

145 FERC ¶ 61,123  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners: Jon Wellinghoff, Chairman;  
Philip D. Moeller, John R. Norris,  
Cheryl A. LaFleur, and Tony Clark.

Transmission Relay Loadability Reliability Standard      Docket Nos. RM08-13-000  
RM08-13-001  
RM11-16-000

ORDER ON COMPLIANCE

(Issued November 13, 2013)

1. On February 19, 2013, the North American Electric Reliability Corporation (NERC) submitted a compliance filing, pursuant to Order No. 733<sup>1</sup> and Order No. 759,<sup>2</sup> that reports on NERC's evaluation of the criteria for Planning Coordinators to identify sub-200 kV circuits that are subject to Reliability Standard PRC-023-2, set forth in Attachment B of the standard. Pursuant to section 215 of the Federal Power Act (FPA),<sup>3</sup> the Commission accepts NERC's filing.

**I. Background**

**A. Section 215 of the FPA**

2. Section 215 of the FPA requires the Commission-certified Electric Reliability Organization (ERO) to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval. Once approved, Reliability Standards may be enforced in the United States by the ERO subject to Commission oversight, or by the

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<sup>1</sup> *Transmission Relay Loadability Reliability Standard*, Order No. 733, 130 FERC ¶ 61,221 (2010), *order on reh'g and clarification*, Order No. 733-A, 134 FERC ¶ 61,127 (2011), *clarified*, Order No. 733-B, 136 FERC ¶ 61,185 (2011).

<sup>2</sup> *Transmission Relay Loadability Reliability Standard*, Order No. 759, 138 FERC ¶ 61,197 (2012).

<sup>3</sup> 16 U.S.C. § 824o (2012).

Commission independently.<sup>4</sup> Pursuant to the requirements of FPA section 215, the Commission established a process to select and certify an ERO<sup>5</sup> and, subsequently, certified NERC as the ERO.<sup>6</sup>

### **B. Order No. 733**

3. On March 18, 2010, the Commission issued Order No. 733 approving Reliability Standard PRC-023-1 (Transmission Relay Loadability), requiring transmission owners, generator owners, and distribution providers to set load-responsive phase protection relays according to specific criteria to ensure that the relays reliably detect and protect the electric network from all fault conditions, but do not operate during non-fault load conditions. In addition, pursuant to section 215(d)(5) of the FPA, the Commission directed NERC to develop modifications to Reliability Standard PRC-023-1 to address certain issues identified by the Commission. Among other things, the Commission directed NERC to “specify the test that planning coordinators must use to determine whether a sub-200 kV facility is critical to the reliability of the Bulk-Power System.”<sup>7</sup> The Commission further directed NERC to “file its test, and the results of applying the test to a representative sample of utilities from each of the three interconnections, for Commission approval[.]”<sup>8</sup>

### **C. Order No. 759**

4. On March 15, 2012, the Commission issued Order No. 759 approving Reliability Standard PRC-023-2 (Transmission Relay Loadability), which NERC filed in response to the Commission’s directives in Order No. 733. In particular, Reliability Standard PRC-023-2 reflects an “add in” approach to bring certain sub-100 kV facilities within scope of the standard and specifies the test that planning coordinators must use to determine whether sub-200 kV facilities, including the sub-100 kV facilities identified

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<sup>4</sup> See 16 U.S.C. § 824o(e)(3).

<sup>5</sup> *Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval and Enforcement of Electric Reliability Standards*, Order No. 672, FERC Stats. & Regs. ¶ 31,204, *order on reh’g*, Order No. 672-A, FERC Stats. & Regs. ¶ 31,212 (2006).

<sup>6</sup> *North American Electric Reliability Corp.*, 116 FERC ¶ 61,062, *order on reh’g and compliance*, 117 FERC ¶ 61,126 (2006), *aff’d sub nom. Alcoa Inc. v. FERC*, 564 F.3d 1342 (D.C. Cir. 2009).

<sup>7</sup> Order No. 733, 130 FERC ¶ 61,221 at P 69.

<sup>8</sup> *Id.*

through the “add in” approach, are critical to the reliability of the Bulk-Power System.<sup>9</sup> Specifically, Attachment B to Reliability Standard PRC-023-2 specifies six criteria that planning coordinators must apply to identify the sub-200 kV facilities that are subject to the standard.

5. In approving Reliability Standard PRC-023-2, the Commission accepted NERC’s proposed implementation plan, which provided NERC the opportunity to apply the Attachment B criteria to a representative sample of utilities from each of the three interconnections, as directed by the Commission in Order No. 733.<sup>10</sup> The Commission directed NERC to submit a report outlining the results of the test of the Attachment B criteria.<sup>11</sup> Specifically, the Commission directed NERC to include in the report:

- (1) A summary of the base cases used in applying the Attachment B criteria and an assessment of how the base cases used for the analysis relate to TPL-003-0, Requirement R1.3.2;
- (2) A discussion of the types of studies that planning coordinators may use to identify circuits under Attachment B; and
- (3) An assessment that demonstrates whether Attachment B is comprehensive enough to capture all circuits that could have an operational impact on the reliability of the bulk electric system in the context of transmission relay loadability.<sup>12</sup>

6. In addition to the three questions, the Commission directed NERC “to evaluate, in the report, relay loadability under the B4 criterion consistent with PRC-023-2, Requirement R1, which requires, in part, that NERC ‘evaluate relay loadability at 0.85 per unit voltage and a power factor angle of 30 degrees’ in addition to applicable

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<sup>9</sup> Under the “add in” approach adopted in Order No. 733, a sub-100 kV facility will be subject to PRC-023-2 if the facility is: (1) owned or operated by a currently-Registered Entity or an entity that becomes a Registered Entity in the future; (2) associated with a facility that is included on a critical facilities list defined by the Regional Entity; (3) employing load-responsive phase protection relays in its protections system(s); and (4) identified by the PRC-023-2, Attachment B4 test. *See* Order No. 733, 130 FERC ¶ 61,221 at PP 41-42.

<sup>10</sup> *See* Order No. 733, 130 FERC ¶ 61,221 at P 69.

<sup>11</sup> Order No. 759, 138 FERC ¶ 61,197 at P 77.

<sup>12</sup> *Id.*

current data.”<sup>13</sup> As noted by the Commission, the 0.85 per unit and 30 degrees power factor criteria in PRC-023-2, Requirement R1 is based on system conditions, voltage, current, and angle observed prior to the cascading stage of the 2003 Northeast Blackout.<sup>14</sup> Therefore, the Commission noted a concern that “testing, which does not, at a minimum, compare whether criteria that do not consider voltage or angle affect the appropriate identification of applicable facilities, is not responsive to ensuring the reliability objective of the critical facilities test or the reliability objective of PRC-023.”<sup>15</sup>

#### **D. NERC Compliance Filing**

7. On February 19, 2013, NERC submitted a compliance filing in response to the Commission’s directives in Order Nos. 733 and 759. NERC provides an overview of the Attachment B criteria, noting that Attachment B “was designed with the objective of minimizing any additional analytical burden on the Planning Coordinators by leveraging existing studies.”<sup>16</sup> NERC explains that criteria B1, B2, and B3 identify circuits subject to PRC-023-2 based on previously-identified criticality of the circuit where the circuit has been identified as part of a flowgate, a monitored facility of an Interconnection Reliability Operating Limits (IROL) identified pursuant to FAC-010, or a path covered by the nuclear plan interface requirements (NIPR) pursuant to NUC-001.<sup>17</sup> NERC states that “it is appropriate to have PRC-023-2 applicable to the protection systems on these circuits without requiring any additional analysis.”<sup>18</sup>

8. With regard to criterion B4, NERC states that criterion B4 is used to identify additional thermal loading conditions of concern associated with transmission relay loadability that are not identified by applying criteria B1 through B3.<sup>19</sup> NERC explains that criterion B4 assesses circuits based on N-2 contingencies without manual system adjustments in between the two contingencies. NERC states that testing N-2 contingencies without manual system adjustment “is in line with the reliability objective

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<sup>13</sup> *Id.* P 78.

<sup>14</sup> *Id.*

<sup>15</sup> *Id.*

<sup>16</sup> NERC Filing at 8.

<sup>17</sup> *Id.*

<sup>18</sup> *Id.*

<sup>19</sup> *Id.* at 9.

of PRC-023-2 by modeling a situation where a system operator may not have time between the two contingencies to make appropriate system adjustments.”<sup>20</sup>

9. NERC states that criteria B5 and B6 “provide the opportunity for the Planning Coordinator to identify circuits based on other technical assessments or by mutual agreement between the Planning Coordinator and Facility Owner.”<sup>21</sup> NERC explains that criteria B5 and B6 will be used less frequently and in unique situations requiring detailed system knowledge. NERC states that it focused the test of the Appendix B criteria on the first four criteria since criteria B5 and B6 “are reserved for special cases that cannot be readily identified with a continent-wide test.”<sup>22</sup>

10. NERC explains that it applied the Attachment B criteria to a representative sample of utilities from each of the three interconnections, including large, small, rural, and metropolitan entities, consistent with the Commission’s directive in Order No. 733.<sup>23</sup> NERC states that the sample of utilities selected for the test of the Attachment B criteria includes various system designs, such as densely networked systems and systems where long transmission lines separate load and generation centers.<sup>24</sup> In addition, NERC provides responses to the three questions specified in Order No. 759.

11. With regard to the first question, NERC states that the simulation testing performed by NERC to assess the test specified in criterion B4 used base cases “modeling summer peak load for the Near-Term Transmission planning Horizon, which is defined as the ‘transmission planning period that covers Year One through five.’”<sup>25</sup> Specifically, NERC states that the base cases used in the simulation testing model one to two years into the future, depending on the system tested.<sup>26</sup> NERC explains that using base cases one to two years into the future is appropriate since these base cases “provide a system representation containing circuits that already are in-service or have a very high certainty of being placed in-service.”<sup>27</sup> In addition, NERC states that it selected base

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

<sup>21</sup> *Id.*

<sup>22</sup> *Id.* at 9-10.

<sup>23</sup> *Id.* at 11 (citing Order No. 733, 130 FERC ¶ 61,221 at P 69).

<sup>24</sup> *Id.*

<sup>25</sup> *Id.* at 15 (citing Reliability Standard TPL-003-0a (Transmission Planning)).

<sup>26</sup> *Id.*

<sup>27</sup> *Id.*

cases that model summer peak load conditions because such conditions reflect “a stressed system condition for which transmission relay loadability is a significant concern based on past system disturbances.”<sup>28</sup>

12. In response to the second question, NERC states that criterion B5 gives a planning coordinator the ability to identify facilities subject to PRC-023-2 through studies other than those identified in criteria B1 through B4. In addition, NERC states that criterion B5 requires that the studies and assessments have a technical basis, and identification must be made in consultation with the facility owner.<sup>29</sup> NERC identifies a list of technical studies or assessments available to planning coordinators, including, but not limited to, assessments used to demonstrate compliance with TPL standard requirements, seasonal reliability assessments, operational planning studies, studies performed to assess interconnection requirements, under voltage load shedding studies, and analyses of actual system events. NERC states that planning coordinators will identify circuits subject to PRC-023-2 when technical studies or assessments “demonstrate the potential for, or actual occurrence of, circuits tripping due to insufficient relay loadability or being loaded above their emergency ratings under contingency conditions.”<sup>30</sup>

13. On the final question, NERC states that the results of applying the Attachment B criteria to the representative sample of utilities demonstrates “that the test is comprehensive enough to identify all circuits that may adversely affect reliability of the Bulk-Power System due to relay loadability constraints.”<sup>31</sup> NERC states that the Attachment B test is comprehensive in that it provides for six different criteria for the identification of circuits subject to PRC-023-2. In addition, NERC notes that the Attachment B criteria use existing information and analyses so that existing knowledge of the system is applied in an effective and efficient manner.<sup>32</sup>

#### **E. Notice and Responsive Pleadings**

14. Notice of NERC’s filing was published in the *Federal Register*, 78 Fed. Reg. 21,929 (2013), with interventions and comments due on or before April 25, 2013. No interventions or comments were filed. Notice of NERC’s filing reflecting Docket Nos. RM08-13-000 and RM11-16-000 was published in the *Federal Register*, 78 Fed.

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<sup>28</sup> *Id.*

<sup>29</sup> *Id.* at 24.

<sup>30</sup> *Id.* at 25.

<sup>31</sup> *Id.*

<sup>32</sup> *Id.* at 26.

Reg. 55,249 (2013), with interventions and comments due on or before September 20, 2013. No interventions or comments were filed.

## II. Discussion

15. We accept NERC's compliance filing and find that NERC has adequately addressed the questions set forth in Order No. 759.

16. As discussed above, the Commission directed NERC to include in its report a summary of the base cases used in applying the Attachment B criteria and an assessment of how the base cases used for the analysis relate to TPL-003-0, Requirement R1.3.12. In its compliance filing, NERC explains that the use of base cases modeled on summer peak conditions is consistent with the critical system conditions that planning coordinators use in transmission planning assessments to evaluate system performance following the loss of two or more bulk electric system elements. We accept NERC's explanation regarding the use of summer peak base cases to validate the effectiveness of criterion B4. We recognize that, depending on the characteristics of a system, a summer peak load with a corresponding generation dispatch similar to the security constrained economic dispatch used in real time operation represents a stressed system condition under which transmission relay loadability can be a significant concern. We agree with NERC that when planning coordinators apply the test in Attachment B, the number of circuits identified will depend on the size, topology, and operating characteristics of their system, reflecting the cases used in their annual transmission planning assessments pursuant to the TPL standards and based on knowledge of their system.

17. Similarly, with respect to NERC's response to the Commission's question concerning the types of studies that planning coordinators may use to identify circuits under criterion B5, we agree that the planning coordinator is in the best position, based on its knowledge of the system and working with facility owners, to use its engineering judgment to determine the types of studies that would identify critical circuits for the purposes of transmission relay loadability. As NERC explains, a circuit will be subject to compliance with PRC-023-2 "when the Planning Coordinator has technical studies or assessments ... that demonstrate the potential for, or actual occurrence of, circuits tripping due to insufficient loadability or being loaded above their emergency rating under contingency conditions."<sup>33</sup> We find NERC's explanation to be reasonable and consistent with the function performed by planning coordinators.

18. With regard to the Commission's third question asking NERC to evaluate whether Attachment B is sufficiently comprehensive, we agree with NERC's assessment that Attachment B is comprehensive enough to capture all circuits that could have an operational impact on the reliability of the bulk electric system in the context of

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<sup>33</sup> *Id.* at 25.

transmission relay loadability.<sup>34</sup> We agree with NERC that the inclusion of six different criteria ensures that the identification of circuits is not dependent on only one criterion. In addition, we recognize that the use of existing analyses performed by planning coordinators and information from other entities, including facility owners, assures that existing knowledge of the system is applied in an effective and efficient manner. We also agree with NERC that where application of the Attachment B test identifies significant overloads on sub-100kV circuits that are not part of the bulk electric system, “the Planning Coordinator may use this information as one factor in deciding whether a circuit is necessary for the reliable operation of the interconnected power system” and, if appropriate, the planning coordinator may file an exception request to bring the facility in the scope of the bulk electric system in accordance with the bulk electric system exception process.<sup>35</sup>

19. Finally, we accept NERC’s explanation that it evaluated transmission relay loadability under criterion B4 at 0.85 per unit voltage and power angle of 30 degrees, consistent with PRC-023-2, Requirement R1. We agree that the testing and validation of criterion B4 was based on a conservative assumption that the simulated voltage is 0.85 per unit and the simulated power factor angle is 30 degrees. NERC has shown that it included current magnitude, 0.85 per unit voltage and 30 degree power factor in the evaluation. According to NERC, in more than 99 percent of the resultant circuit overloads when applying its test, the assumed voltage and power factor facilitated the identification of facilities that should be subject to PRC-023-2.<sup>36</sup> For this reason, we agree with NERC’s assessment that the decision to base the evaluation of the B4 criterion on a conservative assumption using 0.85 per unit voltage and 30 degree power factor is justified.

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<sup>34</sup> We understand from NERC’s Compliance Filing that, although sub-criteria B4b could be read in a manner that limits the application of the Attachment B test, the test and all criteria apply to circuits operated between 100 kV and 200 kV, as well as circuits operated below 100 kV that are part of the bulk electric system. *See* NERC Filing at 26, 28.

<sup>35</sup> *See id.* at 28.

<sup>36</sup> *See id.* at 24.



Docket No. RM08-13-000, *et al.*

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The Commission orders:

The Commission hereby accepts NERC's compliance filing, as discussed in the body of this order.

By the Commission.

( S E A L )

Nathaniel J. Davis, Sr.,  
Deputy Secretary.

Document Content(s)

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