

Unofficial Comment Form

Project 2016-EPR-02 Enhanced Periodic Review of Voltage and Reactive (VAR) Standards | VAR-001-4.1

Do not use this form for submitting comments. Use the [electronic form](#) to submit comments on the **VAR-001-4.1 standard template**. The electronic form must be submitted by **8 p.m. Eastern, Thursday, April 13, 2017**.

Additional information is available on the [Project 2016-EPR-02 VAR page](#). If you have questions, contact Senior Standards Developer, [Scott Barfield-McGinnis](#) (via email), or at (404) 446-9689.

Executive Summary

The periodic review team completed a comprehensive review of VAR-001-4.1 – Voltage and Reactive Control. The team found the standard is sufficient to protect reliability and meet the reliability objective of the standard; however, there may be future opportunity to improve a non-substantive or insignificant quality and content issue. As such, the periodic team seeks comments to the following observations. Comments received from industry will be used to make a final recommendation of whether or not revisions are required to support reliability with a periodic review team initiated Standards Authorization Request

Requirement R4 does not require periodic review of the exemption or review triggered by other changes such as changes in technology, system conditions or other factors, this may require a periodic review of the exemption criteria; and the generators that may have been exempted by the Transmission Operator (TOP).

For Requirement R5, the Generator Operator (GOP) may need to raise concerns to the TOP over the inability to meet the voltage schedule. This concern may result in an exemption, voltage schedule revision, or possibly some other action. This concern could be addressed with a revision to the standard or some equivalent technical guidance (e.g., guideline). The requirement does not have a feedback loop to raise such concerns.

Requirement R2 requires the TOP to maintain sufficient reactive resources to regulate voltage levels under normal and Contingency conditions. The standard's purpose statement notes that reactive resources among other things are monitored. There does not appear to be a requirement to monitor reactive resources (i.e., reserves) to ensure sufficiency.

As VAR-001-4.1 Requirement R5 is written, the TOP has flexibility to determine the duration that a generator can be outside the voltage bandwidth. A TOP may have varying criteria depending on the specific unit size, location, amount that the unit is outside of the target or bandwidth. If the TOP does not specify a timing portion (i.e., duration when notification required) to its notification requirements in Part 5.2 (e.g., outside range for 5 minutes), there can be a lack of clarity of the notification requirements for

the GOP. Specifying the timing portion within the notification requirements while maintaining the necessary flexibility is recommended.

VAR-001-4.1, Requirement R5 does not include the Reliability Coordinator (RC) as a recipient of voltage or Reactive Power schedules. In Requirement R1, Part 1.1, the Transmission Operator must provide the system voltage schedule to the RC within 30 days of a request. If there is a reliability need for the TOP to provide the RC with the voltage and Reactive Power Schedule when notifying the GOP, Requirement R5 should include how the RC obtains the voltage and Reactive Power schedule.

The Western Electricity Coordinating Council (WECC) region should consider whether VAR-002-WECC-2 (*Automatic Voltage Regulators (AVR)*) should be retired in light of the most recent versions of VAR-001-4.1 and VAR-002-4 which require all AVRs to be in service and in voltage control mode unless exempted by the TOP based on identified criteria.

In VAR-001-4.1, Requirement R5 has no requirement to identify the “initial” status of the power system stabilizer (PSS). However, VAR-002-4 Requirement R3 requires the GOP to notify the TOP of a PSS status change. The initial status of the PSS should be clarified within the notification required by Requirement R5. The status of the PSS raises the question whether any of the VAR-501-WECC-2 (*Power System Stabilizer*) Regional Reliability Standard, or any subsequent new version, PSS requirements should be established similar to AVR requirements for inclusion of the continent-wide standards.

The WECC variance E.A.18 is specific to external control loops to the manufacturer’s AVR control loop. Due to the system configuration of the WECC, it was one of the earlier adopters of AVR and PSS controls. Due to the age of the controls or difficulty with setting reactive droop compensation on some older style controls, external loop controls were implemented from the plant control system. This can be done via distributed control system (DCS) or supervisory control and data acquisition (SCADA). Variance E.A.18 requires that if external controls are used, that they do not affect the AVR’s transient response during fault conditions.

There is a need to determine if this type of control is used outside of the WECC. Adding this variance to the continent-wide NERC standard might be justified if other utilities practice this method of voltage control and there have been documented cases that the external control hindered the AVR from responding properly during a fault event.¹

¹ See also (http://www.nerc.com/pa/rrm/ea/Lessons%20Learned%20Document%20Library/LL20150602_Generator_Distributed_Control_System_Impact_on_Automatic_Voltage_Regulators.pdf)

Questions

1. VAR-001-4.1 Requirement R4, regarding exemptions and exempted units, does not require periodic reviews or reviews triggered by changes; such as, technology, system conditions or other factors. Does this create an impact to reliability? If yes, please explain.

Yes

No

Comments:

The exemption should be based on the system need. Operating experience will bring to light when an exemption needs to be reconsidered. There is no need to create a requirement to perform a review.

2. If the voltage schedule issued by the TOP to the GOP (Requirement R5) results in a generating unit routinely running at maximum limits, does a lack of dynamic reactive reserve have a reliability impact?

Yes

No

Comments:

Not necessarily. This would have to be studied to determine whether there is a reliability impact. Planning studies should identify areas that lack sufficient reactive capability. If there are, system modifications should be proposed.

3. As of April 1, 2017, there will no longer be any explicit requirements for monitoring or ensuring adequate reactive reserves. Absent of any explicit requirements to monitor or ensure adequate reactive reserves within the IRO, TOP, or VAR standards, is there an impact to reliability? If yes, please explain.

Yes

No

Comments:

There are requirements to remain within limits post contingency. Operators would be aware of reactive reserve deficiencies if a plan cannot be developed to maintain the system within voltage limits post contingency. See TOP-002-4 R2, TOP-004-2 R1 and TOP-006-2 R3. Therefore monitoring is being done. Additionally it may be impossible to “ensure” adequate reactive reserves if the planning process did not provide adequate reserves.

4. As VAR-001-4.1 Requirement R5, Part 5.2 is silent with regards to a time duration that a generator can be outside of voltage schedule before notification is required. If the TOP is not required to specify the timing portion of the notification requirements while maintaining the necessary flexibility, is there an impact to reliability? If yes, please explain.

Yes

No

Comments:

No, the TOP is aware of real time and post contingency voltages and whether the system is or will be within limits. If the system is not or will not be within limits the TOP can call the generator to inquire the status of the AVR or their ability to control to the reactive schedule.

5. VAR-001-4.1 Requirement R5 does not include the RC as a recipient of voltage or Reactive Power schedules issued to generators. Is there an impact to reliability? If yes, please explain.

Yes

No

Comments:

Per R1.1 the RC can obtain a copy of the voltage schedule. Therefore the schedules are available to the RC.

6. VAR-001-4.1 Requirement R5 dictates the status of an AVR. Does the lack of a similar requirement to identify the initial state of the PSS impact reliability? If yes, please explain.

Yes

No

Comments:

A PSS would only be installed if there was a reliability reason. Presumably when the generator and PSS were commissioned the TOP knew the status. Therefore only notifications of changes to the status are necessary.

7. The continent-wide VAR standards do not address external control loops to the AVR that may impact the reactive response of a generator. Some external control loops do not have the purpose of automative voltage control, therefore, is there a need to coordinate external loops to prevent an impact to reliability?² If yes, please explain.

Yes

No

Comments:

8. There are a number of errata (i.e., administrative) type observations listed in Attachment 4 of the VAR-001-4.1 template. If you disagree with any of the observations, please list the reference number when providing comment.

Comments:

9. There are a number of other observations in Attachment 5 of the VAR-001-4.1 template that could enhance the standard, but would require a drafting team to develop for industry feedback. If you have any comments about these, please list the reference number when providing comment.

Comments:

10. The team did not identify a concern related to cost effectiveness as drafted. Do you agree? If not, please provide additional detail.

Yes

No

Comments:

² See also: Lesson Learned, Generator Distributed Control System Impact on Automatic Voltage Regulators, June 9, 2015, (http://www.nerc.com/pa/rrm/ea/Lessons Learned Document Library/LL20150602_Generator Distributed Control System Impact on Automatic Voltage Regulators.pdf)

11. Given the items identified by the periodic review team in the VAR-001-4.1 template, do you agree that the Reliability Standard is sufficient to protect reliability and meet the reliability objective of the standard and does not need immediate modification through standards development; however, there may be a future opportunity to improve any non-substantive or insignificant quality and content issues? If you have any other comments on this review that you haven't already mentioned above, please provide them here.

Yes

No

Comments: