

144 FERC ¶ 61,055  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

18 CFR Part 40

Docket No. RM13-7-000

Protection System Maintenance Reliability Standard

(July 18, 2013)

AGENCY: Federal Energy Regulatory Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: Pursuant to section 215 of the Federal Power Act, the Commission proposes to approve a revised Reliability Standard, PRC-005-2 – Protection System Maintenance, to supersede four existing Reliability Standards, PRC-005-1.1b (Transmission and Generation Protection System Maintenance and Testing), PRC-008-0 (Underfrequency Load Shedding Equipment Maintenance), PRC-011-0 (Undervoltage Load Shedding Equipment Maintenance) and PRC-017-0 (Special Protection System Maintenance and Testing). In addition, the Commission seeks clarification and comment on three aspects of the proposed Reliability Standard and proposes to modify one violation severity level.

DATES: Comments are due [**INSERT DATE 60 days after publication in the FEDERAL REGISTER**].

ADDRESSES: Comments, identified by docket number, may be filed in the following ways:

- Electronic Filing through <http://www.ferc.gov>. Documents created electronically using word processing software should be filed in native applications or print-to-PDF format and not in a scanned format.
- Mail/Hand Delivery: Those unable to file electronically may mail or hand-deliver comments to: Federal Energy Regulatory Commission, Secretary of the Commission, 888 First Street, NE, Washington, DC 20426.

Instructions: For detailed instructions on submitting comments and additional information on the rulemaking process, see the Comment Procedures Section of this document.

FOR FURTHER INFORMATION CONTACT:

Tom Bradish (Technical Information)  
Office of Electric Reliability  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426  
(301) 665-1391  
[Tom.Bradish@ferc.gov](mailto:Tom.Bradish@ferc.gov)

Julie Greenisen (Legal Information)  
Office of the General Counsel  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426  
(202) 502-6362  
[julie.greenisen@ferc.gov](mailto:julie.greenisen@ferc.gov)

SUPPLEMENTARY INFORMATION:

144 FERC ¶ 61,055  
UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

Protection System Maintenance  
Reliability Standard

Docket No. RM13-7-000

NOTICE OF PROPOSED RULEMAKING

(July 18, 2013)

1. Pursuant to section 215 of the Federal Power Act (FPA),<sup>1</sup> the Commission proposes to approve a revised Reliability Standard, PRC-005-2 – Protection System Maintenance, to supersede four existing Reliability Standards, PRC-005-1.1b (Transmission and Generation Protection System Maintenance and Testing), PRC-008-0 (Underfrequency Load Shedding Equipment Maintenance), PRC-011-0 (Undervoltage Load Shedding Equipment Maintenance) and PRC-017-0 (Special Protection System Maintenance and Testing). The proposed modifications, in part, respond to certain Commission directives issued in Order No. 693,<sup>2</sup> in which the Commission approved initial versions of these four Reliability Standards governing maintenance and testing of protection systems, and maintenance of underfrequency and undervoltage load shedding equipment.

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<sup>1</sup> 16 U.S.C. 824o (2006).

<sup>2</sup> *Mandatory Reliability Standards for the Bulk Power System*, Order No. 693, 72 FR 16,416 (April 4, 2007), FERC Stats. & Regs. ¶ 31,242 (2007), *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007).

2. Proposed Reliability Standard PRC-005-2 represents an improvement over the four existing standards covering protection system maintenance and testing, by incorporating specific, required minimum maintenance activities and maximum time intervals for maintenance of individual components of protection systems and load shedding equipment affecting the bulk electric system. While the proposed Reliability Standard also gives responsible entities the option of developing their own, performance-based maintenance intervals for most components, the intervals must be designed to achieve a minimum performance level, and must be adjusted if that target performance level is not actually achieved. In addition, the proposed Reliability Standard combines the maintenance and testing requirements for protection systems into one comprehensive Reliability Standard, as was suggested by the Commission in Order No. 693.<sup>3</sup>

3. While the proposed Reliability Standard contains overall improvements, as discussed below, we seek additional information and comments on the following: (A) verification of operability and settings upon placement in-service of new or modified protection systems; (B) use of a four percent target for countable events in performance-based programs; and (C) violation severity levels for certain Requirement R1 violations.

4. We also propose to approve the six new definitions associated with proposed Reliability Standard PRC-005-2, i.e., Component, Component Type, Countable Event, Protection System Maintenance Program, Segment, and Unresolved Maintenance Issue. Of these newly defined terms, NERC proposes to include only the term Protection

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<sup>3</sup> Order No. 693, FERC Stats. & Regs. ¶ 31,242 at P 1475.

System Maintenance Program in its Glossary of Terms, with the remainder applying only to Reliability Standard PRC-005-2.

5. Finally, we propose to approve NERC's proposed implementation plan for the proposed Reliability Standard, which requires entities to develop a compliant protection system maintenance program within twelve months, but allows for the transition over time of maintenance activities and documentation to conform to the new minimum maintenance activities and maximum maintenance intervals.

## **I. Background**

### **A. Regulatory Background**

6. Section 215 of the FPA requires a Commission-certified Electric Reliability Organization (ERO) to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval.<sup>4</sup> Once approved, the Reliability Standards may be enforced by the ERO subject to Commission oversight, or by the Commission independently.<sup>5</sup>

7. In 2006, the Commission certified NERC as the ERO pursuant to FPA section 215.<sup>6</sup> In 2007, in Order No. 693, the Commission approved an initial set of Reliability Standards submitted by NERC, including initial versions of four protection

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<sup>4</sup> *Id.* at 824o(c) and (d).

<sup>5</sup> *See id.* at 824o(e).

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

system and load-shedding-related maintenance standards, *i.e.*, PRC-005-1, PRC-008-0, PRC-011-0, and PRC-017-0.<sup>7</sup>

8. In approving these protection system-related Reliability Standards, the Commission directed NERC to develop or to consider a number of modifications. Specifically, the Commission directed NERC to: (1) develop a revision to PRC-005-1 incorporating a maximum time interval during which to conduct maintenance and testing of protection systems; and (2) consider combining into one standard the various maintenance and testing requirements for all of the maintenance and testing-related Reliability Standards for protection systems, underfrequency load shedding (UFLS) equipment and undervoltage load shedding (UVLS) equipment.<sup>8</sup>

9. In a subsequent order, issued in response to NERC's request for approval of its interpretation of PRC-005-1 (Order No. 758), the Commission issued three additional directives, addressing deficiencies in the existing version of Reliability Standard PRC-005.<sup>9</sup> The Commission directed NERC to modify Reliability Standard PRC-005-1, through its standards development process, to: (1) identify and include the auxiliary relays and non-electrical sensing devices designed to sense or take action against any abnormal system condition that will affect reliable operation (such as sudden pressure

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<sup>7</sup> Order No. 693, FERC Stats. & Regs. ¶ 31,242 at PP 1474, 1492, 1497, and 1514.

<sup>8</sup> In Order No. 763, the Commission approved Reliability Standard PRC-006-1 pertaining to "underfrequency load shedding" which also encompasses "undervoltage load shedding." *Automatic Underfrequency Load Shedding and Load Shedding Plans Reliability Standards*, Order No. 763, 139 FERC ¶ 61,098 (2012).

<sup>9</sup> *Interpretation of Protection System Reliability Standard*, 138 FERC ¶ 61,094 (2012) (Order No. 758).

relays); (2) include specific requirements for maintenance and testing of reclosing relays that affect the reliable operation of the bulk-power system; and (3) include specific requirements for maintenance and testing of DC control circuitry.

**B. Existing Protection System-Related Maintenance Standards**

10. Under currently-effective Reliability Standard PRC-005-1b, transmission owners, generator owners, and applicable distribution providers are required to have a protection system maintenance and testing program for any protection system elements that affect the bulk electric system, and must document their compliance with that program. The program must include maintenance and testing intervals and their basis, and a summary of maintenance and testing procedures. However, Reliability Standard PRC-005-1b does not impose any specific requirements regarding maintenance activities, standards or intervals. Similarly, Reliability Standards PRC-008-0, PRC-011-0, and PRC-017-0 require applicable transmission owners, distribution providers and generator owners to have a maintenance and testing program in place for UFLS equipment, UVLS equipment, and special protection systems, respectively, and to document their compliance with their program. These Reliability Standards, like PRC-005-1b, do not impose any specific requirements regarding maintenance activities, standards or intervals.

**C. NERC Petition and Proposed Standard PRC-005-2**

11. On February 26, 2013, NERC submitted a petition seeking approval of proposed Reliability Standard PRC-005-2, six new definitions associated with that standard, and a proposed implementation plan that includes retirement of the four currently-effective Reliability Standards that address maintenance and testing of transmission and generation

protection systems, UFLS and UVLS equipment, and special protection systems. NERC maintains that the proposed Reliability Standard not only consolidates the four currently-effective standards into a single standard, but also addresses the directives in Order No. 693 related to those standards.<sup>10</sup>

12. NERC states that the proposed Reliability Standard establishes minimum acceptable maintenance activities and accompanying maximum allowable maintenance intervals for specific component types, gives responsible entities flexibility to implement “condition-based maintenance” that allows for adjustment of intervals and activities to reflect monitoring of components, and establishes requirements for the implementation of performance-based maintenance programs.<sup>11</sup> NERC maintains that the proposed standard will improve reliability by:

- (i) defining and establishing criteria for a Protection System Maintenance Program; (ii) reducing the risk of Protection System Misoperations; (iii) clearly stating the applicability of the Requirements in proposed PRC-005-2 to certain Functional Entities and Facilities; (iv) establishing Requirements for time-based maintenance programs that include maximum allowable maintenance intervals for all relevant devices; and (v) establishing Requirements for

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<sup>10</sup> NERC Petition at 2. *See also* NERC Petition at 12 where NERC states that while additional directives related to the PRC-005 Reliability Standard were issued by the Commission in a subsequent order, Order No. 758, these directives are being addressed in future projects related to PRC-005. NERC indicates in its petition that it will address these remaining directives in future versions of PRC-005, and that it is currently addressing the maintenance and testing of reclosing relays in a new Project [2007-17]. *See* NERC Petition at 7-8 (citing NERC’s Informational Filing in Compliance with Order No. 758, Docket No. RM10-5, and NERC Project 2007-17 Protection System Maintenance – Phase 2 (Reclosing Relays)).

<sup>11</sup> *Id.* at 3.



condition-based and performance-based maintenance programs where hands-on maintenance intervals are adjusted to reflect the known and reported condition or the historical performance, respectively, of the relevant devices.<sup>12</sup>

13. NERC asserts that the proposed Reliability Standard not only represents a comprehensive approach to documenting and implementing programs for maintenance of all protection systems affecting the reliability of the bulk electric system, but also reduces the risk of misoperations “by applying consistent, best practice maintenance and inspection activities of Protection System Components.”<sup>13</sup> NERC maintains that the proposed Reliability Standard represents an improvement over the four standards that would be superseded, because none of the existing standards contain technical requirements for any of the maintenance programs, but merely specify that a program be in place and that each responsible entity comply with the requirements of its own program.<sup>14</sup>

14. NERC also maintains that the proposed Reliability Standard satisfies three outstanding directives from Order No. 693 related to the PRC maintenance standards. First, NERC explains that the proposed Reliability Standard includes maximum allowable intervals for maintenance of protection system components (as set out in Tables 1-1 through 1-5, Table 2 and Table 3 of Reliability Standard PRC-005-2).<sup>15</sup>

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

<sup>13</sup> *Id.* at 11.

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

<sup>15</sup> *Id.* at 12.

Second, Reliability Standard PRC-005-2 combines the requirements for PRC-005, PRC-008, PRC-011 and PRC-017 into one new, revised standard, addressing maintenance for transmission and generation protection systems, for special protection systems, and for UFLS and UVLS equipment.<sup>16</sup> Finally, in Order No. 693, the Commission directed NERC to consider whether load serving entities and transmission operators should be included in the applicability of PRC-004.<sup>17</sup> NERC maintains that it considered whether load-serving entities and transmission operators should be subject to any of the PRC maintenance and testing requirements, but determined that the applicable maintenance requirements need only apply to equipment owners such as generation owners, transmission owners, and certain distribution providers.<sup>18</sup> NERC explains that “[w]hile an equipment owner may need to coordinate with the operating entities in order to schedule the actual maintenance, the responsibility resides with the equipment owners to complete the required maintenance.”<sup>19</sup>

15. The proposed Reliability Standard includes five requirements. Under Requirement R1, each responsible entity must establish a protection system maintenance program that: (1) identifies which method (time-based or performance-based) will be used for each protection system component type, except that the maintenance program for all batteries associated with the station DC supply of a protection system must be

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<sup>16</sup> *Id.* at 12-13.

<sup>17</sup> Order No. 693, FERC Stats & Regs. ¶ 31,242 at P 1469.

<sup>18</sup> NERC Petition at 13.

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

time-based; and (2) identifies monitored component attributes for each component type where monitoring is used as a basis for extending maintenance intervals.

16. Under Requirement R2, any responsible entity that uses performance-based maintenance intervals must follow the procedures set out in Attachment A of the proposed Reliability Standard to set and to adjust, as necessary, appropriate maintenance intervals. The Attachment A procedures allow a responsible entity to establish maintenance intervals for a given population of similar components based on historical performance, as long as there is a statistically significant population of components for which performance can be examined and monitored. For example, under the Attachment A procedures, a responsible entity can only use a performance-based interval for “segments” with a component population of at least 60 components.<sup>20</sup> The maximum allowable maintenance interval for a given segment is required to be set such that the segment will experience countable events of no more than four percent of the components within that segment, for the greater of either the last 30 components maintained or all components maintained in the previous year.<sup>21</sup>

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<sup>20</sup> NERC defines “segment” as “Protection Systems or components of a consistent design standard, or a particular model or type from a single manufacturer that typically share other common elements. Consistent performance is expected across the entire population of a Segment.” NERC Petition, Ex. B (PRC-005-2) at 26.

<sup>21</sup> NERC defines “countable event” as “a failure of a component requiring repair or replacement, any condition discovered during the maintenance activities in Tables 1-1 through 1-5 and Table 3 which requires corrective action, or a Misoperation attributed to hardware failure or calibration failure.” NERC Petition, Ex. B (PRC-005-2) at 26.

17. In addition, to continue to utilize a performance-based interval, the responsible entity must update its list of components and segments annually (or whenever a change occurs within a segment), must maintain a minimum number or percentage of components a year, and must analyze a given segment's maintenance record to determine the percentage of countable events. If the percentage of countable events for the last 30 components maintained or the number of components maintained over the last year (whichever is larger) exceeds four percent, the responsible entity must implement an action plan to reduce the expected countable events to less than four percent for that segment within the next three years.

18. Requirements R3 and R4 require a responsible entity to adhere to the requirements of its protection system maintenance program, including performance of minimum maintenance activities. Under Requirement R3, which governs time-based maintenance, the activities must be performed in accordance with the intervals prescribed in the tables attached to PRC-005-2. Under Requirement R4, the activities must be carried out in accordance with the performance-based intervals established under Requirement R2 and Attachment A.

19. Under Requirement R5, responsible entities must "demonstrate efforts to correct identified Unresolved Maintenance Issues," which are defined as "deficienc[ies] identified during a maintenance activity that causes the component to not meet the intended performance, cannot be corrected during the maintenance interval, and requires follow-up corrective action." NERC explains that the intent of Requirement R5 is "to

assure that Protection System components are returned to working order following the discovery of failures or malfunctions during scheduled maintenance.”<sup>22</sup>

20. With respect to implementation, NERC proposes to require entities to fully comply with Requirements R1, R2 and R5 within 12 months of regulatory approval (or 24 months from the date of NERC Board approval where no regulatory approval is required).<sup>23</sup> Accordingly, applicable entities must develop their revised protection system maintenance program within one year.<sup>24</sup> NERC’s proposed implementation plan would allow a more lengthy implementation period with respect to achieving full compliance with the newly-prescribed maintenance activities and documentation, permitting a transition of maintenance activities and documentation over time, with the compliance period scaled to the length of the applicable maximum maintenance interval.<sup>25</sup> Thus, for component types with the shortest allowable maintenance interval (i.e., less than one year, or between one and two years), entities would be required to fully comply with the new requirements within 18 months of regulatory approval, and 36 months of regulatory approval, respectively.<sup>26</sup> For components types with longer maintenance intervals (3, 6 and 12 years), NERC proposes to require compliance over the applicable maintenance interval in equally distributed steps. For component types with the longest maximum

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<sup>22</sup> NERC Petition at 18.

<sup>23</sup> NERC Petition, Ex. C (Implementation Plan) at 2, 4.

<sup>24</sup> *See id.* at 2.

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

<sup>26</sup> *Id.* at 4.

allowable maintenance interval (i.e., 12 years), entities must be 30 percent compliant within 5 years, 60 percent compliant within 9 years, and fully compliant within 13 years after regulatory approval.<sup>27</sup>

21. NERC explains that this implementation program takes into consideration that certain entities may not currently be performing all required maintenance activities specified in proposed PRC-005-2, and may not have all the documentation necessary to demonstrate compliance.<sup>28</sup> NERC further states that “it is unrealistic for those entities to be immediately compliant with the new activities or intervals,” and that “entities should be allowed to become compliant in such a way as to facilitate a continuing maintenance program.”<sup>29</sup> Finally, NERC explains that it developed this step-wise implementation plan “in order that entities may implement this standard in a systematic method that facilitates an effective ongoing Protection System Maintenance Program.”<sup>30</sup>

## II. Discussion

22. Pursuant to section 215(d)(2) of the FPA, the Commission proposes to approve Reliability Standard PRC-005-2, the six associated definitions referenced in the proposed standard, and NERC’s proposed implementation plan. The proposed Reliability Standard appears to adequately address the Commission directives from Order No. 693 with

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<sup>27</sup> *Id.* at 5. NERC notes, however, that “[o]nce an entity has designated PRC-005-2 as its maintenance program for specific Protection System components, they cannot revert to the original program for those components.” *Id.* at 2.

<sup>28</sup> *Id.* at 1.

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

<sup>30</sup> *Id.* at 2.

respect to: (1) including maximum allowable intervals in PRC-005; (2) combining PRC-005, PRC-008, PRC-011, and PRC-017; and (3) considering whether load serving entities and transmission operators should be included in the applicability of the PRC-005 Reliability Standard. Proposed Reliability Standard PRC-005-2 should also improve reliability by reducing the risk of protection system misoperations and establishing requirements for condition-based and performance-based maintenance programs where hands-on maintenance intervals are adjusted to reflect the known and reported condition or the historical performance of the relevant devices.

23. However, we believe that further clarification is warranted with respect to certain aspects of proposed PRC-005-2, including NERC's proposed approach to enforcement of its requirements. Additional information is also needed to fully evaluate NERC's proposed targets for the establishment of performance-based maintenance intervals. As discussed below, we seek additional information and comments on the following:

(A) verification of operability and settings upon placement in-service of new or modified protection systems; (B) use of a four percent target for countable events in performance-based programs; and (C) violation severity levels for certain Requirement R1 violations.

**A. Verification of Operability and Settings Upon Placement In-Service**

24. As proposed, Reliability Standard PRC-005-2 does not include separate requirements for protection system commissioning testing for new or modified equipment (i.e., testing activities necessary to ensure that new or modified equipment has been built and will function in accordance with its design). NERC maintains that such testing is often performed by a different organization (such as a start-up or commissioning group of

the organization, or a contractor hired to construct and start-up or commission the facility) than the organization responsible for the on-going maintenance of the protection system, and that the activities required for such testing will not necessarily correlate to the maintenance activities required by the proposed standard.<sup>31</sup>

25. At the same time, NERC acknowledges that “a thorough commission testing program would include, either directly or indirectly, the verification of all those Protection System attributes addressed by the maintenance activities specified in the Tables of PRC-005-2,” and that “an entity would be wise to retain commissioning records to show a maintenance start date.”<sup>32</sup> In addition, NERC states that “PRC-005-2 assumes that thorough commission testing was performed prior to a protection system being placed in service.”<sup>33</sup> Finally, in discussing whether the initial date for setting the time clock for maintenance should be the date of commission testing versus the in-service date, NERC asserts that “[w]hichever method is chosen, for newly installed Protection Systems the components *should not be placed into service until minimum maintenance activities have taken place.*”<sup>34</sup>

26. NERC’s petition assumes that components will not be placed into service until they have been determined to be within the same range of operability and accuracy as

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<sup>31</sup> NERC Petition, Ex. E (Supplementary Reference and FAQ) at 35.

<sup>32</sup> *Id.* NERC also notes that an entity “that requires that their commissioning tests have, at a minimum, the requirements of PRC-005-2 would help that entity prove time interval maximums by setting the initial time clock.” *Id.*

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

<sup>34</sup> *Id.* (emphasis added).



would be required when completing the maintenance and inspection activities delineated in proposed Reliability Standard PRC-005-2. However, the Reliability Standard does not include a requirement to verify that protection system equipment and components operate at least as accurately as required under the PRC-005-2 maintenance standards when those components are first placed in service or are modified. We are concerned that a reliability gap may exist if entities are not required to demonstrate compliance with PRC-005-2 standards when relevant equipment or components are placed in service or modified.<sup>35</sup>

27. We note that the failure to verify the accurate functioning of protection system components when placed in service, or when subsequently modified, has been identified as a direct cause of misoperations in several instances, resulting in violations of the currently-effective PRC-004 standard. For example, Notice of Penalty filings in Docket Nos. NP11-105, NP11-129, and NP13-37 contain Reliability Standard PRC-004 violations where protection systems were placed in service and misoperated.<sup>36</sup>

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<sup>35</sup> For example, Table 1-1 of PRC-005-2 requires entities to “verify that settings are as specified,” to “verify operation of the relay inputs and outputs that are essential to proper functioning of the protection system,” or to “verify acceptable measurement of power system input values” for particular types of protective relays. NERC Petition, Ex. B (Proposed Reliability Standard PRC-005-2) at Table 1-1.

<sup>36</sup> In one instance, the Texas Reliability Entity found that: (1) an entity had incorrectly wired a capacitance coupled voltage transformer used in the protection scheme when it was replaced, resulting in approximately 20 misoperations; and (2) an entity had incorrectly wired and set a protective relay system compounded by contractor or consultant design errors, leading to five misoperations, in violation of its commissioning verification procedures, which called for end-to-end testing of the trip output logic wiring and trip testing, and posing a moderate risk to the reliability of the (continued...)

Accordingly, we seek explanation from NERC regarding whether and, if so, how it intends to interpret and enforce Reliability Standard PRC-005-2 to require that newly installed or modified protection system equipment or components perform at the same level as is required for subsequent compliance, including verification of applicable settings as specified whenever a relay is repaired, replaced, or upgraded with a new firmware version.<sup>37</sup>

28. If NERC does not believe that it can interpret and enforce the proposed Reliability Standard to include such a requirement, we seek comment on whether the proposed standard should be modified to address our underlying concern, i.e., verification that newly-commissioned or modified equipment and components meet the same requirements specified for subsequent maintenance and testing in the proposed Reliability Standard.

**B. Four Percent Target for Countable Events in Performance-Based Program**

29. Pursuant to Requirement R2 of proposed Reliability Standard PRC-005-2, responsible entities may choose to establish performance-based maintenance intervals for individual component types, according to the procedures set out in Attachment A of the

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Bulk-Power System. *See* Notice of Penalty regarding American Electric Power Service Corp., Docket No. NP13-37-000 (filed May 30, 2013). *See also* Notice of Penalty filings in Docket Nos. NP11-105 (incorrect CT wiring configuration led to misoperations) and NP11-129 (failure by a contractor relay technician to remove a shorting screw after testing of relay led to misoperation).

<sup>37</sup> The Commission believes that vendor-issued firmware upgrades for microprocessor relays are common, and verification of settings whenever an upgrade is installed is critical for proper relay performance.

standard. According to the Attachment A procedures, the responsible entity must first develop a list of components to be included in the designated segment (with a minimum population of 60 components).<sup>38</sup> Using that analysis and looking at the greater of either the last 30 components maintained or all components maintained within the segment over the last year, the responsible entity must set a maximum allowable interval for each segment so that countable events will occur on no more than four percent of the components within that segment. In addition, the maintenance history of the segment is to be reviewed at least annually to determine the overall performance of the segment, and, if the four percent target is not met, the entity is required to develop and implement an action plan to reduce countable events to less than four percent within three years.<sup>39</sup>

30. Under the proposed standard, an entity would not be in violation of Requirement R2 of the standard upon failing to achieve a 4 percent or less failure rate for a given

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<sup>38</sup> Until such time as the entity has performed and analyzed the required maintenance activities applicable to the segment for at least 30 individual components, it must maintain the segment using PRC-005-2's time-based intervals, as specified in Tables 1-1 to 1-5, 2 and 3, *i.e.*, it cannot adopt a performance-based interval until it has performed and analyzed the maintenance history for a minimum pool of components.

<sup>39</sup> As NERC explains in the Supplementary Reference and FAQ (Ex. E) attached to its petition, entities using a performance-based program must not only "demonstrate how they analyze findings of performance failures and aberrations" but must also "implement continuous improvement actions" to meet the failure rate targets. *See* NERC Petition, Ex. E at 40. NERC provides examples of the kinds of methods that can be used to correct segment performance, including decreasing the maximum allowable interval, identifying sub-groups of components within the segment that may need more targeted action, and replacement of poorly performing components within a segment. *Id.* at 44. *See also id.* at 47 (providing an example calculation of the development and adjustment of a performance-based interval, showing an immediate adjustment to the maintenance interval, and consequent increase in number of units tested annually, when failure rates exceed 4 percent).

segment in the first year the failure occurs, but would violate Requirement R2 if: (1) the entity could not show that the interval selected was initially set to expect a failure rate of no more than 4 percent; (2) the entity fails to make immediate changes to its performance-based maintenance program to achieve a 4 percent target within 3 years; or (3) the entity does not actually achieve a 4 percent failure rate for that segment within 3 years after adjusting its program.<sup>40</sup>

31. In the Technical Justification NERC submitted as part of its petition, NERC explains the basis for selecting a four percent target for countable events as follows:

The 4% number was developed using the following:

General experience of the drafting team based on open discussions of past performance.

Test results provided by Consumers Energy for the years 1998-2008 showing a yearly average of 7.5% out-of-tolerance relay test results and a yearly average of 1.5% defective rate.

Two failure analysis reports from Tennessee Valley Authority (TVA) where TVA identified problematic equipment based on a noticeably higher failure of a certain relay type (failure rate of 2.5%) and voltage transformer type (failure rate of 3.6%).<sup>41</sup>

32. NERC does not provide any further details about the scope and specific results of the referenced studies, or a clear explanation of how the four percent figure was derived from these studies. Moreover, the referenced studies appear to focus on out-of-tolerance

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<sup>40</sup> See generally, *id.* at 40-53.

<sup>41</sup> NERC Petition, Ex. D (Technical Justification) at 5.

rates for electro-mechanical protective relays, and NERC provided little to no support for application of those expected rates to other types of components.<sup>42</sup>

33. While NERC provides some historical support for the use of a four percent target figure for countable events in setting an appropriate performance-based maintenance interval for certain component types (e.g., electro-mechanical protective relays), it is also not clear whether the four percent rate is appropriate for component types known to have higher levels of reliability (particularly microprocessor-based relays, trip coils, and lockout devices). Microprocessor-based relays, for example, rarely go out-of-tolerance due to continuously-running self-diagnostic routines.<sup>43</sup> Thus, these types of relays either operate as installed and set, or, if faulty, indicate an alarm condition that may disable the device. A four percent failure rate for any given segment of microprocessor-based relays could indicate a significant issue with that relay type, warranting further investigation and possible system-wide replacement rather than continuation of routine maintenance.

34. In light of NERC's finding in its State of Reliability Report that protection system misoperations are the leading initiating cause of disturbance events (other than weather

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<sup>42</sup> An out-of-tolerance condition indicates that the device is not performing within the manufacturer's specified band of tolerance or accuracy, but for electro-mechanical protective relays an out-of-tolerance condition does not imply that the device is not operational.

<sup>43</sup> Schweitzer Engineering Laboratories, Inc. (SEL) indicates in its 2009 white paper "SEL Recommendations on Periodic Maintenance Testing of Protective Relays" a measurement of hardware failures of about 0.33% failures per year for microprocessor-based relays.

and “unknown”),<sup>44</sup> we seek comment from NERC and other interested parties that provides further information and technical support for whether failure rates should be established for each component type rather than relying upon a blanket rate for all component types. If, in the alternative, a blanket failure rate is to be established, we seek comment on whether the use of a blanket four percent failure rate for all component types is better-suited for setting appropriate performance-based maintenance intervals. This information could inform a determination whether modification of the target rate is appropriate. Alternatively, if the technical information to address our concern is not currently available and cannot be provided in comments, we propose to direct that NERC study and submit a report and recommendations based on the study results concerning the expected failure rates for individual component types.

**C. Correcting Unresolved Maintenance Issues (Requirement R5)**

35. Under Requirement R5, responsible entities must “demonstrate efforts to correct identified Unresolved Maintenance Issues.” An “unresolved maintenance issue” is defined as a “deficiency identified during a maintenance activity that causes the component to not meet the intended performance, cannot be corrected during the maintenance interval, and requires follow-up corrective action.”<sup>45</sup>

36. According to NERC, the reliability objective of Requirement R5 is to “assure that Protection System components are returned to working order following the discovery of

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<sup>44</sup> NERC Report: State of Reliability 2013 at 13 (May 2013).

<sup>45</sup> NERC Petition at 14.

failure or malfunctions during scheduled maintenance,”<sup>46</sup> and restoration of a protection system component to working order is not otherwise explicitly required by the maintenance activities specified in the PRC-005-2 Tables.<sup>47</sup> NERC explains the rationale behind Requirement R5, and the latitude to complete correction or restoration of a discovered problem outside of the normal maintenance interval, as follows:

The drafting team does not believe entities should be found in violation of a maintenance program requirement because of the inability to complete a remediation program within the original maintenance interval. The drafting team does believe corrective actions should be timely but concludes it would be impossible to postulate all possible remediation projects and therefore, impossible to specify bounding time frames for resolution of all possible Unresolved Maintenance Issues or what documentation might be sufficient to provide proof that effective corrective action has been initiated. Therefore Requirement R5 requires only the entity demonstrate efforts to correct the Unresolved Maintenance Issues.<sup>48</sup>

37. We agree that allowing entities additional time beyond the maximum maintenance interval period to complete “restorative” action may be warranted in certain circumstances, including when the corrective action involves redesign, ordering additional equipment, or timing corrective work to correspond to planned outages.<sup>49</sup>

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<sup>46</sup> *Id.* 18.

<sup>47</sup> NERC Petition, Ex. D (Technical Justification) at 16 (The maintenance activities specified in the Tables 1-1 through 1-5, Table 2, and Table 3 do not present any requirements related to restoration.”)

<sup>48</sup> *Id.* at 17.

<sup>49</sup> The “corrective actions” to be taken by a transmission owner, generator owner, or distribution provider under PRC-005-2 include potentially time-consuming tasks such as physical repair and replacement of faulty equipment in the protection system. Notably, under PRC-001-1, transmission operators and generator operators have a

(continued...)

However, we expect that these instances will be limited and, in most circumstances, entities should have the capability to replace components and make minor repairs within the maximum maintenance interval. Our expectation is consistent with the assumptions NERC used in developing the maximum maintenance intervals for proposed Reliability Standard PRC-005-2, which include an allowance for the “grace period” that transmission owners and generation owners often include in their maintenance programs.<sup>50</sup>

**D. Violation Severity Level for R1 Violation – Station Batteries**

38. Under the second sentence of Part 1.1 of Requirement R1, all batteries associated with station DC supply must be included in a time-based maintenance program, i.e., they are not eligible for a performance-based program. NERC explains the rationale behind this unique treatment of DC station supply batteries as follows:

Batteries are the only element of a Protection System that is a perishable item with a shelf life. As a perishable item batteries require not only a constant float charge to maintain their freshness (charge), but periodic inspection to determine if there are problems associated with their aging process and testing to see if they are maintaining a charge or can still deliver their rated output as required.

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separate obligation to take “corrective action” when a protective relay or equipment failure reduces system reliability. “Corrective action” under PRC-001-1 refers to operator control actions such as removing the facility without protection from service, generation redispatch, transmission reconfiguration, etc., which actions must be completed as soon as possible and within at least 30 minutes. *See* NERC Reliability Standard PRC-001-1; Order No. 693, FERC Stats. & Regs. ¶ 31,242 at PP 1439-1440.

<sup>50</sup> *See* NERC Petition, Ex. F (Technical Justification for Maintenance Intervals) at 1-2; *see also* Ex. E (Supplementary Reference and FAQ) at 36.



All of the above mentioned factors and several more not discussed here are beyond the control of the Functional Entities that want to use a performance-based maintenance (PBM) program for its Protection Systems. These inherent variances in the aging process of a battery cell make establishment of a designated segment based on manufacturer and type of battery impossible.<sup>51</sup>

39. NERC has assigned a “lower” violation severity level for the failure to include applicable station batteries under a time-based maintenance program. NERC states as to Requirement R1 that “[t]here is an incremental aspect to the violation and the [violation severity levels] follow the guidelines for incremental violations,” indicating that NERC believes the Commission’s violation severity guideline for binary requirements is not applicable.<sup>52</sup> We believe this assignment is inconsistent with the binary nature of Part 1.1 of Requirement R1, since entities either satisfy the obligation to include station batteries in a time-based program or fail to meet the requirement in its entirety.<sup>53</sup> Moreover, we believe a low violation severity level designation does not properly reflect the number of

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<sup>51</sup> NERC Petition, Ex. D (Technical Justification) at 8.

<sup>52</sup> NERC Petition, Ex. I (Discussion of Assignments of VRFs and VSLs) at 10.

<sup>53</sup> NERC’s assignment appears to be inconsistent with its approach to the assignment of violation severity levels for binary requirements, as accepted by the Commission in 2011. *See North American Electric Reliability Corporation*, 135 FERC ¶ 61,166, at P 13 (2011) (“NERC explains that if there are degrees of noncompliance that result in performance that partially meets the reliability objective of the requirement such that the performance or product has some reliability-related value, then the requirement will have multiple violation severity levels that address a range of severity utilizing two or more of the four violation severity level categories. Requirements that are binary, i.e., ‘pass/fail,’ will have only one violation severity level—severe.”). Here, NERC indicates that a performance-based maintenance program for station batteries is untenable, and provides a single violation severity level relating to this portion of Requirement R1, but assigns it a “lower” violation severity level.

historical violations associated with station battery maintenance.<sup>54</sup> We therefore propose to direct NERC to modify the violation severity level for violations of this element of Part 1.1 of Requirement R1 to “severe,” and seek comment on this proposal.

### **III. Information Collection Statement**

40. The following collection of information contained in this Notice of Proposed Rulemaking is subject to review by the Office of Management and Budget (OMB) under section 3507(d) of the Paperwork Reduction Act of 1995.<sup>55</sup> OMB’s regulations require approval of certain information collection requirements imposed by agency rules.<sup>56</sup> Upon approval of a collection(s) of information, OMB will assign an OMB control number and an expiration date. Respondents subject to the filing requirements of a rule will not be penalized for failing to respond to these collections of information unless the collections of information display a valid OMB control number.

41. We solicit comments on the Commission’s need for this information, whether the information will have practical utility, the accuracy of the burden estimates, ways to enhance the quality, utility, and clarity of the information to be collected or retained, and any suggested methods for minimizing respondents’ burden, including the use of

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<sup>54</sup> See, e.g., Docket Nos. NP10-34-000, NP10-160-000, NP11-107-000, NP11-154-000, NP11-162-000, NP11-164-000, NP11-181-000, NP11-186-000, NP11-209-000, NP11-215-000, NP11-252-000, NP11-255-000, NP12-10-000, NP12-18-000, NP12-26-000, NP12-30-000, NP12-36-000, NP12-40-000, NP13-8-000, NP13-33-000 (all of which include violations of PRC-005 related to maintenance and testing of station batteries or battery banks).

<sup>55</sup> 44 U.S.C. 3507(d) (2006).

<sup>56</sup> 5 CFR 1320.11 (2012).

automated information techniques. Specifically, the Commission asks that any revised burden or cost estimates submitted by commenters be supported by sufficient detail to understand how the estimates are generated.

42. The Commission proposes to approve Reliability Standard PRC-005-2, which will replace PRC-005-1.1b (Transmission and Generation Protection System Maintenance and Testing), PRC-008-0 (Underfrequency Load Shedding Equipment Maintenance), PRC-011-0 (Undervoltage Load Shedding Equipment Maintenance) and PRC-017-0 (Special Protection System Maintenance and Testing). The proposed Reliability Standard combines the requirements for maintenance and testing of protection systems, special protection systems, underfrequency load shedding equipment, and undervoltage load shedding equipment into one, comprehensive standard. In addition, the proposed Reliability Standard sets out minimum maintenance activities and maximum maintenance intervals for the various components of these systems, but also allows applicable entities to adopt performance-based maintenance intervals in certain circumstances.

43. Proposed Reliability Standard PRC-005-2 includes specific requirements about the minimum maintenance activities required for each type of applicable component, as well as a maximum time interval during which the maintenance must be completed. Because the specific requirements were designed to reflect common industry practice, entities are not expected to experience a meaningful change in actual maintenance and documentation practices. However, applicable entities will have to perform a one-time review of their current protection system maintenance programs to ensure that they meet the requirements of the revised standard PRC-005-2. Accordingly, all expected

information collection costs are expected to be limited to the first year of implementation of the revised standard.

44. Public Reporting Burden: Our estimate below regarding the number of respondents is based on the NERC compliance registry as of June 10, 2013. According to the compliance registry, 544 entities are registered as distribution providers, 898 entities are registered as generation owners, and 346 entities are registered as transmission owners within the United States. However, due to significant overlap, the total number of these affected entities (i.e., entities registered as a distribution provider, a generation owner, a transmission owner, or some combination of these three functional entities) is 867 entities.

45. Affected entities must perform a one-time review of their existing protection system maintenance program to ensure that it contains at a minimum the activities listed in Tables 1 through 3 in Reliability Standard PRC-005-2 and that the activities are performed within the applicable maximum interval listed in Tables 1 through 3. If the existing protection system maintenance program does not meet the criteria in Reliability Standard PRC-005-2, the entity will have to make certain adjustments to the program.

<b>Requirement</b>	<b>Number of Affected Entities (1)</b>	<b>Number of PSMP Reviewed Per Entity (2)</b>	<b>Average Number of Hours per Review (3)</b>	<b>Total Burden Hours (4) (1)*(2)*(3)</b>	<b>Total Cost (5) (4)*\$70<sup>57</sup></b>
<b>One time review and adjustment of existing protection system maintenance program</b>	867	1	8	6,936	<b>\$485,520</b>

Title: FERC-725P, Mandatory Reliability Standards: Reliability Standard PRC-005-2.

Action: Proposed Collection of Information.

OMB Control No: To be determined.

Respondents: Business or other for-profit and not-for-profit institutions.

Frequency of Responses: One time.

Necessity of the Information: The proposed Reliability Standard PRC-005-2, if adopted, would implement the Congressional mandate of the Energy Policy Act of 2005 to develop mandatory and enforceable Reliability Standards to better ensure the reliability of the nation's Bulk-Power System. Specifically, the proposal would ensure that transmission and generation protection systems affecting the reliability of the bulk electric system are maintained and tested.

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<sup>57</sup> This figure is the average of the salary plus benefits for a manager and an engineer. The figures are taken from the Bureau of Labor and Statistics at ([http://bls.gov/oes/current/naics3\\_221000.htm](http://bls.gov/oes/current/naics3_221000.htm)).

46. Internal review: The Commission has reviewed revised Reliability Standard PRC-005-2 and made a determination that approval of this standard is necessary to implement section 215 of the FPA. The Commission has assured itself, by means of its internal review, that there is specific, objective support for the burden estimates associated with the information requirements.

47. Interested persons may obtain information on the reporting requirements by contacting the Federal Energy Regulatory Commission, Office of the Executive Director, 888 First Street, NE, Washington, DC 20426 [Attention: Ellen Brown, e-mail: DataClearance@ferc.gov, phone: (202) 502-8663, fax: (202) 273-0873].

48. Comments concerning the information collections proposed in this NOPR and the associated burden estimates, should be sent to the Commission in this docket and may also be sent to the Office of Management and Budget, Office of Information and Regulatory Affairs [Attention: Desk Officer for the Federal Energy Regulatory Commission]. For security reasons, comments should be sent by e-mail to OMB at the following e-mail address: oira\_submission@omb.eop.gov. Please reference the docket number of this Notice of Proposed Rulemaking (Docket No. RM13-7-000) in your submission.

#### **IV. Regulatory Flexibility Act Analysis**

49. The Regulatory Flexibility Act of 1980 (RFA)<sup>58</sup> generally requires a description and analysis of Proposed Rules that will have significant economic impact on a

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<sup>58</sup> 5 U.S.C. 601-12.

substantial number of small entities. As discussed above, proposed Reliability Standard PRC-005-2 would apply to 867 individual entities (the number of entities registered as a distribution provider, a generator owner, a transmission owner, or any combination of those three functional entities). Comparison of the NERC Compliance Registry with data submitted to the Energy Information Administration on Form EIA-861 indicates that, of these entities, 230 may qualify as small entities.<sup>59</sup> Of the 230 small entities, 90 are registered as a combination of distribution providers, generator owners and transmission owners, but it is assumed that each entity would have only one comprehensive program to review.

50. The Commission estimates that, on average, each of the 230 small entities affected will have a one-time cost of \$560, representing a one-time review of the program for each entity, consisting of 8 man-hours at \$70/hour as explained above in the information collection statement. We do not consider this cost to be a significant economic impact for small entities. Accordingly, the Commission certifies that proposed Reliability Standard PRC-005-2 will not have a significant economic impact on a substantial number of small entities. The Commission seeks comment on this certification.

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<sup>59</sup> The RFA definition of “small entity” refers to the definition provided in the Small Business Act (SBA), which defines a “small business concern” as a business that is independently owned and operated and that is not dominant in its field of operation. *See* 15 U.S.C. 632 (2006). According to the Small Business Administration, an electric utility is defined as “small” if, including its affiliates, it is primarily engaged in the generation, transmission, and/or distribution of electric energy for sale and its total electric output for the preceding fiscal year did not exceed 4 million megawatt hours.

## V. Environmental Analysis

51. The Commission is required to prepare an Environmental Assessment or an Environmental Impact Statement for any action that may have a significant adverse effect on the human environment.<sup>60</sup> The Commission has categorically excluded certain actions from this requirement as not having a significant effect on the human environment. Included in the exclusion are rules that are clarifying, corrective, or procedural or that do not substantially change the effect of the regulations being amended.<sup>61</sup> The actions proposed herein fall within this categorical exclusion in the Commission's regulations.

## VI. Comment Procedures

52. The Commission invites interested persons to submit comments on the matters and issues proposed in this notice to be adopted, including any related matters or alternative proposals that commenters may wish to discuss. Comments are due **[INSERT DATE 60 days after publication in the FEDERAL REGISTER]**. Comments must refer to Docket No. RM13-7-000, and must include the commenter's name, the organization they represent, if applicable, and address.

53. The Commission encourages comments to be filed electronically via the eFiling link on the Commission's web site at <http://www.ferc.gov>. The Commission accepts most standard word processing formats. Documents created electronically using word

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<sup>60</sup> *Regulations Implementing the National Environmental Policy Act of 1969*, Order No. 486, FERC Stats. & Regs., Regulations Preambles 1986-1990 ¶ 30,783 (1987).

<sup>61</sup> 18 CFR 380.4(a)(2)(ii).



processing software should be filed in native applications or print-to-PDF format and not in a scanned format. Commenters filing electronically do not need to make a paper filing.

54. Commenters that are not able to file comments electronically must send an original of their comments to: Federal Energy Regulatory Commission, Secretary of the Commission, 888 First Street, NE, Washington, DC 20426.

55. All comments will be placed in the Commission's public files and may be viewed, printed, or downloaded remotely as described in the Document Availability section below. Commenters on this proposal are not required to serve copies of their comments on other commenters.

## **VII. Document Availability**

56. In addition to publishing the full text of this document in the Federal Register, the Commission provides all interested persons an opportunity to view and/or print the contents of this document via the Internet through the Commission's Home Page (<http://www.ferc.gov>) and in the Commission's Public Reference Room during normal business hours (8:30 a.m. to 5:00 p.m. Eastern time) at 888 First Street, NE, Room 2A, Washington, DC 20426.

57. From the Commission's Home Page on the Internet, this information is available on eLibrary. The full text of this document is available on eLibrary in PDF and Microsoft Word format for viewing, printing, and/or downloading. To access this document in eLibrary, type the docket number excluding the last three digits of this document in the docket number field.

58. User assistance is available for eLibrary and the Commission's website during normal business hours from the Commission's Online Support at 202-502-6652 (toll free at 1-866-208-3676) or email at [ferconlinesupport@ferc.gov](mailto:ferconlinesupport@ferc.gov), or the Public Reference Room at (202) 502-8371, TTY (202) 502-8659. E-mail the Public Reference Room at [public.referenceroom@ferc.gov](mailto:public.referenceroom@ferc.gov).

By direction of the Commission.

( S E A L )

Kimberly D. Bose,  
Secretary.