

---

**BEFORE THE  
BRITISH COLUMBIA UTILITIES COMMISSION  
OF THE PROVINCE OF BRITISH COLUMBIA**

**NORTH AMERICAN ELECTRIC )  
RELIABILITY CORPORATION )**

**NOTICE OF FILING OF THE  
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION  
OF PROPOSED RELIABILITY STANDARD  
VAR-001-3 (VOLTAGE AND REACTIVE CONTROL)**

Gerald W. Cauley  
President and Chief Executive Officer  
North American Electric Reliability  
Corporation  
3353 Peachtree Road, N.E.  
Suite 600, North Tower  
Atlanta, GA 30326  
(404) 446-2560  
(404) 446-2595 – facsimile

Charles A. Berardesco  
Senior Vice President and General Counsel  
Holly A. Hawkins  
Assistant General Counsel  
William H. Edwards  
Attorney  
North American Electric Reliability  
Corporation  
1325 G Street, N.W., Suite 600  
Washington, D.C. 20005  
(202) 400-3000  
(202) 644-8099 – facsimile  
[charlie.berardesco@nerc.net](mailto:charlie.berardesco@nerc.net)  
[holly.hawkins@nerc.net](mailto:holly.hawkins@nerc.net)  
[william.edwards@nerc.net](mailto:william.edwards@nerc.net)

*Counsel for the North American Electric  
Reliability Corporation*

March 11, 2013

---

**TABLE OF CONTENTS**

I. EXECUTIVE SUMMARY ..... 2

II. NOTICES AND COMMUNICATIONS ..... 3

III. BACKGROUND ..... 3

IV. JUSTIFICATION ..... 4

    A. History of Proposed VAR-001-3 and Need for the Regional Variance ..... 4

    B. Basis and Purpose of Proposed VAR-001-3 ..... 6

        1. Removal of Requirement R3 ..... 7

        2. Replacement of Requirement R4..... 7

    C. Enforceability of the Proposed Reliability Standard, VAR-001-3..... 10

        1. Development of VRFs for Proposed VAR-001-3 ..... 10

        2. Development of Time Horizon for Proposed VAR-001-3 ..... 11

        3. Development of VSLs for Proposed VAR-001-3..... 11

V. SUMMARY OF THE RELIABILITY STANDARD DEVELOPMENT PROCEEDINGS  
..... 13

Exhibit A Proposed Reliability Standard VAR-001-3

Exhibit B Criteria for Proposed Reliability Standard VAR-001-3

Exhibit C Implementation Plan for Proposed Reliability Standard VAR-001-3

Exhibit D NERC Consideration of Comments

Exhibit E NERC Record of Development of Proposed Reliability Standard VAR-001-3

Exhibit F WECC Record of Development of Proposed Reliability Standard VAR-001-3

Exhibit G Standard Drafting Team Roster



## I. EXECUTIVE SUMMARY

Proposed VAR-001-3 modifies currently-effective Reliability Standard VAR-001-2 by adding a regional variance developed by WECC as Section E of proposed VAR-001-3 (“Regional Variance”). The Regional Variance contains certain Requirements that are more stringent than the continent-wide Requirements R3 and R4 of VAR-001-2 and provides an alternative approach to meeting the same reliability objective based on physical differences in the Western Interconnection. Proposed VAR-001-3 continues to fulfill the purpose of VAR-001-2 to “ensure that voltage levels, reactive flows, and reactive resources are monitored, controlled, and maintained within limits in real time to protect equipment and the reliable operation of the Interconnection.”<sup>2</sup>

The Regional Variance is necessary to improve the ability of Generator Operators in the Western Interconnection to operate within the automatic voltage control mode requirements of VAR-002-WECC-1<sup>3</sup> in cases where Transmission Operators issue schedules in reactive terms in lieu of a voltage schedule. Specifically, the Regional Variance will ensure that voltage levels are within limits to protect equipment during system disturbances to support the reliable operation of the Western Interconnection. The Regional Variance requires conversion of a reactive support schedule provided by a Transmission Operator to an equivalent voltage schedule, thereby permitting operation of generators in voltage control mode without the additional responsibility of manually revising the voltage set-point to also maintain a required reactive schedule. Having an automatic voltage regulator in service and in voltage control mode was identified using

---

<sup>2</sup> See Purpose statement of Reliability Standard VAR-001-2 and proposed VAR-001-3.

<sup>3</sup> On April 7, 2009, NERC submitted four revised regional Reliability Standards developed by WECC, including VAR-002-WECC-1. Reliability Standard VAR-002-WECC-1 is meant to ensure that automatic voltage regulators remain in service on synchronous generators and condensers in the Western Interconnection.

disturbance analysis as essential for the reliability of the Bulk Electric System in the WECC region due to western transmission configurations.

## **II. NOTICES AND COMMUNICATIONS**

Notices and communications with respect to this filing may be addressed to the following:

Gerald W. Cauley  
President and Chief Executive Officer  
North American Electric Reliability  
Corporation  
3353 Peachtree Road, N.E.  
Suite 600, North Tower  
Atlanta, GA 30326  
(404) 446-2560  
(404) 446-2595 – facsimile

Charles A. Berardesco  
Senior Vice President and General Counsel  
Holly A. Hawkins  
Assistant General Counsel  
William H. Edwards  
Attorney  
North American Electric Reliability  
Corporation  
1325 G Street, N.W., Suite 600  
Washington, D.C. 20005  
(202) 400-3000  
(202) 644-8099 – facsimile  
[charlie.berardesco@nerc.net](mailto:charlie.berardesco@nerc.net)  
[holly.hawkins@nerc.net](mailto:holly.hawkins@nerc.net)  
[william.edwards@nerc.net](mailto:william.edwards@nerc.net)

*Counsel for the North American Electric  
Reliability Corporation*

## **III. BACKGROUND**

A regional difference generally takes one of two forms: (1) a regional variance may be included in a continent-wide Reliability Standard, which achieves the reliability objective of the continent-wide standard's requirement(s) in an alternate way than specified in a given Requirement in the continent-wide standard or (2) a separate regional Reliability Standard may be developed, which adds one or more Requirements without altering any continent-wide

Requirements that are applicable to entities in the region.<sup>4</sup> Proposed VAR-001-3 contains a regional variance within the proposed continent-wide Reliability Standard.

#### **IV. JUSTIFICATION OF PROPOSED VAR-001-3**

This section discusses the history of proposed VAR-001-3 and the need for the proposed Regional Variance. It also presents the technical basis and content of the proposed Reliability Standard, including the necessary replacement of Requirements R3 and R4 with the Regional Variance. Proposed VAR-001-3 does not propose any changes to or application of the other Requirements of VAR-001-2 for the Western Interconnection. As discussed in **Exhibit B**, proposed VAR-001-3 is just, reasonable, not unduly discriminatory or preferential, and in the public interest.

##### **A. History of Proposed VAR-001-3 and Need for the Regional Variance**

The Version 0 Voltage and Reactive Control Reliability Standard, VAR-001-0, initially implemented on April 1, 2005, was intended to keep Bulk-Power System facilities within voltage and reactive power limits, thereby protecting transmission, generation, distribution, and customer equipment. VAR-001-0 was replaced by VAR-001-1. New Requirements were added to VAR-001-1 for Transmission Operators to keep transmission system voltage or reactive power within schedules and limits. The Federal Energy Regulatory Commission (“FERC”) approved VAR-001-1 in Order No. 693 and issued certain directives to the ERO to make improvements to the Reliability Standard.<sup>5</sup> The Reliability Standard was subsequently modified, and the resulting Reliability Standard, VAR-001-2, was submitted on March 2, 2011.

---

<sup>4</sup> See NERC, *Whitepaper to Provide Guidance on Regional Standards and Variances*, May 17, 2012, available at <http://www.nerc.com/docs/sac/rsg/Whitepaper%20on%20Regional%20Standards%20and%20Variances%20final.pdf>.

<sup>5</sup> Order No. 693 at P 1858, 1861-62, 1868, 1875, 1879.

VAR-002-1 requires Generator Owners and Operators to maintain and operate generators to meet voltage and reactive power schedules and to provide automatic voltage controls necessary for Bulk-Power System reliability. On June 8, 2007, FERC approved regional Reliability Standard WECC-VAR-STD-002a-1 for use in WECC.<sup>6</sup> WECC-VAR-STD-002a-1 was later replaced by regional Reliability Standard VAR-002-WECC-1.

During the standard development process for VAR-002-WECC-1, industry commenters noted that some WECC Transmission Operators were providing reactive power schedules in lieu of voltage schedules to their Generator Operators.<sup>7</sup> This is permitted since Requirement R4 of Reliability Standard VAR-001-2 allows Transmission Operators to provide *either* a voltage schedule or a reactive power schedule to Generator Operators. Generator Operators in WECC need voltage schedules to meet the more stringent voltage operating requirements in VAR-002-WECC-1. If the Transmission Operator instead chooses to supply a reactive power schedule, the Generator Operator must perform continuous manual adjustments to maintain a reactive power schedule, as required by VAR-002-1.1b,<sup>8</sup> and meet the voltage requirements of VAR-002-WECC-1. The Regional Variance resolves this reliability issue as explained below. The regional difference was originally proposed as new regional Reliability Standard VAR-001-WECC-1. It was appropriately recast as a variance within the continent-wide Reliability

---

<sup>6</sup> *N. Am. Elec. Reliability Corp.*, 119 FERC ¶ 61,260 (2007).

<sup>7</sup> FERC also encouraged WECC, in Order No. 751, to consider the comments of Mariner Consulting Services, Inc. (“Mariner”) submitted in response to FERC’s Notice of Proposed Rulemaking proposing to approve VAR-002-WECC-1. In its comments, Mariner noted the same concern as above, and expressed that a reactive power schedule does not provide a generator operator with enough information to appropriately program the automatic voltage regulator to operate in automatic voltage control mode as required and that continuous manual adjustments to maintain a constant reactive power output could actually harm the reliability of the system. In fact, Mariner submitted the Standard Authorization Request for Project WECC-0046. In its Final Rule, FERC noted that WECC had an ongoing project to address the same issue and encouraged WECC to consider the comments in Project WECC-0046. Order No. 751 at P 67.

<sup>8</sup> Reliability Standard VAR-002-1.1b, Requirement R2, requires Generator Operators to maintain the generator voltage or reactive power output as directed by the Transmission Operator, unless an exemption is given.

Standard VAR-001-2 because it proposes to replace Requirements within the continent-wide Reliability Standard with region-specific Requirements.<sup>9</sup>

**B. Basis and Purpose of Proposed VAR-001-3**

Analysis of disturbances in the Western Interconnection have demonstrated that during and immediately following a disturbance, the generator’s automatic voltage regulator – operating in automatic voltage control mode – is needed to stabilize voltage in the Bulk Electric System. If Transmission Operators provide voltage schedules, rather than reactive power schedules, to the Generator Operators in the Western Interconnection, Generator Operators can better assist in controlling system voltage during steady-state and outage conditions by allowing the automatic voltage regulator to automatically adjust the reactive support. The provision of voltage schedules would also allow for Generator Operators to more efficiently meet the requirements of VAR-002-WECC-1 without the need for continuous manual adjustments in response to the alternative production of the reactive power schedule allowed under Requirement R4 of VAR-001-2. The provision of a voltage schedule would provide the information Generator Operators need to set the automatic voltage regulator properly to maintain reliability in the Western Interconnection under the operating requirements in VAR-002-WECC-1.

WECC has created the Regional Variance to resolve the issue. The Regional Variance in proposed VAR-001-3, offers an alternative approach for the Western Interconnection to replace Requirements R3 and R4 of Reliability Standard VAR-001-2 while continuing to meet the reliability purpose of Reliability Standard VAR-001-2 to “ensure that voltage levels, reactive

---

<sup>9</sup> At the time that VAR-001-2 was submitted, the Regional Variance was still in the form of a draft regional Reliability Standard and was therefore not submitted as part of VAR-001-2.

flows, and reactive resources are monitored, controlled, and maintained within limits in real-time to protect equipment and the reliable operation of the Interconnection.”<sup>10</sup>

### **1. Removal of Requirement R3**

The proposed Regional Variance removes Requirement R3 from application in the Western Interconnection. Requirement R3 of VAR-001-2 allows Transmission Operators the option of specifying criteria that exempt generators from compliance with the Requirements defined in VAR-001-2, Requirement R4 and Requirement R6.1. Permitting such exemptions in the Western Interconnection would reduce the amount of voltage support available when generation and transmission outages occur, adversely impacting the reliability of the Western Interconnection. Further, regional Reliability Standard VAR-002-WECC-1 requires automatic voltage regulators to be in service controlling voltage during 98 percent of operating hours and already provides for appropriate and necessary exceptions. Consequently, in the Western Interconnection, Requirement R3 reduces the effectiveness and intent of the stringent requirements contained in VAR-002-WECC-1 by allowing for the establishment of new exemptions. Removing this Requirement from applicability favors a more stringent approach of not permitting the establishment of new exemptions. This Requirement would remain applicable to entities outside of WECC.

### **2. Replacement of Requirement R4**

The standard drafting team initially designed the proposed Regional Variance to require that Transmission Operators issue only voltage schedules to Generator Operators for each generator, as opposed to having the option to alternatively issue reactive schedules as permitted in Requirement R4 of Reliability Standard VAR-001-2. However, during the standards development process, WECC identified an approach that would accommodate the continued use

---

<sup>10</sup> See Purpose statement of Reliability Standard VAR-001-2.

of reactive schedules, rather than requiring all Transmission Operators to define the stable system voltage with the exclusive use of a voltage schedule. The latter approach allows Transmission Operators to provide a schedule through a reactive power level *in addition to* providing voltage schedules, provided that the reactive power level is converted to a voltage level for the automatic voltage regulator's automatic voltage control mode setting. Once a reactive power level is converted to a voltage level, that voltage level defines the schedule until a new voltage schedule, which may be in reactive power terms, is provided by the Transmission Operator.

This approach is more stringent than Requirement R4 of VAR-001-2. It requires all schedules to be conveyed in or converted to voltage terms. The Regional Variance provides a specific alternative approach that allows Generator Operators to meet the regional voltage control requirements in VAR-002-WECC-1 needed to maintain reliability in the Western Interconnection.

The proposed Regional Variance clarifies the conveyance of voltage schedules, emphasizes the desired voltage control response to those schedules, removes voltage schedule exemption criteria, and modifies other continent-wide industry practices that might potentially negate the voltage control needs of the Western Interconnection set by VAR-002-WECC-1. The alternative approach offered restricts the Transmission Operator to providing only a voltage schedule,<sup>11</sup> but allows the schedule to be conveyed through a reactive power level,<sup>12</sup> provided

---

<sup>11</sup> Proposed VAR-001-3, **Requirement E.A.13** requires each Transmission Operator to issue any one of certain enumerated types of voltage schedules to the Generator Operators for each of their generation resources that are on-line and part of the Bulk Electric System within the Transmission Operator Area

<sup>12</sup> *See id.* (allowing the issuance of an initial volt-ampere reactive output or initial power factor output with a voltage tolerance band for a specified period that the Generator Operator uses to establish a generator bus voltage set point).

that the reactive power level is converted<sup>13</sup> to a voltage level for the automatic voltage regulator's automatic voltage control mode setting. When a Transmission Operator provides a clear voltage schedule for a specified location<sup>14</sup> and the Generator Operator has an agreed upon methodology<sup>15</sup> for converting a schedule conveyed in reactive power terms to a voltage setting for the automatic voltage regulator, the desired voltage control for the Western Interconnection is enhanced. Better voltage control in the Western Interconnection, achieved through the combination of Requirements in the Regional Variance, results in heightened reliability. The new Requirements for the conveyance of voltage schedules and conversion of voltage schedules<sup>16</sup> to automatic voltage regulator voltage set points also requires Transmission Operators to more closely monitor transmission voltages to ensure achievement of the desired system operation. With the approval of proposed VAR-001-3, Generator Operators will not have to manually alter the voltage schedule of the automatic voltage regulator throughout each day in order to return the generator output to the initial desired reactive schedule.

The resulting system voltage is monitored by the Transmission Operator in order to ensure the desired voltage support from Generator Operators is achieved. If system conditions change and the desired voltage is no longer being achieved, then the Transmission Operator is responsible for issuing additional schedules to achieve the desired voltage. This is consistent with the responsibilities for Transmission Operators as described in the NERC Functional Model,

---

<sup>13</sup> Proposed VAR-001-3, **Requirement E.A.15** requires each Generator Operator to convert each voltage schedule specified in Requirement E.A.13 into the voltage set point for the generator excitation system.

<sup>14</sup> Proposed VAR-001-3, **Requirement E.A.14** requires each Transmission Operator to provide one of certain enumerated voltage schedule reference points for each generation resource in its Area to the Generator Operator.

<sup>15</sup> Proposed VAR-001-3, **Requirement E.A.16** requires each Generator Operator to provide its voltage set point conversion methodology from the reference point in Requirement E.A.14 to the generator terminals within 30 calendar days of request by its Transmission Operator. Thirty days was a reasonable amount of time, in the opinion of the subject matter experts on the drafting team, for the Generator Operator to develop or modify their conversion methodology.

<sup>16</sup> If voltage schedules are given for a point other than the AVR set point or if reactive schedules are given, each must be converted to voltage schedules for the AVR set point.

which identifies Transmission Operators as being responsible for monitoring the voltages and for ensuring that reactive response from Generator Operators is as desired.<sup>17</sup> As a result, this approach continues to require that Transmission Operators ensure voltage levels necessary for reliability as required by the Reliability Standard VAR-001-2, Requirement R4.

Finally, the proposed Regional Variance requires communication between the Transmission Operators and Generator Operators by requiring the exchange of the conversion methodology and of operating data. This promotes agreement upon a suitable conversion methodology and aids the Transmission Operator's understanding of the impact of a voltage schedule on a desired system voltage.

### **C. Enforceability of the Proposed Reliability Standard, VAR-001-3**

The proposed Reliability Standard VAR-001-3 contains measures that support each Requirement by clearly identifying what is required and how the Requirement will be enforced. These measures help provide clarity regarding how the Requirements will be enforced, and ensure that the requirements will be enforced in a clear, consistent, and non-preferential manner and without prejudice to any party. The VSLs also provide further guidance on how NERC will enforce the requirements of the standard.

#### **1. Development of VRFs for Proposed VAR-001-3**

The standard drafting team used the definitions for VRFs found in the "Reliability Standard Development Procedures" to determine the VRF for each requirement. Based upon the definitions, the standard drafting team assigned a "Medium" VRF for Requirements E.A.13, E.A.14, E.A.15, and E.A.18, because, if violated, these requirements could directly affect the electrical state or the capability of the Bulk Electric System, or the ability to effectively monitor

---

<sup>17</sup> See NERC Reliability Functional Model, Version 5, available at [http://www.nerc.com/files/Functional\\_Model\\_V5\\_Final\\_2009Dec1.pdf](http://www.nerc.com/files/Functional_Model_V5_Final_2009Dec1.pdf).

and control the Bulk Electric System. For Requirements E.A.16 and E.A.17 the drafting team assigned a “Low” VRF because these administrative requirements address providing documentation of methodologies and data for development of the methodology. These Requirements, if violated, would not be expected to adversely affect either the electrical state of the Bulk Electric System or the ability to effectively monitor and control the Bulk Electric System.

## **2. Development of Time Horizon for Proposed VAR-001-3**

The standard drafting team assigned Time Horizons of “Operations Planning” and “Same-day Operations” for Requirements E.A.13, E.A.14, and E.A.15. Depending upon the Transmission Operator voltage schedules that may be developed for the coming year (*i.e.*, the “Operations Planning” Time Horizon), or as the system conditions change throughout the year, voltage schedules may be adjusted on a daily basis (*i.e.*, “Same-day Operations” Time Horizon). Voltage schedules generally are not adjusted on an hourly basis and do not meet the criteria for Real-time Operations. The conversion of these voltage schedules to a voltage set point will be made as each voltage schedule is received. The standard drafting team assigned the Operations Planning Time Horizon to Requirements E.A.16 and E.A.17. The standard drafting team expects the development and review of voltage conversion methodology to be performed only during the Operations Planning period. The standard drafting team assigned Real-time Operations to the use of control loops external to the automatic voltage regulators since control loops are a real-time control system.

## **3. Development of VSLs for Proposed VAR-001-3**

The standard drafting team developed VSLs for Requirements E.A.13, E.A.14, and E.A.15, using the methodology in “Requirements with Parts that Contribute Equally to the

Requirement” of the NERC VSL Guidelines.<sup>18</sup> The standard drafting team developed VSLs for Requirements E.A.16 and E.A.17, using the methodology in “Requirements with Wide Range of Noncompliant Performance”<sup>19</sup> of the NERC VSL Guidelines. The standard drafting team developed VSLs for Requirements E.A.18 using the methodology in “Requirements with Parts that Contribute Unequally to the Requirement”<sup>20</sup> of the NERC VSL Guidelines.

The range for the VSLs for Requirement E.A.15 was expanded from the five-percent increments recommended in the NERC VSL Guidelines to better match the VSLs with Generator Operators that operate fewer generating units (*e.g.*, less than or equal to four units) with Generator Operators that operate a large number of generators (*e.g.*, one hundred generators). If the recommended five-percent increments were used, it meant that the failure to convert one schedule for a Generator Operator operating four generators would receive a severe VSL when a Generator Operator that operates one hundred generators would receive only a lower VSL. Having a small range for the VSLs seemed discriminatory toward Generator Operators operating a small number of generators with little or no difference on reliability. Also considered in developing the broader range was that fact that in VAR-002-WECC-1, Generator Operators are required to operate AVRs in voltage control mode. If voltage schedules are not properly converted, the impact to reliability during transmission outages would be less significant if units are still operated in voltage control mode and Transmission Operators monitor system voltages during steady state conditions. As a result, the standard drafting team determined that expanding the VSL range to twenty-five percent increments more equitably addressed the number of units operated against the sanction severity and system reliability.

---

<sup>18</sup> The NERC VSL Guidelines are available at [http://www.nerc.com/files/VSL\\_Guidelines\\_20090817.pdf](http://www.nerc.com/files/VSL_Guidelines_20090817.pdf).

<sup>19</sup> *Id.* at 2.

<sup>20</sup> *Id.* at 3.

## V. SUMMARY OF THE RELIABILITY STANDARD DEVELOPMENT PROCEEDINGS

The proposed VAR-001-3 Reliability Standard was developed using NERC's and WECC's open and fair Reliability Standard development processes and each was administered in a proper manner. A short summary of the development process is provided below. The complete development record for VAR-001-3, including NERC's and WECC's process, has been submitted as **Exhibits E and F**.

WECC posted the original draft regional Reliability Standard VAR-001-WECC-1 for initial industry comments on December 14, 2009. The standard development process for proposed VAR-001-3 included: (1) drafting by an open and inclusive standards drafting team; (2) consideration of industry comments received by WECC during five public posting and comment periods;<sup>21</sup> (3) approval by the WECC Operating Committee at its March 2-4, 2011 meeting; (4) approval by the WECC Board of Directors at its June 21-24, 2011 meeting; and (5) production of other supporting documentation in response to various public and staff questions or concerns. NERC commenced an evaluation of the regional Reliability Standard as prescribed by Section 312 of NERC's Rules of Procedures, informed in part by the comments during NERC's 45-day posting of VAR-001-3. Proposed VAR-001-3 was approved by the NERC Board of Trustees on May 9, 2012.

---

<sup>21</sup> On December 7, 2010, the regional Reliability Standard VAR-001-WECC-1 was instead posted as a regional variance within continent-wide Reliability Standard VAR-001-2 proposing to replace Requirements R3 and R4 of VAR-001-2.

Respectfully submitted,

*/s/ William H. Edwards*

Gerald W. Cauley  
President and Chief Executive Officer  
North American Electric Reliability  
Corporation  
3353 Peachtree Road, N.E.  
Suite 600, North Tower  
Atlanta, GA 30326  
(404) 446-2560  
(404) 446-2595 – facsimile

Charles A. Berardesco  
Senior Vice President and General Counsel  
Holly A. Hawkins  
Assistant General Counsel  
William H. Edwards  
Attorney  
North American Electric Reliability  
Corporation  
1325 G Street, N.W., Suite 600  
Washington, D.C. 20005  
(202) 400-3000  
(202) 644-8099 – facsimile  
[charlie.berardesco@nerc.net](mailto:charlie.berardesco@nerc.net)  
[holly.hawkins@nerc.net](mailto:holly.hawkins@nerc.net)  
[william.edwards@nerc.net](mailto:william.edwards@nerc.net)

*Counsel for the North American Electric  
Reliability Corporation*

March 11, 2013

## **Exhibits A and C—G**

(Available on the NERC Website at  
[http://www.nerc.com/fileUploads/File/Filings/Attachments VAR-001-3 Exhibits](http://www.nerc.com/fileUploads/File/Filings/Attachments%20VAR-001-3%20Exhibits))

## **EXHIBIT B**

### **Criteria for Proposed Reliability Standard**

**1. Proposed Reliability Standard is designed to achieve a specified reliability goal and contains a technically sound means to achieve that goal.**

The Regional Variance is designed to achieve the specific reliability goal of having Transmission Operators fulfill their responsibility of monitoring, controlling, and maintaining voltage levels, reactive flows, and reactive resources within limits in real time. The proposed Requirements ensure reliable operations by ensuring that Generator Operators receive information necessary through the issuance of or conversion to a voltage schedule by the Transmission Operator to maintain required voltage levels and protect equipment in the Western Interconnection. The Regional Variance achieves this goal by requiring that Transmission Operators and Generator Operators use a more efficient process for communicating and implementing voltage schedules, which will eliminate or significantly limit the need for manual adjustments necessary to meet a reactive power schedule. Ensuring that Generator Operators receive voltage schedules or have a methodology in place for converting voltage schedules provided in reactive power terms, will allow for enhanced dynamic voltage support during system events in the Western Interconnection.

The Regional Variance promotes reliability by requiring the exchange of transmission equipment data, operating data, and conversion methodologies. Specifically, through this exchange, Transmission Operators are able to review each Generator Operator's conversion methodology, giving Transmission Operators the ability to understand the reliability implications of the process that the Generator Operator will follow in converting the schedule to a voltage set

point and the influence of the automatic voltage regulator adjustment on the desired substation voltage. In the proposed Regional Variance, and consistent with Version 5 of the NERC Functional Model,<sup>22</sup> the Transmission Operator retains responsibility for monitoring, controlling, and maintaining voltage levels. Through the scheduling and conversion process, Transmission Operators can ensure that Generator Operators maintain voltage levels necessary for reliability, and Generator Operators can comply with the Requirements in VAR-002-WECC-1 and meet the Requirement in VAR-002-1.1b to follow the schedule set by the Transmission Operator,<sup>23</sup> thereby aligning the VAR Reliability Standards to meet the reliability needs in the Western Interconnection.

The Regional Variance contains a technically sound method to achieve its stated goal. The Regional Variance was developed by a standard drafting team comprised of experts<sup>24</sup> throughout the Western Interconnection in the areas of electric grid operations and generator operations. The Regional Variance improves the process for controlling voltage and resolves any misunderstanding between Transmission Operators and Generator Operators over which type of schedule is needed from the Transmission Operator to meet the Requirements of VAR-002-WECC-1.

More specifically, proposed Requirement E.A.13 is designed to ensure that Transmission Operators clearly issue *voltage* schedules to Generator Operators that can be followed. Requirement E.A.14 requires the Transmission Operator to identify a reference point for voltage schedules. Pursuant to Requirement E.A.15, the Generator Operator converts that voltage

---

<sup>22</sup> See NERC Reliability Functional Model, Version 5, *available at* [http://www.nerc.com/files/Functional\\_Model\\_V5\\_Final\\_2009Dec1.pdf](http://www.nerc.com/files/Functional_Model_V5_Final_2009Dec1.pdf).

<sup>23</sup> Because all schedules, regardless of how they are expressed, must be converted into a voltage target for the automatic voltage regulator set point, Generator Operators will continue to meet Requirement R2 of VAR-002 to maintain the generator voltage directed by the Transmission Operator.

<sup>24</sup> See **Exhibit G** to NERC's Petition.

schedule into an automatic voltage regulator set point using its methodology. In Requirements E.A.16 and E.A.17, Generator Operators and Transmission Operators exchange information and data associated with the conversion methodology, so that the methodology is clearly understood. The automatic voltage regulator is operated in voltage control mode at the specified voltage set point until the Transmission Operator provides another voltage schedule at which time the Generator Operator must change the voltage set point.

**2. Proposed Reliability Standard is applicable only to users, owners and operators of the bulk power system, and is clear and unambiguous as to what is required and who is required to comply.**

Proposed VAR-001-3 is clear and unambiguous as to what is required and who is required to comply. The Regional Variance applies exclusively to WECC Transmission Operators and Generator Operators, respectively as identified within the applicability section of proposed VAR-001-3. The Regional Variance contains six requirements that clearly and unambiguously state to whom the requirement applies and establish the applicable entities' compliance obligations.

Specifically, Transmission Operators must issue voltage schedules at defined reference points (*see* Requirements E.A.13 and E.A.14). Generator Operators must convert each voltage schedule to the automatic voltage regulator voltage set point (*see* Requirement E.A.15). Transmission Operators and Generator Operators are required to exchange information in the development of the voltage set point conversion methodology (*see* Requirements E.A.16 and E.A.17). Generator Operators who use control systems (*i.e.*, control loops) external to the automatic voltage regulator are required to have a control system design that incorporates the automatic voltage controlled response to voltage deviations during System Disturbances (*see* Requirement E.A.18.1). The use of a control loop is only permitted when the Generator Operators and the Transmission Operator agree to its use (*see*, Requirement E.A.18.2).

**3. Proposed Reliability Standard includes clear and understandable consequences and a range of penalties (monetary and/or non-monetary) for a violation.**

The VRFs and VSLs for the proposed standard comport with NERC guidelines related to their assignment. The assignment of the severity level for each VSL is consistent with the corresponding Requirement and the VSLs should ensure uniformity and consistency in the determination of penalties. The VSLs do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations. For these reasons, the proposed Reliability Standard includes clear and understandable consequences. Proposed VAR-001-3 also includes clear and understandable consequences and a range of penalties (monetary and/or non-monetary) for a violation. The ranges of penalties for violations will be based on the applicable VRF and VSL in accordance with the sanctions table and the supporting penalty determination process described in the NERC Sanction Guidelines, Appendix 4B to the NERC Rules of Procedure.

**4. Proposed Reliability Standard identifies clear and objective criterion or measure for compliance, so that it can be enforced in a consistent and non-preferential manner.**

Proposed VAR-001-3 identifies clear and objective criterion or measures for compliance, so that it can be enforced in a consistent non-preferential manner. The Regional Variance contains individual measures that support the regional difference's Requirements by plainly identifying how the Requirements will be assessed and enforced. These six measures ensure that the Requirements will be assessed and enforced in a clear, consistent, and non-preferential manner, without prejudice to any party.

Measurement M.E.A.13 requires that Transmission Operators have, and provide upon request, evidence that they provided the voltage schedules to the Generator Operator.

Measurement M.E.A.14 requires that Transmission Operators have, and provide upon request, evidence that they provided one of the voltage schedule reference points to the Generator Operator. Measurement M.E.A.15 requires that Generator Operators have, and provide upon request, evidence that they converted the voltage schedule into a voltage set point for the automatic voltage regulator. Measurement M.E.A.16 requires that Generator Operators have, and provide upon request, evidence that they provided the voltage set point conversion methodology to Transmission Operators within 30 calendar days of a request. Measurement M.E.A.17 requires that Transmission Operators have, and provide upon request, evidence that they provided data to support the development of the voltage set point conversion methodology. Finally, Measurement M.E.A.18 requires that Generator Operators have, and provide upon request, evidence that their control loops used to manage MVar loading meet the control loop specifications.

**5. Proposed Reliability Standards achieves a reliability goal effectively and efficiently — but does not necessarily reflect “best practices” without regard to implementation cost or historical regional infrastructure design.**

The Regional Variance in proposed VAR-001-3 achieves its reliability goal effectively and efficiently. The regional difference provides a more effective and efficient way to achieve the same reliability objective of VAR-001-2 by requiring Transmission Operators to provide Generator Operators with a voltage schedule so that Generator Operators can provide the voltage support that is needed during steady state and transient conditions to ensure the reliable operation of the Bulk Electric System in the Western Interconnection. As explained above, the current method for Generator Operators to comply with VAR-002-WECC-1 can result in burdensome manual adjustments to automatic voltage regulators in cases where a reactive power schedule is issued by the Transmission Operator. The Regional Variance makes it easier for Generator

Operators to comply with and meet the more stringent operating requirements of VAR-002-WECC-1 by eliminating the conflict created when Transmission Owners provide reactive schedules. This conflict is eliminated through the use of a conversion methodology to convert the schedule into voltage terms.

A more restrictive means of achieving the goal would have been to require only the provision of voltage schedules. The approach chosen is more efficient because it maintains the current status quo between Generator Operators and Transmission Operators, while providing the Generator Operator with the necessary voltage schedule information and conversion methodology for voltage schedules provided in reactive power terms for operation of the automatic voltage regulator.

- 6. Proposed Reliability Standards is not “lowest common denominator,” *i.e.*, does not reflect a compromise that does not adequately protect Bulk-Power System reliability. Proposed Reliability Standard can consider costs to implement for smaller entities, but not at consequences of less than excellence in operating system reliability.**

Proposed VAR-001-3 does not reflect a compromise that does not adequately protect Bulk-Power System reliability. As noted above, the alternative approach continues to meet the reliability goal in VAR-001-2. The alternative was developed to resolve a specific issue in the Western Interconnection identified during the development of VAR-002-WECC-1 and was designed to accommodate the current status quo in the industry – to allow Transmission Operators to provide schedules in reactive power terms – while providing Generator Operators with the information necessary to keep their automatic voltage regulator in service and in voltage control mode as required by VAR-002-WECC-1.

The standard drafting team determined that the Regional Variance should result in relatively the same aggregate costs to entities with applicable registered functions because the

number of schedules issued is the same as in VAR-001-2. The modifications in the Regional Variance are mainly administrative. There will be some minor cost associated with documenting the conversion methodology to translate the schedules, regardless of the form they are provided to the Generator Operator, into a voltage schedule. Because the Regional Variance should lead to little change in the aggregate total cost, a special accommodation for smaller entities was not necessary. The Regional Variance will apply equally to all entities with applicable registered functions in a consistent manner. Further, during the standard development process, no small entity expressed a concern regarding the cost to implement.

- 7. Proposed Reliability Standard is designed to apply throughout North America to the maximum extent achievable with a single Reliability Standard while not favoring one geographic area or regional model. It should take into account regional variations in the organization and corporate structures of transmission owners and operators, variations in generation fuel type and ownership patterns, and regional variations in market design if these affect the proposed Reliability Standard.**

Proposed VAR-001-3 will be enforceable throughout North America. The existing requirements in VAR-001-2 will continue to be enforced in proposed VAR-001-3 on a continent-wide basis, except as modified in the Western Interconnection through the Regional Variance.

- 8. Proposed Reliability Standard will cause no undue negative effect on competition or restriction of the grid beyond any restriction necessary for reliability.**

The Regional Variance in proposed VAR-001-3 does not cause undue negative effect on competition or restriction of the grid. Specifically, the proposed Regional Variance does not restrict the available transmission capability or limit use of the Bulk-Power System in a preferential manner. The proposed Regional Variance includes a fair and reliable process for providing voltage schedules and controlling voltages that supports the need for reactive support.

**9. The implementation time for the proposed Reliability Standard is reasonable.**

The implementation time for the proposed Reliability Standard is reasonable. Proposed VAR-001-3 become effective on the first day of the first calendar quarter six months after applicable regulatory approval, or in those jurisdictions where no regulatory approval is required, the first day of the first calendar quarter six months after NERC Board of Trustees' approval. Six months will provide Transmission Operators sufficient time to review scheduling practices; to revise existing procedures and other documents that contain scheduling practices; and to distribute any required revisions to those documents in order to be in compliance with the regional difference. Six months will also allow time for Generator Operators to develop voltage schedule conversion methodologies from the reference point to the automatic voltage regulator set point as required in proposed VAR-001-3, Requirement E.A.16. The proposed effective dates are explained in the proposed implementation plan, attached as **Exhibit C**.

**10. The Reliability Standard was developed in an open and fair manner and in accordance with the Reliability Standard development process.**

The proposed Reliability Standard was developed in accordance with NERC's and WECC's ANSI- accredited processes for developing and approving Reliability Standards. Section V, *Summary of the Reliability Standard Development Proceedings*, details the processes followed to develop the standard (for a more thorough review, please see the complete development history included as **Exhibits F and G**).

These processes included, among other things, multiple comment periods, pre-ballot review periods, and balloting periods. Additionally, all drafting team meetings were properly noticed and open to the public. The initial and recirculation ballots both achieved a quorum and exceeded the required ballot pool approval levels.

**11. NERC explains any balancing of vital public interests in the development of proposed Reliability Standards.**

NERC and WECC have not identified competing vital public interests with respect to the request for approval of the regional difference, and no comments were received during the development of the regional difference indicating the regional difference conflicts with other vital public interests.

**12. Proposed Reliability Standard considers any other appropriate factors.<sup>25</sup>**

As explained above, a Regional Variance must satisfy two additional criteria. A Regional Variance from a continent-wide Reliability Standard *generally* must either be: (1) more stringent than the continent-wide reliability standard (which includes a regional standard that addresses matters that the continent-wide standard does not); or (2) a regional Reliability Standard that is necessitated by a physical difference in the Bulk-Power System. The removal of Requirement R3 in the proposed Regional Variance is more stringent because it reduces the ability to exempt Generator Operators from complying with voltage schedules. Requirements E.A.13 through E.A.18 are more stringent than Requirement R4 of Reliability Standard VAR-001-2 because collectively, they limit schedules provided by Transmission Operators to voltage schedules, but allow the voltage schedule to be communicated in reactive terms. If communicated in reactive terms, the Regional Variance establishes a process for the Generator Operator to convert each into a voltage set point for the automatic voltage regulator. The new Requirements also establish communication between each Generator Operator and its Transmission Operator in establishing the voltage set point conversion methodology and also establish control-loop specifications.

---

<sup>25</sup> Order No. 672 at P 323. In considering whether a proposed Reliability Standard is just and reasonable, we will consider the following general factors, as well as other factors that are appropriate for the particular Reliability Standard proposed.