this **reliability standard** is to~~To~~ ensure **generating units** and **aggregated generating facilities** provide reactive support and voltage control, within generating facility capabilities, in order to protect equipment and maintain reliable operation of the **interconnected electric system**~~**Interconnection**~~.	***Marked changes in column 1, NERC VAR-002-4.1, indicate amendments from NERC version 3 to version 4. There were no material changes made to requirements by NERC in moving from version 4 to version 4.1;*** ***Marked changes in column 3, Alberta version 4.1, show proposed amendments from column 2, Alberta version 3.*** **Reason for Difference**: The Alberta version of this standard addresses maintaining the reliable operation of the interconnected electric system in accordance with the AESO's mandate under the Electric Utilities Act.

Applicability 4.1. Generator Operator 4.2. Generator Owner	**Applicability** This **reliability standard** applies to: (a) the **legal owner** of a **generating unit**, including a **generating unit** that operates as a synchronous condenser, that: (i) is not part of an **aggregated generating facility**; (ii) has a **maximum authorized real power** rating greater than 4.5 MW; and (iii) is directly connected to either the **transmission system** or to **transmission facilities** within the City of Medicine Hat; (b) the **operator** of a **generating unit**, including a **generating unit** that operates as a synchronous condenser, that: (i) is not part of an **aggregated generating facility**; (ii) has a **maximum authorized real power** rating greater than 4.5 MW; and (iii) is directly connected to either the **transmission system** or to **transmission facilities** within the City of Medicine Hat;	**Applicability** This **reliability standard** applies to: (a) the **legal owner** of a **generating unit**~~, including a **generating unit** that operates as a synchronous condenser,~~ that has a **maximum authorized real power** greater than or equal to 5 MW and where the **generating unit** is: (i) ~~is not part of an **aggregated generating facility**;~~ connected to a switchyard at which **system access service** is provided to: (A) the **generating unit**; or (B) an industrial complex of which the **generating unit** is a part; or (ii) ~~has a **maximum authorized real power** rating greater than 4.5 MW; and~~directly connected to **transmission facilities** within the City of Medicine Hat; ~~(iii) is directly connected to either the **transmission system** or to **transmission facilities** within the City of Medicine Hat;~~ (b) the **operator** of a **generating unit**~~, including a **generating unit** that operates as a synchronous condenser,~~ that has a **maximum authorized real power** greater than or equal to 5 MW and where the **generating unit** is: (i) ~~is not part of an **aggregated generating facility**;~~ connected to a switchyard at which **system access service** is provided to: (A) the **generating unit**; or (B) an industrial complex of which the **generating unit** is a part; or (ii) ~~has a **maximum authorized real power** rating greater than 4.5 MW; and~~ directly	**Reason for Difference**: The AESO is recommending to change the threshold of the size of the generating resources included in the applicability section of VAR-002-AB-4.1 from a MARP of 4.5 MW to 5 MW to establish consistency with the ISO rules that apply to generating resources at this level.

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Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
		connected to **transmission facilities** within the City of Medicine Hat; ~~(iii) is directly connected to either the **transmission system** or to **transmission facilities** within the City of Medicine Hat;~~	
	(c) the **legal owner** of an **aggregated generating facility** that: (i) has a **maximum authorized real power** rating greater than 4.5 MW; and (ii) is directly connected to either the **transmission system** or to **transmission facilities** within the City of Medicine Hat; and	(c) the **legal owner** of an **aggregated generating facility** that has a **maximum authorized real power** greater than or equal to 5 MW and is: (i) ~~has a **maximum authorized real power** rating greater than 4.5 MW; and~~ connected to a switchyard at which **system access service** is provided to: (A) the **aggregated generating facility**; or (B) an industrial complex of which the **aggregated generating facility** is a part; or (ii) ~~is~~ directly connected to ~~either the **transmission system** or to~~ **transmission facilities** within the City of Medicine Hat; and	
	(d) the **operator** of an **aggregated generating facility** that: (i) has a **maximum authorized real power** rating greater than 4.5 MW; and (ii) is directly connected to either the **transmission system** or to **transmission facilities** within the City of Medicine Hat. Notwithstanding subsections (c) and (d) above, this	(d) the **operator** of an **aggregated generating facility** that has a **maximum authorized real power** greater than or equal to 5 MW and is: (i) ~~has a **maximum authorized real power** rating greater than 4.5 MW; and~~ connected to a	

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Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
	reliability standard does not apply to the **legal owner** of an **aggregated generating facility** or the **operator** of an **aggregated generating facility** that meets the criteria listed in Appendix 1 of VAR-001-AB.	switchyard at which **system access service** is provided to: (A) the **aggregated generating facility**; or (B) an industrial complex of which the **aggregated generating facility** is a part; or (ii) ~~is~~ directly connected to ~~either the **transmission system** or to~~ **transmission facilities** within the City of Medicine Hat~~; and~~. Notwithstanding subsections (c) and (d) above, this **reliability standard** does not apply to the **legal owner** of an **aggregated generating facility** or the **operator** of an **aggregated generating facility** that meets the criteria listed in Appendix 1 of VAR-001-AB.	

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Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
Effective Date See Implementation Plan.	**Effective Date** 2016-04-01	**Effective Date** Upon approval by the Commission	

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) or in a different control mode as instructed by the Transmission Operator unless: 1) the generator is exempted by the Transmission Operator, or 2) the Generator Operator has notified the Transmission Operator of one of the following: *[Violation Risk Factor: Medium] [Time Horizon: Real-time Operations]* • That the generator is being operated in start-up,[1] shutdown,[2] 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 automatic voltage control mode or in the control mode that was instructed by the Transmission Operator for a reason other than start-up, shutdown, or testing.	**R1** The **operator** of a **generating unit** and the **operator** of an **aggregated generating facility** must, while a **generating unit** or **aggregated generating facility** is electrically connected to the **transmission system**, operate the **generating unit** or **aggregated generating facility** with its **automatic voltage regulator** or **voltage regulating system** in service and in voltage control mode unless: a) exempted by the **ISO**; b) the **operator** of the **generating unit** or **operator** of the **aggregated generating facility** provides voice notification to the **ISO** of its intention to operate the **generating unit** or **aggregated generating facility** otherwise; c) the **generating unit** or **aggregated generating facility** is being operated in start-up or shut-down mode in accordance with the procedure of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility**; or d) the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** has previously obtained approval from the **ISO** allowing the **generating unit**	**R1** The **operator** of a **generating unit** and ~~the~~ **operator** of an **aggregated generating facility** must, while a **generating unit** or **aggregated generating facility** is electrically connected to the **transmission system**, operate the **generating unit** or **aggregated generating facility** with its **automatic voltage regulator** or **voltage regulating system** in service and in automatic voltage control mode, or in a different control mode as instructed by the **ISO** unless: a) ~~exempted by the **ISO**~~the **generating unit** or **aggregated generating facility** is exempted by the **ISO**; b) the **operator** of ~~the~~ a **generating unit** or **operator** of ~~the~~an **aggregated generating facility** ~~provides voice notification to the **ISO** of its intention to operate the **generating unit** or **aggregated generating facility** otherwise~~has notified the **ISO** in accordance with requirement R3 that the **generating unit** or **aggregated generating facility** is not being operated in automatic voltage control mode or in the control mode that was instructed by the **ISO** for a reason other than start-up, shutdown, or testing. Such reasons may include a forced or unplanned change in control mode; c) the **generating unit** or **aggregated generating facility** is being operated ~~in~~ during start-up or shut-down ~~mode~~ in accordance with the procedure of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility**; or d) the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** has previously obtained approval from the **ISO** allowing the **generating unit** or	**Alberta Variance**: Amended requirement R1(b) to not require notification to the AESO when the control mode of the automatic voltage regulator, voltage regulating system or alternative voltage controlling device has been restored within 30 minutes. The notification required is to be made in accordance with requirement R3.

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Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
	or **aggregated generating facility** to be in a testing mode.	**aggregated generating facility** to be in a testing mode.	

[1] 1 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.
[2] 2 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.

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Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
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 or in a different 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 as required in Requirement R1. Such evidence may 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 a generator is exempted, the Generator Operator shall also have evidence that the generator is exempted from being in automatic voltage control mode (with its AVR in service and controlling voltage).	**M1** Evidence of operating the **generating unit** or **aggregated generating facility** in automatic voltage control mode as required in requirement R1 exists. Evidence may include, but is not limited to, exemption letters, data files, start-up or shut-down procedures, **operator** logs, voice recordings, e-mail, or other equivalent evidence.	**MR1** Evidence of operating the **generating unit** or **aggregated generating facility** in automatic voltage control mode as required in requirement R1 exists. Evidence may include~~, but is not limited to,~~ exemption letters, data files, start-up or shut-down procedures, **operator** logs, voice recordings, e-mail, or other equivalent evidence.	

R2 Unless exempted by the Transmission Operator, each Generator Operator shall maintain the generator voltage or Reactive Power schedule[3] (within each generating Facility's capabilities[4]) provided by the Transmission Operator, or otherwise shall meet the conditions of notification for deviations from the voltage or Reactive Power schedule provided by the Transmission Operator. [Violation Risk Factor: Medium] [Time Horizon: Real-time Operations] 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 provided by the Transmission Operator. 2.2. When instructed 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.	**R2** Unless exempted by the **ISO**, each **operator** of a **generating unit** and each **operator** of an **aggregated generating facility** must, upon receiving an instruction from the **ISO** regarding voltage levels or **reactive power**, comply with that instruction. **R2.1** Each **operator** of a **generating unit** and each **operator** of an **aggregated generating facility** must, when: a) the **automatic voltage regulator** of a **generating unit** or the **voltage regulating system** of an **aggregated generating facility** is out of service; or (b) the **generating unit** does not have an **automatic voltage regulator**, or the **aggregated generating facility** does not have a **voltage regulating system**, use an alternative method to control the generator reactive output to comply with an instruction from the **ISO** regarding voltage levels or **reactive power**. **R2.2** Notwithstanding requirement R2, where the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** cannot comply with an instruction to modify voltage, the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** must provide an explanation for why the instruction cannot be met. **R2.3** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** that does not monitor the voltage or **reactive power** at the location specified in an	**R2** Unless exempted by the **ISO**, each **operator** of a **generating unit** and each **operator** of an **aggregated generating facility** must, upon receiving an instruction from the **ISO** regarding voltage levels or **reactive power**, comply with that instruction. **R2.1** Each **operator** of a **generating unit** and each **operator** of an **aggregated generating facility** must, when: a) the **automatic voltage regulator** of a **generating unit** or the **voltage regulating system** of an **aggregated generating facility** is out of service; or (b) the **generating unit** does not have an **automatic voltage regulator**, or the **aggregated generating facility** does not have a **voltage regulating system**, use an alternative method to control the generator **reactive power** output to comply with an instruction from the **ISO** regarding voltage levels or **reactive power**. **R2.2** Notwithstanding requirement R2, where the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** cannot comply with an instruction to modify voltage, the **operator** of a **generating unit** or the **operator** of an **aggregated generating facility** must provide an explanation for why the instruction cannot be met. **R2.3** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** that does not monitor the voltage or	

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NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
	instruction from the **ISO**, or at the location specified in a **directive** issued by the **ISO** in accordance with section 301.2 of the **ISO rules**, *ISO Directives*, must have a methodology for converting the voltage or **reactive power** at the location specified by the **ISO**.	**reactive power** at the location specified in an instruction or **directive** from the **ISO** ~~, or at the location specified in a **directive** issued by the **ISO** in accordance with section 301.2 of the **ISO rules**, *ISO Directives*,~~ must have a methodology for converting the voltage or **reactive power** at the location specified by the **ISO**.	

[3] 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.

[4] 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

M2 In order to identify when a generator 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 or Reactive Power 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 or Reactive Power 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 provided by the Transmission Operator. For Part 2.2, the Generator Operator shall have evidence that it complied with the Transmission Operator's instructions to modify its voltage or provided an explanation to the Transmission Operator of why the Generator Operator was unable to comply with the instruction. Evidence may include, but is not limited to, operator logs, SCADA data, and phone logs. For Part 2.3, for Generator Operators that do not monitor the voltage at the location specified on the voltage schedule, the Generator Operator shall demonstrate the methodology for	**MR2** Evidence of complying with an instruction as required in requirement R2 exists. Evidence may include, but is not limited to, data files or **operator** logs. **MR 2.1** Evidence of using an alternative method to control generator **reactive power** output as required in requirement R2.1 exists. Evidence may include, but is not limited to, data files, **operator** logs or voice recordings. **MR 2.2** Evidence of providing an explanation to the **ISO**, as required in requirement R2.2 exists. Evidence may include, but is not limited to, voice recordings or **operator** logs. **MR 2.3** Evidence of having a methodology as required in requirement R2.3 exists. Evidence may include, but is not limited to, a documented methodology or other equivalent evidence.	**MR2** Evidence of complying with an instruction as required in requirement R2 exists. Evidence may include~~, but is not limited to,~~ data files, ~~or~~ **operator** logs, or other equivalent evidence. **MR2.1** Evidence of using an alternative method to control generator **reactive power** output as required in requirement R2.1 exists. Evidence may include~~, but is not limited to,~~ data files, **operator** logs, ~~or~~ voice recordings, or other equivalent evidence. **MR2.2** Evidence of providing an explanation to the **ISO**, as required in requirement R2.2 exists. Evidence may include~~, but is not limited to,~~ voice recordings, ~~or~~ **operator** logs, or other equivalent evidence. **MR2.3** Evidence of having a methodology as required in requirement R2.3 exists. Evidence may include~~, but is not limited to,~~ a documented methodology, or other equivalent evidence.	

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NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
converting the scheduled voltage specified by the Transmission Operator to the voltage point being monitored by the Generator Operator**.**			
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 30 minutes of such change, then the Generator Operator is not required to notify the Transmission Operator of the status change. *[Violation Risk Factor: Medium] [Time Horizon: Real-time Operations]*	**R3** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must notify the **ISO** within thirty (30) minutes after a status change of the **automatic voltage regulator**, **voltage regulating system** or alternative voltage controlling device and power system stabilizer, as applicable, on any **generating unit** or **aggregated generating facility**. **R3.1** If the status has been restored within thirty (30) minutes of such change, then the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** is not required to notify the **ISO** of the status change. **R3.2** If a **generating unit** or an **aggregated generating facility** is in testing, start-up, shut-down or offline mode, requirement R3 does not apply.	**R3** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must notify the **ISO** within 30 minutes after a status or control mode change of the **automatic voltage regulator**, **voltage regulating system** or alternative voltage controlling device and power system stabilizer, as applicable, on any **generating unit** or **aggregated generating facility**. **R3.1** If the status or control mode has been restored within 30 minutes of such change, then the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** is not required to notify the **ISO** of the status or control mode change. **R3.2** If a **generating unit** or an **aggregated generating facility** is in testing, start-up, shut-down or offline mode, requirement R3 does not apply.	**Alberta Variance:** Included reference to control mode in Requirement R3, to align with the amendment made to Requirement R1(b).
M3 The Generator Operator shall have evidence it notified its associated Transmission Operator within 30 minutes of any status change identified in Requirement R3. If the status has been restored within the first 30 minutes, no notification is necessary.	**MR3** Evidence of notifying the **ISO** within thirty (30) minutes of any status change as required in requirement R3 exists. Evidence may include, but is not limited to, data logs, SCADA logs, voice recordings or operator logs.	**MR3** Evidence of notifying the **ISO** within 30 minutes of any status or control mode change as required in requirement R3 exists. Evidence may include~~,~~ ~~but is not limited to,~~ data logs, SCADA logs, voice recordings, ~~or~~ **operator** logs, or other equivalent evidence.	

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NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
R4 Each Generator Operator shall notify its associated Transmission Operator within 30 minutes of 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 30 minutes of the Generator Operator becoming aware of such change, then the Generator Operator is not required to notify the Transmission Operator of the change in reactive capability. *[Violation Risk Factor: Medium] [Time Horizon: Real-time Operations]* • Reporting of status or capability changes as stated in Requirement R4 is not applicable to the individual generating units of dispersed power producing resources identified through Inclusion I4 of the Bulk Electric System definition.	**R4** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must notify the **ISO** within thirty (30) minutes after becoming aware of a change in reactive capability due to factors other than a status change described in requirement R3. **R4.1** If the capability has been restored within thirty (30) minutes of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** becoming aware of such change, then the **operator** is not required to notify the **ISO** of the change in reactive capability. **R4.2** If a **generating unit** or an **aggregated generating facility** is in testing, start-up, shut-down or offline mode, requirement R4 does not apply.	**R4** Each **operator** of a **generating unit** and **operator** of an **aggregated generating facility** must notify the **ISO** within ~~(~~30~~)~~ minutes after becoming aware of a change in **reactive power** capability due to factors other than a status or control mode change described in requirement R3, or unless~~.~~: **R4.1** ~~If~~ the capability has been restored within ~~(~~30~~)~~ minutes of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** becoming aware of such change, then the **operator** is not required to notify the **ISO** of the change in **reactive power** capability~~.~~; or **R4.2** ~~If~~ a **generating unit** or an **aggregated generating facility** is in testing, start-up, shut-down or offline mode, requirement R4 does not apply.	**Alberta Variance:** Did not adopt the revision made by NERC in the last bulleted point in R4 as an outage of an individual synchronous generating unit may have an impact on the reactive power capability of an AGF.
M4 The Generator Operator shall have evidence it notified its associated Transmission Operator within 30 minutes of becoming aware of a change in reactive capability in accordance with Requirement R4. If the capability has been restored within the first 30 minutes, no notification is necessary.	**MR4** Evidence of notifying the **ISO** within thirty (30) minutes of becoming aware of a change in capability as required in requirement R4 exists. If the capability has been restored within the first thirty (30) minutes of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** becoming aware of such change, no evidence of notification is necessary. Evidence may include, but is not limited to, voice recordings or **operator** logs.	**MR4** Evidence of notifying the **ISO** within ~~(~~30~~)~~ minutes of becoming aware of a change in **reactive power** capability as required in requirement R4 exists. ~~If the capability has been restored within the first thirty (30) minutes of the **operator** of a **generating unit** or **operator** of an **aggregated generating facility** becoming aware of such change, no evidence of notification is necessary.~~ Evidence may include~~, but is not limited to,~~ voice recordings, ~~or~~ **operator** logs, or other equivalent evidence.	

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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. [Violation Risk Factor: Lower] [Time Horizon: Real-time Operations] 5.1. For generator step-up and auxiliary transformers[5] 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.	**R5** Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** whose step-up transformer for connecting to the **transmission system** or auxiliary transformer has primary voltages equal to or greater than the **generating unit** terminal voltage must provide any one (1) or more of the following to the **ISO** within thirty (30) **days** of a request: a) tap settings; b) available fixed tap ranges; and c) impedance data.	**R5** Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** whose step-up transformer for connecting to the **transmission system** or auxiliary transformer has primary voltages equal to or greater than the **generating unit** terminal voltage must provide any one ~~(1)~~ or more of the following to the **ISO** within ~~(~~30~~)~~ **days** of a request: a) tap settings; b) available fixed tap ranges; and c) 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 Requirement R5, Part 5.1.1 through Part 5.1.3 within 30 calendar days.	**MR5** Evidence of providing the **ISO** with information on its step-up transformer or auxiliary transformer, as required in requirement R5 exists. Evidence may include, but is not limited to, dated written or electronic records.	**MR5** Evidence of providing the **ISO** with information on its step-up ~~transformer or~~ and auxiliary transformers, as required in requirement R5 exists. Evidence may include~~, but is not limited to,~~ dated written or electronic records, or other equivalent evidence.	

[5] For dispersed power producing resourcesidentified through Inclusion I4 of the Bulk Electric System definition, this requirement applies only to those transformers that have at least one winding at a voltage of 100 kV or above

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Alberta Reliability Standard –VAR-002-AB-4.1 — *Generator Operation for Maintaining Network Voltages*

NERC VAR-002-4.1	Current Alberta VAR-002-AB-3	New Alberta VAR-002-AB-4.1	Alberta Variances, Reason for Differences and Comments
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. *[Violation Risk Factor: Lower] [Time Horizon: Real-time Operations]* 6.1. If the Generator Owner cannot comply with the Transmission Operator's specifications, the Generator Owner shall notify the Transmission Operator and shall provide the technical justification.	**R6** Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** that has a step-up transformer, with off-load taps for connecting to the **transmission system** must, change the tap positions according to the specifications the **ISO** provides. **R6.1** Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** that cannot comply with requirement R6 must notify the **ISO** within thirty (30) **days** of the **ISO** providing the specifications, and must include the technical justification along with the notice.	**R6** Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** that has a step-up transformer, with off-load taps for connecting to the **transmission system** must, change the tap positions according to the specifications the **ISO** provides. **R6.1** Each **legal owner** of a **generating unit** and each **legal owner** of an **aggregated generating facility** that cannot comply with requirement R6 must notify the **ISO** within ~~thirty (~~30~~)~~ **days** of the **ISO** providing the specifications~~,~~ and must include the technical justification along with the notice.	
M6 The Generator Owner shall have evidence that its step-up transformer taps were modified per the Transmission Operator's documentation in accordance with Requirement R6. The Generator Owner 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 in accordance with Requirement R6, Part 6.1.	**MR6** Evidence of changing step-up transformer taps in accordance with the **ISO**'s specifications as required in requirement R6 exists. Evidence may include, but is not limited to, written or electronic records. **MR6.1** Evidence of notifying the **ISO** as required in requirement R6.1 exists. Evidence may include, but is not limited to, written or electronic notifications.	**MR6** Evidence of changing step-up transformer taps in accordance with the **ISO**'s specifications as required in requirement R6 exists. Evidence may include~~, but is not limited to,~~ written or electronic records, or other equivalent evidence. **MR6.1** Evidence of notifying the **ISO** as required in requirement R6.1 exists. Evidence may include~~, but is not limited to,~~ written or electronic notifications, or other equivalent evidence.	