UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Protection System Maintenance Reliability Standard	**)** **)**	**Docket No. RM14-8-000**

COMMENTS OF THE NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION IN RESPONSE TO NOTICE OF PROPOSED RULEMAKING

The North American Electric Reliability Corporation ("NERC")[1] hereby provides comments in response to the Notice of Proposed Rulemaking ("NOPR")[2] regarding proposed Reliability Standard PRC-005-3 (Protection System and Automatic Reclosing Maintenance), issued by the Federal Energy Regulatory Commission ("FERC" or "Commission") in this proceeding on July 17, 2014. In the NOPR, the Commission proposes to approve proposed Reliability Standard PRC-005-3 to supersede Reliability Standard PRC-005-2 (Protection System Maintenance). The Commission also proposes to direct NERC to modify the proposed Reliability Standard to add the maintenance and testing of supervisory relays for Automatic Reclosing such as synchronism check and voltage relays. In addition, the Commission proposes to direct NERC to: (1) submit a report that addresses whether the proposed Reliability Standard applies to an appropriate set of autoreclosing relays that can affect Bulk-Power System reliability; and (2) add tracking of automatic reclosing misoperations to NERC's data collection efforts going forward. As discussed more fully below, the Commission seeks comment on

[1] The Federal Energy Regulatory Commission certified NERC as the electric reliability organization in its order issued on July 20, 2006, in Docket No. RR06-1-000. *N. Am. Elec. Reliability Corp.*, 116 FERC ¶ 61,062 (2006).

[2] *Protection System Maintenance Reliability Standard*, Notice of Proposed Rulemaking, 148 FERC ¶ 61,041 (2014). NERC notes that the title of the modified PRC-005 standard is now "Protection System and Automatic Reclosing Maintenance" and suggests that the Commission modify the title of the proceeding in its final rule to "Protection System and Automatic Reclosing Maintenance Reliability Standard" in order to avoid confusion with its final rule approving PRC-005-2. NERC inadvertently captioned the title of the proposed standard in its petition as "PRC-005-3 (Protection System Maintenance)" instead of "PRC-005-3 (Protection System and Automatic Reclosing Maintenance)."

certain aspects of the proposed Reliability Standard and the proposed actions by the Commission.

As discussed more fully below, NERC supports the Commission's proposal to approve the proposed Reliability Standard. NERC also acknowledges the issues the Commission raises in the NOPR regarding the inclusion of maintenance and testing of certain supervisory devices for autoreclosing. In light of the Commission's concerns and in the interest of improving reliability, NERC would support the addition of voltage supervision and, where used, supervisory inputs associated with selective autoreclosing in the coverage of PRC-005. NERC would also support the addition of synchronism check supervision as it provides a reliability benefit without a significant increase in maintenance burden on industry.

However, NERC does not support the Commission's proposed directives related to further data collection and verification of the applicability thresholds as currently drafted in the NOPR. NERC is generally not opposed to measuring the effectiveness of a proposed Reliability Standard through analysis of data. In this instance, the Commission has not yet justified why further evaluation of the effectiveness of the proposed applicability thresholds is necessary in the short term or why NERC should continue data collection of misoperations information for automatic reclosing on a going forward basis.

Finally, NERC explains how its current project to modify the PRC-005 Reliability Standard addresses the Commission's inquiry on the reasonableness of proposed record retention obligations through a reduction in the required period for document retention.

I. Notices and Communications

Notices and communications with respect to this filing may be addressed to the following:[3]

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II. Coverage of Supervisory Devices

A. Supervisory Devices

In the NOPR, the Commission states that the proposed PRC-005-3 Reliability Standard does not include supervisory devices such as synchronism check or voltage relays that may be critical to the operation of an autoreclosing scheme. The Commission continues that the supervisory devices, like synchronism check relays, are "applied to monitor voltages on both sides of a circuit breaker to allow autoreclosing for desirable conditions (e.g., proper phase angle and voltage) or block autoreclosing for undesirable conditions.[4] The Commission explains that "these supervisory devices essentially 'supervise' the actions of an autoreclosing scheme; i.e.,

[3] Persons to be included on the Commission's service list are identified by an asterisk. NERC respectfully requests a waiver of Rule 203 of the Commission's regulations, 18 C.F.R. § 385.203 (2014), to allow the inclusion of more than two persons on the service list in this proceeding.

[4] NOPR at P 28.

allow autoreclosing for desirable conditions or block autoreclosing for undesirable conditions."[5] The Commission asserts that NERC has not explained in its petition how a failure of a synchronism check relay for undesirable conditions would not allow autoreclosing.[6] The Commission proposes to direct that NERC develop modifications to PRC-005-3 that address the appropriateness of including supervisory relays under the mandatory maintenance and testing provisions of the PRC-005 Reliability Standard.

While NERC supports the standard as proposed, NERC acknowledges the issues the Commission raises in the NOPR regarding the inclusion of maintenance and testing of certain supervisory devices for autoreclosing. In light of the Commission's concerns, NERC suggests modifying the proposed Reliability Standard to include maintenance of supervision functions for which a failure can result in autoreclosing into a fault and potentially cause generating unit or plant instability. NERC would support the addition of voltage supervision and, where used, supervisory inputs associated with selective autoreclosing in the coverage of PRC-005.[7] The analysis in the report by the System Analysis and Modeling Subcommittee ("SAMS") and System Protection and Control Subcommittee ("SPCS") ("SAMS/SPCS Report")[8] identified that

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5 NOPR at P 30.

6 *Id.* (citing *Interpretation of Protection System Reliability Standard*, Order No. 758, 138 FERC ¶ 61,094 at P 24) (2012)). In Order No. 758, the Commission explains that that "a misoperating or miscoordinated reclosing relay may result in the reclosure of a Bulk-Power System element back onto a fault or that a misoperating or miscoordinated reclosing relay may fail to operate after a fault has been cleared, thus failing to restore the element to service." The Commission goes on to explain that misoperated or miscoordinated relays may result in damage to the Bulk-Power System such as excessive shaft torques and winding stresses and exposure of circuit breakers to systems conditions less than optimal for correct operation. Order No. 758 at P 24.

7 In preparing these comments, NERC has reviewed the SAMS/SPCS Report, which provides a thorough analysis of the Commission's concern that autoreclosing failures may impact reliable operation of the Bulk-Power System following reclosure of a Bulk-Power System element back onto a fault, or failure of a reclosing relay to operate after a fault has been cleared, thus failing to restore the element to service. NERC has also consulted with its internal subject matter experts on which supervisory devices should be included within NERC's PRC-005 standard to meet the Commission's concerns raised in the NOPR and ensure entities properly maintain the devices in order to minimize the risk of failure.

8 As noted in the Petition, the SAMS and SPCS jointly performed a technical study to determine which reclosing relays should be addressed within PRC-005 and provide advice to the Standard Drafting Team regarding appropriate maintenance intervals and activities for those relays. *See* NERC Petition at Ex. D.

the failure mode of concern is associated with premature autoreclosing into a fault, which creates the potential for generating unit or plant instability. As noted in the SAMS/SPCS Report, this may occur due to a timing failure in the autoreclosing relay or when a supervision failure results in autoreclosing into a dead-line with a fault when this closing is not intended. Autoreclosing into a fault when dead-line closing is not intended could result from failure of voltage supervision or, when used, failure of a selective autoreclosing input, such as a protective relay output that blocks autoreclosing following a three-phase fault.

NERC would also support the addition of synchronism check supervision. Undesired autoreclosing due to a supervision failure is an infrequent, unplanned disturbance, which falls into the category of unplanned and unavoidable disturbances contemplated in the accepted industry practice for switching near generating stations. For these reasons, NERC asserts that synchronism check failures do not have the potential to affect reliable operation of the Bulk-Power System. However, NERC acknowledges that including synchronism check supervision, as suggested by the Commission, would provide a reliability benefit. Therefore, NERC supports the addition of this device to meet the Commission's concerns. NERC also notes that if the Commission decides to direct inclusion of synchronism check relays in PRC-005-3, the incremental burden on entities to include these within the maintenance and testing program would not be significant.

Inclusion of the maintenance and testing of the above identified devices would: (1) address the Commission's concerns set forth in the NOPR; (2) meet a reliability concern related to "Supervision Function Failures" as identified in the SAMS/SPCS Report[9]; and (3) not be

[9] SAMS/SPCS Report, Ex. D of NERC's Petition at 6.

unduly burdensome to industry to include verification of these permissive inputs in all cases where an autoreclosing relay is subject to PRC-005-3.

If the Commission issues its proposed directive, NERC requests that the Commission direct NERC to develop modifications to PRC-005-3 to include only those supervisory devices related to autoreclosing that are needed to directly address the Commission's concerns raised in the NOPR.[10] A clear and limited directive would provide industry with certainty as to which supervisory devices need to be included in PRC-005-3 in order to address the issues identified by the Commission. In addition, NERC asks the Commission to provide its position on whether the devices identified in NERC's comments would address the Commission's concerns. The Commission's opinion on NERC's suggested additions to the PRC-005 standard would assist NERC during the standard development process to design modifications that would ultimately meet the Commission's concerns related to supervisory devices.

B. Clarification of SAMS/SPCS Report Findings on Synchronism Check Relays

In the NOPR, the Commission states "NERC has not explained in its petition how failure of a synchronism check relay for *undesirable conditions*, such as when static angles are greater than designed, would not allow autoreclosing and, consequently the concern discussed in Order No. 758."[11] The Commission further states that SAMS and SPCS dismissed the need to consider supervision failures because the subcommittees believe supervisory device failures to be a small subset of autoreclosing failures.[12]

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[10] Some industry participants questioned NERC as to whether the Commission's directive was to include all supervisory devices used in conjunction with an applicable autoreclosing relay.

[11] NOPR at P 30.

[12] The NOPR also states that the Commission rejected almost identical arguments in Order No. 733 regarding inclusion of supervisory relays. NERC asserts that the circumstances related to autoreclosing supervision is substantially different as explained in these comments, because the SAMS/SPCS Report does not use this as a sole basis for excluding supervisory devices; rather, the report only cites the infrequent nature of certain failures in relation to accepted industry practice to conduct planned switching operations, such as simple line restoration, in a

NERC asserts that the Commission has read the SAMS/SPCS Report discussion out of context. The SAMS/SPCS Report does state that premature autoreclosing due to a supervision failure is a small subset of autoreclosing failures (the overwhelming majority of autoreclosing failures are failure to close) and is an infrequent, unplanned disturbance. However, the SAMS/SPCS Report does not use this statement to dismiss concern with all supervisory device failures. Rather, this statement is one part of the rationale regarding why it is not necessary to consider the incremental shaft fatigue that may occur for infrequent events as the basis for whether to include maintenance and testing of autoreclosing relays in PRC-005. The SAMS/SPCS Report explains that autoreclosing when static angles are greater than designed contributes to cumulative shaft fatigue, rather than impacting reliable operation of the Bulk-Power System. The SAMS/SPCS analysis concludes that the incremental shaft fatigue is acceptable because, consistent with accepted industry guidance, planned switching operations (e.g., simple line restoration) are conducted in a way that avoids significant contribution to cumulative shaft fatigue. Entities typically implement this guidance at generating stations by using time-delayed autoreclosing to allow shaft oscillations to dampen, and/or live-line autoreclosing or autoreclosing with synchronism check supervision to minimize shaft torque. By conducting planned switching in this manner, nearly all of the fatigue capability of the shaft is preserved to withstand the impact of unplanned and unavoidable disturbances such as faults, fault clearing, reclosing into system faults, and emergency line switching.

III. Proposed Directives Regarding Applicability Thresholds and Data Collection

In the NOPR, the Commission summarizes that NERC's proposed Reliability Standard would, consistent with Order No. 758, expand the scope of the Protection System maintenance

way that preserves fatigue capability of generating unit shafts to withstand the impact of unplanned and unavoidable disturbances.

Reliability Standard requirements to apply to a limited subset of autoreclosing relays.[13] The Commission states that NERC provided technical support for the applicability thresholds in the proposed Reliability Standard through both the SAMS/SPCS Report and the NERC study of the ten-mile threshold.[14] Despite the support NERC provides for the thresholds, the Commission, without elaboration, finds that it "nonetheless ha[s] concerns whether the thresholds are too narrow and that the standard therefore does not encompass a comprehensive set of autoreclosing relays that could affect the reliable operation of the Bulk-Power System."[15]

The Commission proposes that NERC submit a report, two years after the effective date of the standard, addressing the effectiveness of the autoreclosing provisions based on (1) actual operations data, and (2) simulated system conditions from planning assessments. For actual operations data, the Commission proposes that NERC enhance the granularity of its misoperations database to gather relevant information regarding events that involve autoreclosing relays, such as distance from the fault, whether the relay reclosed into the fault, and whether that reclosure caused or exacerbated an event. The Commission further proposes that NERC continue this enhancement of its data collection on a going forward basis. The Commission also suggests that simulated contingency analyses, generated as part of planning assessments, could serve as an appropriate benchmark or metric to assess whether the right set of autoreclosing relays is included in the proposed Reliability Standard, or whether further enhancements or modifications are appropriate to include those autoreclosing relays that affect reliable operation of the Bulk-Power System. The Commission proposes to require NERC to submit a report two years after the effective date of Reliability Standard PRC-005-3, comparing

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13 NOPR at P 21.

14 *Id.* (citing NERC Petition at 15-21 and Ex. D at 2-7).

15 *Id.* at P 22.

the set of reclosing relays identified as having an impact on reliability using the contingency analyses generated under TPL-001-4, versus the set of relays covered by PRC-005-3.[16]

While NERC supports the Commission's proposal to approve the proposed Reliability Standard, NERC does not support the Commission's proposed directives related to further data collection and verification of the applicability thresholds as currently drafted in the NOPR. NERC is generally not opposed to measuring the effectiveness of a proposed Reliability Standard through analysis of data. However, in this case, the Commission has not justified why further evaluation of the effectiveness of the proposed applicability thresholds is necessary in the short term or why NERC should continue data collection of misoperations information for automatic reclosing on a going forward basis.[17] Further, NERC contends it has supported its proposed approach in the Reliability Standard and requests that the Commission limit its action regarding the applicability thresholds to approval and allow NERC and industry to focus their time and attention on implementing the proposed Reliability Standard.

A. NERC Support of the Applicability Thresholds

As explained in NERC's petition, the applicability thresholds meet the recommendations of the SAMS and SPCS, which conducted a lengthy review of the use of reclosing within the Bulk-Power System. The applicability section also reflects the agreement, input, and support of NERC's standard drafting team and the industry ballot body that approved the standard. In addition, prior to submitting these comments, NERC reviewed current event analysis data with respect to automatic reclosing failures to determine whether the standard drafting team failed to include applications of automatic reclosing that caused or contributed to an event. NERC

[16] *Id*. at P 26.

[17] NERC also notes that the Commission has not estimated the burden of these collections in the NOPR in its "Information Collection" analysis.

reviewed all 507 qualified events reported since the inception of the NERC Event Analysis Process in October 2010. Of the 507 events, 34 events have relay failures as a part of the event. None of these relay failures included applications of automatic reclosing failures that impact Bulk-Power System reliability.

The Commission also acknowledges in the NOPR that NERC has supported the applicability thresholds in the proposed Reliability Standard through the SAMS/SPCS Report and NERC's petition[18] and that the proposed standard adds automatic reclosing in a manner that is "consistent with the Commission's directive in Order No. 758."[19] In Order No. 758, the Commission agreed with NERC that it is reasonable to require maintenance and testing where reclosing relays are applied to meet performance requirements in approved NERC Reliability Standards, or where automatic restoration of service is fundamental to derivation of an Interconnection Reliability Operating Limit ("IROL").[20] The Commission also noted that a misoperating or miscoordinated reclosing relay may result in the reclosure of a Bulk-Power System Element back onto a fault or that a misoperating or miscoordinated reclosing relay may fail to operate after a fault has been cleared, thus failing to restore the Element to service. As explained in the SAMS/SPCS Report, failure to restore an element to service cannot impact reliable operation of the Bulk-Power System or be fundamental to establishing the transfer limit associated with an IROL because the system must be planned and operated to address the potential that a permanent fault prevents successful autoreclosing. Autoreclosing into a permanent fault results in a more severe system response than a failure to reclose, with the same result that the faulted element is not restored to service. The SAMS/SPCS Report identified that

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18 NOPR at P 21.

19 *Id*. at P 26.

20 Order No. 758 at P 23.

the only exception is when autoreclosing is an integral part of a Special Protection System, and the proposed Reliability Standard addresses this exception by including autoreclosing applied as an integral part of a Special Protection System.[21]

The Commission further agreed in Order No. 758 with a commenter that states "specific requirements or selection criteria should be used to identify reclosing relays that affect the reliability of the Bulk-Power System."[22] NERC has created, proposed, and supported such criteria in the applicability section. The Commission continues in Order No. 758 by stating that the Reliability Standard should "provide the Transmission Owner, Generator Owner, and Distribution Provider with the discretion to include in a Protection System maintenance and testing program only those reclosing relays that the entity identifies as having an effect on the reliability of the Bulk-Power System."[23] The proposed standard establishes continent-wide criteria for inclusion of autoreclosing relays. The proposed standard also provides entities the ability to exclude autoreclosing relays, based on application of a defined test, in cases where the entity can demonstrate an autoreclosing failure will not impact reliable operation of the Bulk-Power System. This approach results in a robust solution to address the concern by ensuring consistent application on a continent-wide basis.

In addition, NERC staff and standard drafting team members engaged Commission staff throughout the standard development process to ensure that the standard was adequately covering Automatic Reclosing that may have an effect on the reliability of the Bulk-Power System. As a result of that input from Commission staff, NERC developed and provided the

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[21] NERC notes that inclusion of autoreclosing applied as an integral part of a Special Protection System addresses the Commission concern with an event that ultimately resulted in the loss of over 4,000 MW of generation and multiple 765 kV lines.

[22] Order No. 758 at P 26.

[23] *Id*.

Commission with specific technical analysis of the 10-mile threshold used in the applicability section 4.2.6.2.[24]

Therefore, as discussed above, NERC believes that the coverage of Automatic Reclosing in the applicability section of the Reliability Standard has met all of the Commission's stated concerns in Order No. 758 with respect to setting the applicability of the proposed Reliability Standard and should be approved without additional compliance work necessary. As discussed above and in the SAMS/SPCS Report, the addition of specific supervisory functions to the proposed standard, fully addresses the Commission's concern in Order No. 758 with reclosure of a Bulk-Power System element back onto a fault.

B. Commission Concerns Regarding Applicability Thresholds

As previously noted, the Commission concludes in the NOPR that it "nonetheless ha[s] concerns whether the thresholds are too narrow and that the standard therefore does not encompass a comprehensive set of autoreclosing relays that could affect the reliable operation of the Bulk-Power System."[25] Without a more detailed description of the Commission's concerns regarding the applicability thresholds, NERC and the industry are unable to meaningfully comment on the Commission's proposal. The Commission has not adequately explained the need for further support of the proposed applicability thresholds to justify the additional burden on NERC and industry to collect, analyze, and report back to the Commission on the results, let alone permanently expand data collection indefinitely related to automatic reclosing. NERC asks that the Commission refrain from issuing any directive regarding measuring the effectiveness of the applicability thresholds through data collection and reporting and engage

[24] Section 4.2.6.2 includes Automatic Reclosing applied on the terminals of all Bulk Electric System Elements at substations one bus away from generating plants specified in applicability section 4.2.6.1 when the substation is less than 10 circuit-miles from the generating plant substation.

[25] NOPR at 22.

NERC staff informally to address any concerns that the Commission may have. In the event that the Commission chooses to issue its directive, NERC requests that the Commission identify its specific concerns regarding the applicability thresholds in its final rule so that NERC is able to measure the effectiveness of the standard in a way that will address remaining concerns the Commission may have in the subsequent report. This detail will also allow NERC to limit the data collection scope to just the information necessary to meet the Commission's concerns.

The Commission has not identified a specific reliability concern for NERC to monitor or address through the additional data collection and report other than to verify the effectiveness of the standard. NERC asserts that a follow-up report is not justified since NERC adequately supports the applicability thresholds and the Commission signaled in Order No. 758 that only a subset of autoreclosing relays need to be covered in the PRC-005 standard. NERC does not see a compelling need to expand data collection at this time prior to the proposed standard's implementation. NERC and the Commission staff can revisit this issue at any time on an informal basis. NERC also uses a number of methods to measure the effectiveness of standards, not just data collection, including review by technical committees or subcommittees, periodic reviews through the standard development process, and other technical reviews as deemed necessary. NERC also continuously monitors effective Reliability Standards for issues through its compliance and enforcement program and in response to events analysis findings. NERC would have the option to pursue an expansion of its data collection efforts through Section 1600 of the NERC Rules of Procedure if at any time it determines that the reliability reason for a collection justifies the burden imposed on industry due to reporting.

C. Use of Contingency Analyses in TPL-001-4

As a separate matter, the NOPR asks NERC to address whether the information generated pursuant to the contingency analyses required by Requirement R4 of TPL-001-4 would provide a meaningful metric or benchmark in analyzing the scope of PRC-005-3. Based on NERC's understanding of the NOPR proposal regarding using TPL-001-4 as a source of information, NERC notes that simulations of autoreclosing in planning assessments pursuant to TPL-001-4 only assess the impact of successful autoreclosing (no fault present and the element is restored to service) and unsuccessful autoreclosing into a fault. The former case is the desired outcome and provides no information relative to the Commission's concern. The latter case will assess correct operation of an autoreclosing relay when a fault is still present, but will not provide information regarding the potential impact of an autoreclosing failure that may result in premature reclosing into a fault. Therefore, use of the contingency analyses in the context of measuring the effectiveness of the applicability thresholds in the proposed standard may not return meaningful information.

IV. Record Retention

As noted by the Commission, the proposed standard retains the same evidence retention requirements approved in PRC-005-2, which require entities to maintain documentation of maintenance activities for the longer of: (1) the two most recent performances of each distinct maintenance activity for the component; or (2) all performances of each distinct maintenance activity for the component since the previous scheduled audit date.[26] This could result in entities retaining evidence for up to twenty-four years (two maintenance cycles). The Commission seeks comment regarding the reasonableness of the proposed data retention obligations.

[26] NOPR at 33.

NERC has consulted with its compliance staff and determined that there is not a substantial need to maintain the records for two full cycles. NERC is currently balloting changes to the PRC-005 Reliability Standard in Project 2007-17.3 (PRC-005-X) Protection System Maintenance and Testing - Phase 3 (Sudden Pressure Relays)[27] and has revised the compliance section. The last ballot of the draft standard in Project 2007-17.3 achieved industry approval and will now transition to a final ballot in preparation for NERC Board of Trustees adoption and submission to the Commission. The compliance section now requires Transmission Owners, Generator Owners, and Distribution Providers to keep documentation of the most recent performance of that maintenance activity for the relevant Component in cases where the interval of the maintenance activity is longer than the audit cycle. In cases where the interval of the maintenance activity is shorter than the audit cycle, documentation of all performances of that maintenance activity for the Component since the previous scheduled audit date must be retained.

V. Conclusion

For the reasons set forth above, NERC respectfully requests that the Commission accept these comments for consideration.

Respectfully submitted,

/s/ William H. Edwards

[27] The standard development page and the draft standard PRC-005-X can be found on NERC's webpage at http://www.nerc.com/pa/Stand/Pages/Project-2007-17_3-Protection-System-Maintenance-and-Testing-Phase-3.aspx.

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Date: September 29, 2014

CERTIFICATE OF SERVICE

I hereby certify that I have served a copy of the foregoing document upon all parties listed on the official service list compiled by the Secretary in this proceeding. Dated at Washington, D.C. this 29th day of September, 2014.

/s/ William H. Edwards

William H. Edwards
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