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DEPARTMENT OF ENERGY
FEDERAL ENERGY REGULATORY COMMISSION

18 CFR Part 40

[Docket No. RM19-10-000]

Transmission Planning Reliability Standard TPL-001-5

AGENCY: Federal Energy Regulatory Commission.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Federal Energy Regulatory Commission (Commission) proposes to approve Reliability Standard TPL-001-5 (Transmission System Planning Performance Requirements). The North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization, submitted the proposed Reliability Standard for Commission approval to address: reliability issues concerning the study of single points of failure of protection systems; and Commission directives regarding planned maintenance outages and stability analysis for spare equipment strategy. In addition, the Commission proposes to direct NERC to modify the Reliability Standards to require corrective action plans for protection system single points of failure in combination with a three-phase fault if planning studies indicate potential cascading.

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:

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SUPPLEMENTARY INFORMATION:

1. Pursuant to section 215(d)(2) of the Federal Power Act (FPA), the Commission proposes to approve Reliability Standard TPL-001-5 (Transmission System Planning Performance Requirements).¹ The North American Electric Reliability Corporation (NERC), the Commission-certified Electric Reliability Organization (ERO), submitted proposed Reliability Standard TPL-001-5 for Commission approval to address: reliability issues concerning the study of single points of failure of protection systems discussed in Order No. 754; and directives from Order No. 786 regarding planned maintenance outages and stability analysis for spare equipment strategy.²

2. Proposed Reliability Standard TPL-001-5 is one of two transmission planning Reliability Standards containing requirements for planning authorities and transmission planners to develop studies of their portions of the bulk electric system. Proposed Reliability Standard TPL-001-5 establishes transmission system planning performance requirements within the planning horizon to promote a bulk electric system that will operate reliably over a broad spectrum of system conditions and following a wide range of probable contingencies. NERC states that the revisions in the proposed Reliability

¹ 16 U.S.C. 824o(d)(2) (2012).

² *Interpretation of Transmission Planning Reliability Standard*, Order No. 754, 136 FERC ¶ 61,186, at P 19 (2011); *Transmission Planning Reliability Standards*, Order No. 786, 145 FERC ¶ 61,051, at PP 40, 89 (2013)

Standard are intended to enhance requirements for the study of protection system single points of failure.³

3. Proposed Reliability Standard TPL-001-5 requires each planning authority and transmission planner to perform an annual planning assessment of its portion of the bulk electric system considering a number of system conditions and contingencies. The proposed Reliability Standard employs a risk-based approach to the study of contingencies and the types of corrective action that are required if the entity's system cannot meet the specified performance requirements.⁴ For scenarios considered to be more commonplace (i.e., planning events), the planning entity must develop a corrective action plan if it determines through studies that its system would experience performance issues. For the scenarios considered to be less commonplace, but which could result in potentially severe impacts such as cascading (i.e., extreme events), the planning entity must conduct a comprehensive analysis to understand both the potential impacts on its system and the types of actions that could reduce or mitigate those impacts.⁵

³ A protection system "single point of failure" refers to a non-redundant component of a protection system that, if it failed, would affect normal clearing of faults. NERC Petition at 4.

⁴ NERC defines "Corrective Action Plan" as, "A list of actions and an associated timetable for implementation to remedy a specific problem." Glossary of Terms Used in NERC Reliability Standards (May 13, 2019) (NERC Glossary).

⁵ NERC defines "Cascading" as, "The uncontrolled successive loss of System Elements triggered by an incident at any location. Cascading results in widespread electric service interruption that cannot be restrained from sequentially spreading beyond an area predetermined by studies." NERC Glossary.

4. Proposed Reliability Standard TPL-001-5 contains revisions to both the planning event (Category P5) and extreme events (Stability 2.a-h) - identified in Table 1 (Steady State and Stability Performance Planning Events and Steady State and Stability Performance Extreme Events) and the associated footnote 13 - to provide for more comprehensive study of the potential impacts of protection system single points of failure.⁶ Planning entities would be required to take action, consistent with currently-effective Reliability Standard TPL-001-4 requirements, to address system performance issues identified as a result of these studies. Additionally, the proposed Reliability Standard addresses the two Commission directives in Order No. 786. Accordingly, pursuant to section 215(d)(2) of the FPA, the Commission proposes to approve proposed Reliability Standard TPL-001-5 because it is responsive to the Commission's directives and improves upon the currently-effective Reliability Standard by enhancing requirements for the study of protection system single points of failure.

5. Non-redundant protection systems can also misoperate when faced with a three-phase fault. Because three-phase faults are more serious than single-phase-to-ground faults, the consequences can be more severe, including cascading. However, rather than

⁶ Proposed Reliability Standard TPL-001-5 includes an expanded list of protection system components for single points of failure studies. The selected list of components account for: (1) those failed non-redundant components of a protection system that may impact one or more protection systems; (2) the duration that faults remain energized until delayed fault clearing; and (3) the additional system equipment removed from service following fault clearing depending on the specific failed non-redundant component of a protection system. NERC Petition at 16.

require a corrective action plan to address such events, proposed Reliability Standard TPL-001-5 only requires an evaluation of possible actions designed to reduce the likelihood or mitigate their consequences and adverse impacts.⁷ NERC has not adequately justified categorizing protection system single points of failure in combination with a three-phase fault as an “extreme event” that only requires study, but not a corrective action plan, when there is the potential for cascading. We are not persuaded that such events do not necessitate corrective action plans because of their alleged rarity, particularly because their potential impacts may result in cascading. Thus, pursuant to section 215(d)(5) of the FPA, we also propose to direct that NERC develop modifications to the Reliability Standards to require corrective action plans for protection system single points of failure in combination with three-phase faults if planning studies indicate potential cascading.⁸

I. Background

A. Section 215 and Mandatory Reliability Standards

6. Section 215 of the FPA requires a Commission-certified ERO to develop mandatory and enforceable Reliability Standards, subject to Commission review and approval. Reliability Standards may be enforced by the ERO, subject to Commission

⁷ NERC, Informational Filing, Docket No. RM10-06-000, at 10 (filed March 15, 2012) (2012 Informational Filing). A three-phase fault can originate as a single-line-to-ground (SLG) fault as “it is not uncommon for a SLG fault to evolve to a multi-phase fault.” *Id.*

⁸ 16 U.S.C. 824o(d)(5).

oversight, or by the Commission independently.⁹ Pursuant to section 215 of the FPA, the Commission established a process to select and certify an ERO,¹⁰ and subsequently certified NERC.¹¹

B. Order No. 754

7. In Order No. 754, which approved an interpretation of Reliability Standard TPL-002-0, Requirement R1.3.10, the Commission determined that “there may be a system protection issue that merits further exploration by technical experts” and that there is “an issue concerning the study of the non-operation of non-redundant primary protection systems; e.g., the study of a single point of failure on protection systems.”¹² To address this concern, the Commission directed “Commission staff to meet with NERC and its appropriate subject matter experts to explore the reliability concern, including where it can best be addressed, and identify any additional actions necessary to address the matter.”¹³ The Commission also directed NERC “to make an informational filing . . . explaining whether there is a further system protection issue that needs to be

⁹ *Id.* 824o(e).

¹⁰ *Rules Concerning Certification of the Electric Reliability Organization; and Procedures for the Establishment, Approval, and Enforcement of Electric Reliability Standards*, Order No. 672, 114 FERC ¶ 61,104, *order on reh’g*, Order No. 672-A, 114 FERC ¶ 61,328 (2006).

¹¹ *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).

¹² Order No. 754, 136 FERC ¶ 61,186 at P 19.

¹³ *Id.* P 20.

addressed and, if so, what forum and process should be used to address that issue and what priority it should be accorded relative to other reliability initiatives planned by NERC.”¹⁴

8. In October 2011, Commission staff hosted a technical conference on single points of failure, which resulted in four consensus points and the following problem statement: “The group perceives a reliability concern regarding the comprehensive assessment of potential protection system failures by registered entities. The group agrees on the need to study if a [reliability] gap exists regarding the study and resolution of a single point of failure on protection systems.”¹⁵ One outcome of the 2011 technical conference, as described in the 2012 Informational Filing, was that NERC would issue a data request to aid in assessing whether single points of failure in protection systems pose a reliability concern. To that end, the NERC Board of Trustees subsequently approved a request for data under the NERC Rules of Procedure.¹⁶ Over the next two years, NERC collected data from transmission planners. Using the collected data, two subcommittees of the NERC Planning Committee, the System Protection and Control Subcommittee (SPCS) and the System Analysis and Modeling Subcommittee (SAMS), conducted an assessment of protection system single points of failure. The study examined in detail the protection

¹⁴ *Id.*

¹⁵ NERC, Order No. 754 Single Point of Failure Technical Meeting Notes at 8 (October 24-25, 2011).

¹⁶ 2012 NERC Informational Filing at 7 (stating that the data request “is based on an approach that utilizes . . . a three-phase (3Ø) fault and assesses simulated system performance against performance measures”).

systems related to nearly 4,000 buses. The findings were presented in a September 2015 report that concluded that single points of failure on protection systems posed a reliability risk that warranted further action.¹⁷ The SPCS/SAMS Report recommended, after considering a variety of alternatives, that NERC modify Reliability Standard TPL-001-4 to best align with the Order No. 754 directives and maximize reliability of protection system performance. In particular, the SPCS/SAMS Report recommended that three-phase faults involving protection system failures be assessed as an extreme event in Reliability Standard TPL-001-4, as follows:

Additional emphasis in planning studies should be placed on assessment of three-phase faults involving protection system single points of failure. This concern (the study of protection system single points of failure) is appropriately addressed as an extreme event in TPL-001-4 Part 4.5. From TPL-001-4, Part 4.5: If the analysis concludes there is Cascading caused by the occurrence of extreme events, an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts of the event(s) shall be conducted.¹⁸

C. Order No. 786

9. In Order No. 786, the Commission approved the currently-effective version of the transmission system planning standard, Reliability Standard TPL-001-4. In that Order, the Commission also issued several directives to NERC, including two relating to future standard modifications that are addressed in proposed Reliability Standard TPL-001-5. First, the Commission expressed concern that the six-month outage duration threshold in

¹⁷ NERC, Order No. 754 Assessment of Protection System Single Points of Failure Based on the Section 1600 Data Request at 11 (September 2015) (SPCS/SAMS Report).

¹⁸ *Id.*

Reliability Standard TPL-001-4, Requirement R1 could exclude planned maintenance outages of significant facilities from future planning assessments.¹⁹ The Commission determined that planned maintenance outages of less than six months in duration may result in relevant impacts during one or both of the seasonal off-peak periods, and that prudent transmission planning should consider maintenance outages at those load levels when planned outages are performed to allow for a single element to be taken out of service for maintenance without compromising the ability of the system to meet demand without loss of load. The Commission further determined that a properly planned transmission system should ensure the known, planned removal of facilities (i.e., generation, transmission or protection system facilities) for maintenance purposes without the loss of nonconsequential load or detrimental impacts to system reliability such as cascading, voltage instability or uncontrolled islanding. The Commission directed NERC to modify the Reliability Standards to address this concern.

10. Second, while stating that NERC had met the Commission's Order No. 693 directive to include a spare equipment strategy for steady state analysis in Reliability Standard TPL-001-4, the Commission determined that a spare equipment strategy for stability analysis was not addressed in the standard. The Commission stated that a similar spare equipment strategy for stability analysis should exist that requires studies to be performed for P0, P1, and P2 categories with the conditions that the system is

¹⁹ Order No. 786, 145 FERC ¶ 61,051 at PP 40-45.

expected to experience during the possible unavailability of the long lead time equipment. Rather than direct a change at that time, however, the Commission directed NERC to consider the issue during the next review cycle of Reliability Standard TPL-001-4.²⁰

D. NERC Petition and Proposed Reliability Standard TPL-001-5

11. On December 7, 2018, NERC submitted proposed Reliability Standard TPL-001-5 for Commission approval.²¹ NERC maintains that the proposed Reliability Standard addresses potential system contingencies including the protection system single point of failure issue and Order No. 786 directives. With regard to protection system single points of failure, NERC indicates that Table 1 of the proposed Reliability Standard describes system performance requirements for a range of potential system contingencies required to be evaluated by the planner. Table 1 includes three parts: (1) Steady State & Stability Performance Planning Events, (2) Steady State & Stability Performance Extreme Events, and (3) Steady State & Stability Performance Footnotes. Table 1 describes system performance requirements for a range of potential system contingencies required to be evaluated by the planner. The table categorizes the events as either “planning events” or “extreme events.” The table lists seven contingency planning events (P1 through P7) that

²⁰ *Id.* PP 88-89.

²¹ Proposed Reliability Standard TPL-001-5 is not attached to this notice of proposed rulemaking (NPR). The proposed Reliability Standard is available on the Commission’s eLibrary document retrieval system in Docket No. RM19-10-000 and on the NERC website, www.nerc.com.

require steady-state and stability analysis as well as five extreme event contingencies: three for steady-state and two for stability. NERC asserts that proposed Reliability Standard TPL-001-5 also includes certain modifications to better ensure that planning entities are performing a more complete analysis of potential protection system single points of failure on their systems and taking appropriate action to address these concerns. NERC explains that the proposed Reliability Standard contains revisions to both the Table 1 planning event (Category P5) and extreme events (Stability 2.a-h) and the associated footnote 13 to provide for more comprehensive study of the potential impacts of protection system single points of failure.

12. NERC states that if the study of a protection system single point of failure for a single-line-to-ground fault (i.e., Category P5 event) results in cascading, a corrective action plan is required.²² NERC considers this a relatively commonplace scenario, and it explains that an entity would be required to develop a corrective action plan if it determines that its system would be unable to meet the performance requirements of Table 1 for the Category P5 event.

13. In contrast, NERC proposes revisions to Table 1 to include the study of a protection system single point of failure in combination with a three-phase fault as an

²² Proposed TPL-001-5 Reliability Standard, Table 1 (Steady State and Stability Performance Planning Events), Category P5 requires the study of a single-line-to-ground faulted element (e.g., generator, transmission circuit or transformer) along with a failure to operate of a non-redundant component of the protection system (i.e., a single point of failure) protecting the faulted element.

extreme event, which does not require a corrective action plan. NERC avers in its petition that the three-phase fault scenario is much rarer (compared to the single-line-to-ground fault). According to NERC, like the other extreme events in the proposed Reliability Standard, this scenario, while rare, could result in more significant impacts to an entity's system.²³ Under this approach, NERC asserts that, if an entity determines that its system will experience cascading as a result of a three-phase fault scenario, an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences of the event will be conducted but a corrective action plan is not required.

14. Based on a historical analysis of NERC data on protection system misoperations, NERC asserts that the expected likelihood of a three-phase fault event occurring and resulting in the most severe impacts would be small. NERC states that it reviewed over 12,000 protection system misoperations in its Misoperation Information Data Analysis System (MIDAS) database reported since 2011, of which only 28 involved three-phase faults. Of those, NERC states that 10 involved breakers that failed to operate, and the remaining 18 involved breakers that were slow to operate.²⁴ NERC explains that a failure

²³ See *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, 118 FERC ¶ 61,218, at P 1826, *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007) (describing extreme events as “events resulting in loss of two or more elements or Cascading” that do not require a corrective action plan rather than assigning a quantitative probability to the event).

²⁴ NERC Petition at 26, n.55 (“The ERO began to collect misoperations data in a common format beginning in 2011. Applicable entities are currently required to report information on Protection System misoperations to NERC pursuant to a request for data or information under Section 1600 of the NERC Rules of Procedure approved by the

(continued...)

to operate potentially indicates instances of a protection system single point of failure. While the potential for severe impacts from such events remains, NERC states that none of the 10 failure to trip scenarios reported since 2011 resulted in events that reached the threshold for reporting under Reliability Standard EOP-004 (Event Reporting).²⁵ With regard to the Order No. 786 directives, NERC states that proposed Reliability Standard TPL-001-5 provides for a more complete consideration of factors for selecting which known outages will be included in near-term transmission planning horizon studies.

II. Discussion

15. Pursuant to section 215(d)(2) of the FPA, the Commission proposes to approve proposed Reliability Standard TPL-001-5 as just, reasonable, not unduly discriminatory or preferential, and in the public interest. The proposed Reliability Standard will improve Bulk-Power System reliability by requiring enhanced transmission system planning with regard to the study of protection system single points of failure in combination with a single-line-to-ground fault, as discussed in Order No. 754. The Commission also

NERC Board of Trustees on August 14, 2014. Previously, the PRC-004 standard contained requirements for misoperation reporting.”); *see also North American Electric Reliability Corp.*, 151 FERC ¶ 61,129, at P 6 (2015) (“PRC-004-3, and the parallel Section 1600 Data Request provides means to accomplish this systematic analysis and correction”).

²⁵ Reliability Standard EOP-004-3 (Event Reporting), Attachment 1: Reportable Events, contains a list of various thresholds for reporting certain events to NERC. Examples of reporting thresholds include: loss of firm load for 15 minutes or more if 300 MW or greater for entities with a previous year’s demand of at least 3,000 MW, or 200 MW or greater for all other entities, and total generation loss within one minute 2,000 MW or greater for entities in the Eastern or Western Interconnection, or 1,000 MW for entities in the ERCOT or Quebec Interconnection.

proposes to approve the associated violation risk factors, violation severity levels and implementation plan.

16. With respect to the Order No. 786 directives, regarding planned maintenance outages and stability analysis for spare equipment strategy, the Commission proposes to determine that the revisions satisfy the directives. First, proposed Reliability Standard TPL-001-5 provides for a more complete consideration of factors for selecting which known outages will be included in near-term transmission planning horizon studies. In particular, the modifications reflected in proposed Reliability Standard TPL-001-5 address the Commission's concern that the exclusion of known outages of less than six months in currently-effective Reliability Standard TPL-001-4 could result in outages of significant facilities not being studied. Second, the proposed Reliability Standard modifies requirements for stability analysis to require an entity to assess the impact of the possible unavailability of long lead time equipment, consistent with the entity's spare equipment strategy.

17. In addition, the Commission, pursuant to section 215(d)(5) of the FPA, proposes to direct that NERC develop modifications to the Reliability Standards because certain protection system single points of failure may not be fully addressed even with the implementation of proposed Reliability Standard TPL-001-5. As discussed below, the Commission is concerned that the proposed Reliability Standard does not require responsible entities to develop corrective action plans to address protection system single points of failure in combination with a three-phase fault if planning studies indicate potential cascading. Accordingly, the Commission proposes to direct that NERC develop

modifications to the Reliability Standards to require corrective action plans for protection system single points of failure in combination with three-phase faults if planning studies indicate potential cascading.

A. The Record Indicates There is a Reliability Gap for a Protection System Single Point of Failure in Combination with a Three-Phase Fault

18. While protection system single points of failure in combination with a three-phase fault must be studied under the proposed Reliability Standard to determine the impact of failure, the Commission believes that the record may not support NERC's contention that corrective action plans should not be required even when studies of the event indicate the potential for cascading. Specifically, NERC asserts that protection system single points of failure in combination with a three-phase fault is an extreme event that does not require a corrective action plan, even in cases where the study results indicate potential cascading. NERC claims that protection system single points of failure in combination with a three-phase fault are rare and, "[l]ike all of the 'extreme events' scenarios in this [TPL-001 Standard risk-based] framework, the impacts of a protection system single point of failure in combination with a three phase fault could be severe in some cases, but are very unlikely."²⁶ Based on the present record, it is unclear whether such contingencies are as rare as NERC maintains.

19. A 2009 NERC Industry Advisory reported three system disturbances that occurred during a five-year period that were initiated by a protection system single point of failure

²⁶ NERC Petition at 26.

in combination with a single-line-to-ground fault.²⁷ According to the Industry Advisory and supporting documentation, all three events evolved into either a multi-phase fault or a three-phase fault with cascading.²⁸ Moreover, in the 2012 Informational Filing, NERC reported that it is not uncommon for a single-line-to-ground fault to evolve into a multi-phase fault, and NERC stated that studies solely on single-line-to-ground faults may understate the reliability risk of single points of failure of protection systems.²⁹ As mentioned below, the NERC standard drafting team pointed to the likelihood of a single-line-to-ground fault evolving into a multi-phase fault when responding to stakeholder comments that a single-line-to-ground fault was a rare event.

20. NERC indicates that it reviewed over 12,000 protection system misoperations and determined that only 28 involved three-phase faults from 2011 through 2018. However that averages to approximately one three-phase fault event every three months. NERC, moreover, indicates that ten of those 28 misoperations involved breakers that failed to operate that could reasonably be assumed to be representative of protection system single points of failure, which averages to about one event every 8 months.³⁰ Although we

²⁷ NERC, Industry Advisory: Protection System Single Point of Failure (March 30, 2009) (2009 NERC Industry Advisory).

²⁸ *Id.* at 2 (“Three system disturbances were caused by failure of a single component (lockout or auxiliary relay) of a protection system.”).

²⁹ 2012 NERC Informational Filing at 3, 10 (“identif[ying] five events between 2004 and 2010 in which a single point of failure on a protection system caused, in whole or in part, an event on the Bulk-Power System...”).

³⁰ NERC Petition at 26-27. NERC stated that none of the ten failure to trip scenarios reached the threshold for reporting under Reliability Standard EOP-004.

(continued...)

recognize that three-phase faults constitute a relatively small subset of all protection system operations, under the following measure of one protection system single point of failure every 8 months, the occurrence of three-phase faults with misoperations could reasonably be viewed as regular occurrences. Thus, based on the information currently before us, we are not persuaded by NERC's analysis that three-phase faults are rare events that should be categorized with other extreme events in proposed Reliability Standard TPL-001-5 and should be studied but not have corrective action plans.

21. The record of development for proposed Reliability Standard TPL-001-5 also supports our concerns with the absence of a corrective action plan requirement. The development record evidences a standard drafting team repeatedly expressing concerns regarding the reliability risks of three-phase faults involving protection system single points of failure. Indeed, the standard drafting team evaluated and initially adopted more robust options to mitigate protection system single points of failure in combination with three-phase faults if studies indicated cascading, including requiring a corrective action plan or some variation of a corrective action plan.

22. In the first draft of proposed Reliability Standard TPL-001-5, the standard drafting team included a draft requirement (Requirement R4.6) that would have addressed protection system single points of failure in combination with a three-phase fault,

Although NERC did not offer further explanation, system conditions such as off-peak load conditions could have contributed to whether Reliability Standard EOP-004 thresholds were met.

including a specific requirement for the development of a corrective action plan.³¹ After reviewing the unofficial comments on the proposal, the standard drafting team provided the following response:

The [standard drafting team (SDT)] recognized that the industry comments . . . were particularly negative. The SDT would like to address the most common comment received: requiring Corrective Action Plans as part of Requirement R4.6 goes beyond the scope of the SAR, was not part of the recommendations from the SPCS/SAMS report titled “Order No. 754 Assessment of Protection System Single Points of Failure Based on the Section 1600 Data Request”, and/or is not justifiable given the low likelihood of occurrence. . . . While it is clear that a [single point of failure (SPF)] for a Protection System component may lead to significantly longer Delayed Clearing and notably worse system response than typically analyzed breaker failure conditions, the industry has indicated that the probability of simultaneous SPF occurrence with a bolted three-phase fault is low. Therefore the SDT has restored the assessment of SPF for a Protection System component with a three-phase fault to language consistent with TPL-001-4 Requirement 4.5.³²

While the standard drafting team agreed to remove the corrective action plan provision in response to the stakeholder comments, the following language from the standard drafting team’s response stressed the reliability concerns posed by protection system single points of failure in combination with a three-phase fault, and suggested that the related risks are “underappreciated”:

³¹ NERC Petition, Ex. G (Summary of Development and Complete Record of Development) at page 372-373 of pdf (“If the analysis concludes there is Cascading caused by the occurrence of Table 1 extreme events listed in the stability column for events 2e-2h, a Corrective Action Plan shall be developed.”).

³² *Id.* at page 810 of pdf.

The SPF for a Protection System component is an important topic that, the SDT believes, may involve risks that are underappreciated. The SDT considered using Corrective Action Plan changes in proposed Requirement 4.6 or a new Table 1 Planning Events Category P8 to emphasize the importance of this issue, but given the industry comments and lack of a FERC directive did not “raise the bar” at this time. The SDT would like to document an important considerations (sic) it considered, that the fault conditions and system performance requirement, referred to as Performance Measure, of the Order 754 data request were very similar to those of Extreme Events of TPL-001-4 Table 1, namely three-phase fault application and conditions that can indicate Cascading. The primary conclusive finding of the SPCS/SAMS report was: “analysis of the data demonstrates the existence of a reliability risk associated with single points of failure in protection systems that warrants further action.” Further, the SPCS/SAMS report concluded that: “additional emphasis in planning studies should be placed on assessment of three-phase faults involving protection system single points of failure.”³³

The standard drafting team’s above response acknowledged the importance of a corrective action plan and noted conclusive findings of the SPCS/SAMS report that the reliability risk associated with protection system single points of failure warrants further action. The standard drafting team, nonetheless, indicated that “lacking a FERC directive” it would remove the corrective action plan provision.

23. The standard drafting team then developed a second draft of proposed Reliability Standard TPL-001-5. The second draft did not require a corrective action plan by name. Rather, the standard drafting team developed and submitted for ballot a new provision requiring that, when system studies show that a protection system single points of failure

³³ *Id.*

in combination with a three-phase fault results in system cascading, the entity must take specific actions, namely “listing system deficiencies, the associated actions needed to prevent the system from Cascading and the associated timetable for implementation.”³⁴ Further, the proposed provision would require follow-up in annual planning assessments for “continued validity and implementation status.”

24. The standard drafting team developed a technical rationale document that accompanied the second draft of the proposed Reliability Standard.³⁵ In the draft technical rationale document, the standard drafting team explained the technical basis for draft Requirement R4.2.2:

Given the risk to BES reliability, additional emphasis in planning studies should be placed on assessment of three-phase faults involving Protection System SPF. This concern (the study of Protection System SPF) is appropriately addressed as an extreme event in TPL-001-4, Requirement R4, Part 4.2. While less probable than single-phase-to-ground faults, *three-phase faults typically initiate as single-phase-to-ground and often evolve into three-phase faults*, leading to Delayed Fault Clearing scenarios more severe than the Table 1 P5 event. Therefore, TPL-001-4, Requirement R4, Part 4.5, which specifies that an evaluation of possible mitigating actions be conducted if analysis concludes there is cascading caused by the occurrence of this extreme event, *is inadequate to address the risk of Protection System component SPF to the reliability of the BES.*³⁶

³⁴ *Id.* at page 824 of pdf (proposed Requirement 4.2.2).

³⁵ *Id.* at page 942 of pdf.

³⁶ *Id.* at page 950-951 of pdf (emphasis added).

Again, the standard drafting team expressed its concerns regarding the reliability risks associated with a protection system single point of failure in combination with a three-phase fault. The standard drafting team addressed the stakeholder comments regarding the perceived low risk of such conditions by pointing out that “[w]hile less probable than single-phase-to-ground faults, three-phase faults typically initiate as single-phase-to-ground and often evolve into three-phase faults, leading to Delayed Fault Clearing scenarios more severe than the Table 1 P5 event.”³⁷ Further, the standard drafting team noted the inadequacy of simply conducting an “evaluation” as set forth in the relevant provision of the current Reliability Standard.³⁸

25. The standard drafting team developed a third draft of the proposed Reliability Standard. This third draft removed the more robust provision (proposed Requirement R4.2.2) in favor of the currently proposed language in Requirement 4.2, which requires that “[i]f the analysis concludes there is Cascading caused by the occurrence of extreme events, an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences of the event (s) shall be conducted.” Significantly, however, in the draft technical rationale document associated with the second draft of the proposed Reliability

³⁷ *Id.*

³⁸ The second draft of Reliability Standard TPL-001-5, was voted down by stakeholders, with stakeholders suggesting the removal of Requirement R4.2.2 again suggesting that three-phase fault followed by a protection failure is a low probability event. *Id.* at page 1327 of pdf.

Standard, the standard drafting team stated that merely requiring that “an evaluation of possible mitigating actions be conducted if analysis concludes there is cascading caused by the occurrence of this extreme event, *is inadequate to address the risk of Protection System component SPF to the reliability of the BES.*”³⁹

26. The standard development history discussed above therefore supports our concern that there is a potential reliability gap with respect to the proposed Reliability Standard’s treatment of protection system single points of failure in combination with a three-phase fault.⁴⁰

B. Commission Proposal

27. The Commission, pursuant to section 215(d)(5) of the FPA, proposes to direct that NERC develop modifications to require corrective action plans for protection system single points of failure in combination with three-phase faults if planning studies indicate potential cascading. While we do not propose to prescribe how NERC should respond to the proposed directive, we discuss below certain possible alternatives.

³⁹ *Id.* at page 951 of pdf (emphasis added).

⁴⁰ The standard development record indicates several stakeholder comments in support of a corrective action plan requirement for protection system single points of failure in combination with a three-phase fault that was proposed in the third draft. For example, one commenter suggested “the best way to achieve this [corrective action plan] requirement is through the creation of a P8 [new category planning event] contingency rather than extreme events.” Another commenter stated it “does not believe though that the language . . . goes far enough . . . and believes a corrective action plan should be required.” *Id.* at pages 2283, 2291, 2415, and 2424 of pdf.

28. NERC could address the proposed directive by modifying the current Category P5 proposal for single-line-to-ground faults (that already includes a P5 corrective action plan) to include language, such as, a footnote stating that the simulation of Delayed Fault Clearing must consider that a single-line-to-ground faulted condition may evolve to all three-phases before protection system action operates to clear the fault. Alternatively, NERC could modify the Reliability Standard to have a new Category planning event that would require a corrective action plan for the study of a protection system single point of failure in combination with a three-phase fault if the study indicates cascading.⁴¹

29. In addition, we recognize that during the standard drafting process for proposed Reliability Standard TPL-001-5 some stakeholders were concerned with incurring significant costs to mitigate protection system single points of failure in combination with a three-phase fault, while others stated that such actions do not usually incur significant costs.⁴² While we are aware of the potential for increased cost under this proposal, we understand that there are likely cost-effective actions that could be taken to mitigate a protection system single point of failure in combination with a three-phase fault. For example, a corrective action plan to eliminate a single point of failure of protection system could add a redundant lockout relay in the control circuitry of a protection system, which would eliminate occurrence of those events reported in the 2009 NERC Industry

⁴¹ See *id.* at page 1506 and 1746 of pdf.

⁴² See, e.g., *id.* at page 1016 (Seattle City Light), 1019 (Arizona Public Service), 1044 (Northeast Power Coordinating Council), 1048 (Eversource Energy), 1331 and 1333 (Standard Drafting Team Response to Commenters) of pdf.

Advisory.⁴³ As another option, an entity could add control center monitoring and reporting functions to a DC battery bank or to a communication system of a communication-aided protection scheme so that system operators are aware of their failure.⁴⁴ To better understand the potential for increased costs and other implementation issues, the Commission seeks comment on how many corrective action plans are expected for protection system single points of failure in combination with a three-phase fault if study results indicate cascading.

⁴³ NERC Petition at 20 (“most, if not all, constituent parts of the control circuitry are generally unmonitored, may fail, and may remain undetected until periodic testing is conducted. This is particularly significant for non-redundant auxiliary relays or lockout relays within the control circuitry because they may be used for multiple functions”). In addition, the standard drafting team stated that “[i]t is emphasized that Footnote 13 does not prescribe any level of redundancy If, after proper consideration and simulation, required System performance is achieved, then there may be no impetus to make non-redundant components of a Protection System redundant. On the other hand, after proper consideration and simulation it is demonstrated that required System performance is not achieved, making non-redundant components of a Protection System redundant may be but one of many alternatives for corrective actions to obtain required System performance.” *Id.*, Ex. G at page 162 of pdf.

⁴⁴ NERC Petition at 18-19 (stating that “[f]ootnote 13 provides that certain non-redundant components that are both monitored and reported at a Control Center would not need to be considered as part of planning studies. This includes the communications systems identified in footnote 13.b. The standard drafting team considered that the monitoring and reporting of a non-redundant component to a centralized location (i.e., the Control Center) would facilitate prompt identification and correction of abnormal conditions to minimize the exposure to and consequence of the failed component Similar to footnote 13.b, monitoring and reporting the status of the DC supply to a centralized location [i.e., footnote 13.c] can be considered a sufficient alternative to physical redundancy if the result is prompt notification and remediation which minimizes the exposure to and consequence of DC supply failure”).

30. To ensure no delay and to align the effective date of the proposed directive with the current implementation plan of proposed Reliability Standard TPL-001-5, the Commission proposes to direct that NERC address the directive within one year of the effective date of a final rule.⁴⁵ The Commission seeks comments on its proposals.

III. Information Collection Statement

31. The FERC-725N information collection requirements contained in this notice of proposed rulemaking are subject to review by the Office of Management and Budget (OMB) under section 3507(d) of the Paperwork Reduction Act of 1995.⁴⁶ OMB's regulations require approval of certain information collection requirements imposed by agency rules.⁴⁷ Upon approval of a collection of information, OMB will assign an OMB control number and expiration date. Respondents subject to the filing requirements of this 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. The Commission solicits 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 automated information techniques.

⁴⁵ NERC Petition, Exhibit B (Implementation Plan) at 2.

⁴⁶ 44 U.S.C. 3507(d) (2012).

⁴⁷ 5 CFR 1320.11 (2018).

32. The Commission bases its paperwork burden estimates on the changes in paperwork burden presented by proposed Reliability Standard TPL-001-5. The NERC Compliance Registry, as of May 10, 2019, identifies approximately 144 planning coordinators and transmission planners in the United States that are subject to mandatory compliance with this proposed Regulatory Standard. Of the 144 entities 62 of the entities are registered as both transmission planners and planning coordinators. The register indicates there are seven entities registered as planning coordinators and 137 entities registered as transmission planners.

33. Burden Estimate⁴⁸: The estimated burden and cost for the requirements contained in this proposed rule follows:

⁴⁸ “Burden” is the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. For further explanation of what is included in the information collection burden, refer to 5 CFR § 1320.3.

RM19-10-000 NOPR FERC-725N (Mandatory Reliability Standards: Reliability Standard TPL-001-5)					
Areas of Modification	Number of Respondents (1)	Annual Number of Responses⁴⁹ per Respondent (2)	Total Number of Responses (1)*(2)=(3)	Average Burden & Cost Per Response⁵⁰ (4)	Total Annual Burden Hours & Total Annual Cost (3)*(4)=(5)
Single Point of Failure (one-time)	206 (PC/TP) ⁵¹	1	206	16 hrs. (reporting: 12 hrs.; recordkeeping: 4 hrs.); \$880	3,296 hrs; \$181,280
Spare Equipment Strategy (one-time)	206 (PC/TP)	1	206	4 hrs. (reporting: 2 hrs.; recordkeeping: 2 hrs.); \$220	824 hrs; \$45,320
Plan Maintenance Outage (one-time)	206 (PC/TP)	1	206	16 hrs. (reporting: 12 hrs.; recordkeeping: 4 hrs.) \$880	3,296 hrs; \$181,280
TOTAL			618		7,416 hrs; \$407,880

⁴⁹ We consider the filing of an application to be a “response.”

⁵⁰ Hourly costs are based on the Bureau of Labor Statistics (BLS) figures for May 2017 (Sector 22, Utilities) for wages (https://www.bls.gov/oes/current/naics2_22.htm) and benefits for December 2019 (<https://www.bls.gov/news.release/ecec.nr0.htm>). We estimate that an Office and Administrative Support (Occupation code: 43-0000) would perform the functions associated with recordkeeping requirements, at an average hourly cost (for wages and benefits) of \$41.34. The functions associated with reporting requirements, we estimate, would be performed by an Electrical Engineer (Occupation code: 17-2051) at an average hourly cost of \$68.10 including wages and benefits. These occupational categories’ wage figures are averaged and weighted equally as follows: $(\$41.34 \text{ hour} + 68.10 \text{ hour}) \div 2 = \$54.72/\text{hour}$. The resulting wage figure is rounded to \$55.00/hour for use in calculating wage figures in the NOPR in Docket No. RM19-10-000.

⁵¹ Entity count based on May 10, 2019 NERC Registration: 7 entities register as Planning Coordinators (PC), 137 entities register as Transmission Planners (TP), and 62 entities register as both PCs and TPs.

This notice of proposed rulemaking will not significantly change existing burdens on an ongoing basis. The Commission estimates a one-time burden increase for Year 1 only because Year 1 represents a one-time task not repeated in subsequent years.

The one-time burden for FERC-725N information collection can be averaged over three years:

- $7,416 \text{ hours} \div 3 = 2,472 \text{ (rounded) hours/year over three years.}$

34. Title: FERC-725N, Mandatory Reliability Standards: Transmission Planning (TPL) Reliability Standards

Action: Proposed revision to FERC-725N information collection.

OMB Control No.: 1902-0264.

Respondents: Businesses or other for-profit institutions; not-for-profit institutions.

Frequency of Responses: One Time

Necessity of the Information: This notice of proposed rulemaking proposes to approve the requested modifications to a Reliability Standard pertaining to transmission planning. As discussed above, the Commission proposes to approve proposed Reliability Standard TPL-001-5 pursuant to section 215(d)(2) of the FPA because it improves upon the currently-effective Reliability Standard TPL-001-4.

Internal Review: The Commission has reviewed proposed Reliability Standard TPL-001-5 and made a determination that its action 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.

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

36. For submitting comments concerning the collection(s) of information and the associated burden estimate(s), please send your comments to the Commission, and to the Office of Management and Budget, Office of Information and Regulatory Affairs, 725 17th Street NW, Washington, DC 20503, [Attention: Desk Officer for the Federal Energy Regulatory Commission, phone: (202) 395-0710, fax: (202) 395-7285].

For security reasons, comments to OMB should be submitted by e-mail to:

oira_submission@omb.eop.gov. Comments submitted to OMB should include Docket Number RM19-10-000 and FERC-725N (OMB Control No. 1902-0264).

IV. Environmental Analysis

37. 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.⁵² 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

⁵² *Regulations Implementing the National Environmental Policy Act of 1969*, Order No. 486, FERC Stats. & Regs. ¶ 30,783 (1987) (cross-referenced at 41 FERC ¶ 61,284).

not substantially change the effect of the regulations being amended.⁵³ The actions proposed herein fall within this categorical exclusion in the Commission's regulations.

V. Regulatory Flexibility Act Analysis

38. The Regulatory Flexibility Act of 1980 (RFA)⁵⁴ generally requires a description and analysis of proposed rules that will have significant economic impact on a substantial number of small entities.⁵⁵ The Small Business Administration's (SBA) Office of Size Standards develops the numerical definition of a small business.⁵⁶ The SBA revised its size standard for electric utilities (effective January 22, 2014) to a standard based on the number of employees, including affiliates (from the prior standard based on megawatt hour sales).⁵⁷

39. Proposed Reliability Standard TPL-001-5 is expected to impose an additional burden on 206 entities⁵⁸ (planning coordinators and transmission planners).

40. Of the 206 affected entities discussed above, we estimate that approximately 10 percent of the affected entities are small entities. We estimate that each of the

⁵³ 18 CFR 380.4(a)(2)(ii) (2018).

⁵⁴ 5 U.S.C. 601-612 (2012).

⁵⁵ *Id.* 601-12.

⁵⁶ 13 CFR 121.101 (2018).

⁵⁷ *Id.* 121.201.

⁵⁸ Public utilities may fall under one of several different categories, each with a size threshold based on the company's number of employees, including affiliates, the parent company, and subsidiaries. For the analysis in this NOPR, we are using a 500 employee threshold due to each affected entity falling within the role of Electric Bulk Power Transmission and Control (NAISC Code: 221121).

21 small entities to whom the proposed modifications to proposed Reliability Standard TPL-001-5 apply will incur one-time costs of approximately \$1,980 per entity to implement the proposed Reliability Standard. We do not consider the estimated costs for these 21 small entities to be a significant economic impact. Accordingly, we propose to certify that proposed Reliability Standard TPL-001-5 will not have a significant economic impact on a substantial number of small entities.

VI. Comment Procedures

41. 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. RM19-10-000, and must include the commenter's name, the organization they represent, if applicable, and address.

42. 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 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.

43. 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.

44. 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

45. 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.

46. 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 of this document, excluding the last three digits, in the docket number field. 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 e-mail at 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.
By direction of the Commission.

Issued: June 20, 2019

Nathaniel J. Davis, Sr.,
Deputy Secretary.

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