

March 10, 2016

VIA OVERNIGHT MAIL

Sheri Young, Secretary of the Board
National Energy Board
517 – 10th Avenue SW
Calgary, Alberta
T2R 0A8

Re: *North American Electric Reliability Corporation*

Dear Ms. Young:

The North American Electric Reliability Corporation hereby submits Notice of Filing of the North American Electric Reliability Corporation of Proposed Reliability Standards IRO-002-5 and TOP-001-4. NERC requests, to the extent necessary, a waiver of any applicable filing requirements with respect to this filing.

Please contact the undersigned if you have any questions concerning this filing.

Respectfully submitted,

/s/ Shamai Elstein

Shamai Elstein
*Senior Counsel for the North American Electric
Reliability Corporation*

Enclosure

3353 Peachtree Road NE
Suite 600, North Tower
Atlanta, GA 30326
404-446-2560 | www.nerc.com

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**BEFORE THE
NATIONAL ENERGY BOARD**

**NORTH AMERICAN ELECTRIC)
RELIABILITY CORPORATION)**

**NOTICE OF FILING OF THE
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION OF PROPOSED
RELIABILITY STANDARDS
IRO-002-5 and TOP-001-4**

The North American Electric Reliability Corporation (“NERC”) hereby submits proposed Reliability Standards IRO-002-5 – Reliability Coordination – Monitoring and Analysis and TOP-001-4 – Transmission Operations. The proposed Reliability Standards address the Federal Energy Regulatory Commission (“FERC”) directives in Order No. 817 related to: (i) Transmission Operator monitoring of non-Bulk Electric System (“BES”) facilities; (ii) redundancy and diverse routing of Transmission Operator, Balancing Authority, and Reliability Coordinator data exchange capabilities; and (iii) testing of alternative or less frequently used data exchange capabilities.¹

The proposed Reliability Standards (**Exhibit A**) are consistent with FERC’s directives in Order No. 817 and are just, reasonable, not unduly discriminatory or preferential, and in the public interest.² NERC also provides notice of: (i) the associated Implementation Plan (**Exhibit B**); (ii) the associated Violation Risk Factors and Violation Severity Levels (**Exhibit E**); and (iii) the retirement of Reliability Standards TOP-001-3 and IRO-002-4.

¹ Order No. 817, *Transmission Operations Reliability Standards and Interconnection Reliability Operations and Coordination Reliability Standards*, 153 FERC ¶ 61,178, 80 FR 73977 (2015) (“Order No. 817”).

² Unless otherwise designated, capitalized terms shall have the meaning set forth in the *Glossary of Terms Used in NERC Reliability Standards* (“NERC Glossary of Terms”), available at http://www.nerc.com/files/Glossary_of_Terms.pdf.

This filing presents the technical basis and purpose of the proposed Reliability Standards, a demonstration that the proposed Reliability Standards meet the Reliability Standards criteria (**Exhibit C**), and a summary of the standard development history (**Exhibit F**). The proposed Reliability Standards were adopted by the NERC Board of Trustees on February 9, 2017.

This filing is organized as follows: Section I of the filing presents an executive summary of the proposed Reliability Standards. Section II of the filing provides the individuals to whom notices and communications related to the filing should be provided. Section III provides background on the structure governing the Reliability Standards approval process. This section also provides information on the development of the proposed Reliability Standards through Project 2016-01 - Modifications to TOP and IRO Standards and FERC's directives from Order 817. Section IV of the filing provides a detailed discussion of the proposed Reliability Standards and explains how the proposed standards enhance reliability and address FERC's directives from Order No. 817.

I. EXECUTIVE SUMMARY

In 2015, FERC issued Order No. 817 approving a suite of nine revised Transmission Operations ("TOP") and Interconnection Reliability Operations and Coordination ("IRO") Reliability Standards.³ In this order, FERC determined that the revised standards "provide a comprehensive framework as well as important improvements to ensure that the bulk electric system is operated within pre-established limits while enhancing situational awareness and strengthening operations planning" and "address the coordinated efforts to plan and reliably operate the bulk electric system under both normal and abnormal conditions."⁴ Further, FERC determined that the revised TOP and IRO standards addressed several of FERC's reliability-

³ These nine Reliability Standards were submitted to this governmental authority on March 25, 2015.

⁴ Order No. 817 at P 14.

related concerns and improved upon previous versions of the standards by clarifying responsibilities, eliminating gaps and ambiguities, and reducing redundancy.

Proposed Reliability Standards TOP-001-4 and IRO-002-5 build upon the improvements made in the prior versions of those standards to further advance reliability. As explained in detail in Section IV, proposed TOP-001-4 Requirement R10 has been revised to require the Transmission Operator to monitor non-BES facilities for determining System Operating Limit (“SOL”) exceedances within its Transmission Operator Area, as directed by FERC in Order No. 817.⁵ This revision helps to ensure that all facilities that can adversely impact reliability are monitored.

Proposed TOP-001-4 has been further revised to require that the Transmission Operator’s and Balancing Authority’s data exchange capabilities for the exchange of Real-time data needed for Real-time monitoring and analysis have redundant and diversely routed data exchange infrastructure within the entity’s primary Control Center and that these capabilities be tested for redundant functionality on a regular basis. Similar revisions are reflected in proposed Reliability Standard IRO-002-5 to clarify the obligations of the Reliability Coordinator. These modifications, which are responsive to FERC’s directives in Order No. 817,⁶ help support reliable operations by preventing a single point of failure in primary Control Center data exchange infrastructure from halting the flow of Real-time data used by operators to monitor and control the BES.

⁵ See Order No. 817 at P 35.

⁶ See Order No. 817 at PP 47, 51.

For the reasons explained more fully in this filing, the proposed Reliability Standards TOP-001-4 and IRO-002-5 are consistent with FERC's directives in Order No. 817 and are just, reasonable, not unduly discriminatory or preferential, and in the public interest.

II. NOTICES AND COMMUNICATIONS

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

Shamai Elstein
Senior Counsel
Lauren A. Perotti
Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099 – facsimile
shamai.elstein@nerc.net
lauren.perotti@nerc.net

Howard Gugel
Director of Standards
North American Electric Reliability Corporation
3353 Peachtree Road, N.E.
Suite 600, North Tower
Atlanta, GA 30326
(404) 446-2560
(404) 446-2595 – facsimile
howard.gugel@nerc.net

III. BACKGROUND

A. NERC Reliability Standards Development Procedure

The proposed Reliability Standards were developed in an open and fair manner and in accordance with the Reliability Standard development process. NERC develops Reliability Standards in accordance with Section 300 (Reliability Standards Development) of its Rules of Procedure and the NERC Standard Processes Manual.⁷

NERC's proposed rules provide for reasonable notice and opportunity for public comment, due process, openness, and a balance of interests in developing Reliability Standards, and thus satisfy certain of the criteria for approving Reliability Standards. The development process is open to any person or entity with a legitimate interest in the reliability of the Bulk

⁷ The NERC Rules of Procedure are available at <http://www.nerc.com/AboutNERC/Pages/Rules-of-Procedure.aspx>. The NERC Standard Processes Manual is available at http://www.nerc.com/comm/SC/Documents/Appendix_3A_StandardsProcessesManual.pdf.

Power System. NERC considers the comments of all stakeholders. Stakeholders must approve, and the NERC Board of Trustees must adopt, a Reliability Standard before NERC submits the Reliability Standard to the applicable governmental authorities.

B. Order No. 817 Approving Revised TOP/IRO Reliability Standards

On November 19, 2015, FERC issued Order No. 817 approving nine TOP and IRO Reliability Standards including TOP-001-3 – Transmission Operations and IRO-002-4 – Reliability Coordination – Monitoring and Analysis.⁸ FERC determined that the standards provided a comprehensive framework to support reliable operations and contained a number of improvements from previous versions of the standards. FERC directed NERC to make modifications to address three reliability-related concerns. These concerns included: (i) monitoring of non-BES facilities by Transmission Operators; (ii) redundancy and diverse routing of data exchange capabilities; and (iii) testing of alternate or less frequently used data exchange capabilities. FERC directed NERC to submit revised Reliability Standards addressing these areas within 18 months of the effective date of Order 817,⁹ or by July 26, 2017. A summary of FERC’s directives is provided below.

1. Monitoring of Non-Bulk Electric System Facilities (P 35)

Reliability Standard TOP-001-3 Requirement R10 requires the Transmission Operator to monitor Facilities and the status of Special Protection Systems within its Transmission Operator Area, and to obtain and use status, voltages, and flow data for Facilities and the status of Special

⁸ The other revised TOP and IRO standards approved in Order 817 are: TOP-002-4 – Operations Planning; TOP-003-3 – Operational Reliability Data; IRO-001-4 – Reliability Coordination – Responsibilities; IRO-008-2 – Reliability Coordinator Operational Analysis and Real-time Assessments; IRO-010-2 – Reliability Coordinator Data Specification and Collection; IRO-014-3 – Coordination Among Reliability Coordinators; and IRO-017-1 – Outage Coordination.

⁹ Order No. 817 at P 2.

Protection Systems outside of its area, for the purpose of determining SOL exceedances within its Transmission Operator Area.

In Order No. 817, FERC expressed concern that “in some instances the absence of real-time monitoring of non-BES facilities by the transmission operator within and outside its TOP areas as necessary for determining SOL exceedances in proposed TOP-001-3, Requirement R10 creates a reliability gap.”¹⁰ Monitoring of such facilities, FERC explained, could protect reliability while these non-BES facilities are considered for inclusion in the BES through the BES Exception Process. Further, FERC noted that certain non-BES facilities may not qualify as candidates for inclusion in the BES definition but should be monitored for reliability purposes because they are occasional SOL exceedance performers. FERC therefore directed NERC to revise TOP-001-3 Requirement R10 to require real-time monitoring of non-BES facilities. FERC suggested that to address this directive, NERC could “adopt... language similar to Reliability Standard IRO-002- 4, Requirement R3, which requires reliability coordinators to monitor non-bulk electric system facilities to the extent necessary.”¹¹

2. Redundancy and Diverse Routing of Data Exchange Capabilities (P 47)

Reliability Standard TOP-001-3 Requirements R19 and R20 require each Transmission Operator and Balancing Authority, respectively, to have data exchange capabilities with the entities from which it needs data in order to maintain reliability in its area. Reliability Standard IRO-002-4 Requirement R1 requires each Reliability Coordinator to have data exchange capabilities with its Balancing Authorities, Transmission Operators, and other entities it deems necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-

¹⁰ *Id.* at P 35.

¹¹ *Id.*

time Assessments. Reliability Standards TOP-003-3 and IRO-010-2 address the operational data needed by these entities. Reliability Standard IRO-002-4 Requirement R4 requires Reliability Coordinators to have a redundant infrastructure for system monitoring.

In Order No. 817, FERC stated that there is a reliability need for the Reliability Coordinator, Transmission Operator, and Balancing Authority to have data exchange capabilities that are redundant and diversely routed. FERC expressed concern that the standards “do not clearly address redundancy and diverse routing so that registered entities will unambiguously recognize that they have an obligation to address redundancy and diverse routing as part of their TOP and IRO compliance obligations.”¹² Stating that “redundancy for data communications is no less important than the redundancy explicitly required in the COM standards for voice communications,” FERC directed NERC to modify TOP-001-3 Requirements R19 and R20 to require that the Transmission Operator and Balancing Authority data exchange capabilities be redundant and diversely routed.¹³ In addition, FERC directed NERC to clarify that “redundant infrastructure” in IRO-002-4 Requirement R4 is equivalent to redundant and diversely routed data exchange capabilities.¹⁴

3. Testing of Alternate Data Exchange Capabilities (P 51)

In Order No. 817, FERC determined that testing of the Reliability Coordinator, Transmission Operator, and Balancing Authority alternative data exchange capabilities is “important to reliability and should not be left to what may or may not be implied in the standards.”¹⁵ Therefore, FERC directed NERC to modify the TOP and IRO standards to address

¹² Order No. 817 at P 47.

¹³ Order No. 817 at PP 47-48.

¹⁴ *Id.*

¹⁵ Order No. 817 at P 51.

the testing of alternate or less frequently used data exchange capabilities for those data exchange capabilities used in the primary Control Centers.¹⁶

C. Project 2016-01, Modifications to TOP and IRO Reliability Standards

NERC initiated Project 2016-01 - Modifications to TOP and IRO Standards in January 2016 to respond to FERC's directives in Order No. 817. Following two comment and ballot periods, the proposed standards were approved by the ballot pool on December 12, 2016. The NERC Board of Trustees adopted the proposed standards on February 9, 2017.

IV. JUSTIFICATION

As discussed in **Exhibit C** and below, proposed Reliability Standards IRO-002-5 and TOP-001-4 satisfy the Reliability Standards criteria, address FERC's directives from Order No. 817, and are just, reasonable, not unduly discriminatory or preferential, and in the public interest. Below is a requirement-by-requirement justification for the revisions reflected in the proposed standards and a summary of how the revisions address FERC's directives in Order No. 817.

A. Proposed Reliability Standard TOP-001-4 Requirement R10 Addresses FERC's Directive to Require Real-time Monitoring of Non-BES Facilities

In Order No. 817, FERC directed NERC to revise Reliability Standard TOP-001-3 to require real-time monitoring of non-BES facilities by Transmission Operators. Proposed TOP-001-4 Requirement R10 addresses FERC's directive by requiring each Transmission Operator to monitor non-BES facilities within its Transmission Operator Area (R 10.3), and to obtain and utilize status, voltages, and flow data for non-BES facilities outside of its Transmission Operator Area (R10.6), as necessary for determining SOL exceedances within its Transmission Operator Area. Consistent with FERC's directive, the intent of proposed Reliability Standard TOP-001-4 Requirement R10 is to ensure that all facilities that can adversely impact reliability are

¹⁶ *Id.*

monitored. The format of the proposed requirement has been changed from two subparts in the approved standard to six subparts in the proposed standard to indicate more clearly which monitoring activities the Transmission Operator is required to be perform.

Proposed TOP-001-4 Requirement R10 modifies approved TOP-001-3 Requirement R10 to address FERC's directive as follows:

- R10. Each Transmission Operator shall perform the following ~~as necessary~~ for determining System Operating Limit (SOL) exceedances within its Transmission Operator Area: [*Violation Risk Factor: High*] [*Time Horizon: Real-Time Operations*]
- 10.1. ~~Within its Transmission Operator Area, m~~ Monitor Facilities within its Transmission Operator Area; and
 - 10.2. Monitor the status of ~~Special Protection Systems Remedial Action Schemes~~ within its Transmission Operator Area;
 - 10.3. Monitor non-BES facilities within its Transmission Operator Area identified as necessary by the Transmission Operator;
 - ~~10.2-10.4~~ Outside its Transmission Operator Area, o Obtain and utilize status, voltages, and flow data for Facilities outside its Transmission Operator Area identified as necessary by the Transmission Operator;
 - 10.5. Obtain and utilize and the status of ~~Special Protection Systems Remedial Action Schemes~~ outside its Transmission Operator Area identified as necessary by the Transmission Operator; and
 - 10.6. Obtain and utilize status, voltages, and flow data for non-BES facilities outside its Transmission Operator Area identified as necessary by the Transmission Operator.

The non-BES facilities that the Transmission Operator is required to monitor are those that are necessary for the Transmission Operator to determine SOL exceedances within its Transmission Operator Area. The proposed Requirement corresponds to proposed Reliability Standard IRO-002-5 Requirement R5 (which maps to approved IRO-002-4 Requirement R3)

which requires Reliability Coordinators to monitor non-BES facilities to the extent necessary. The proposed requirement allows Transmission Operators flexibility for identifying the non-BES facilities that should be monitored for determining SOL exceedances. Transmission Operators perform various analyses and studies that could lead to the identification such facilities. These analyses and studies include, for example, the Operational Planning Analysis required by TOP-002-4 Requirement R1, the Real-time Assessments required by TOP-001-4 Requirement R13, any analysis performed by the Transmission Operator as part of BES exception processing, and analysis which may be specified in the Reliability Coordinator's outage process that leads the Transmission Operator to identify a non-BES facility that should be monitored temporarily for determining SOL exceedances.

B. Proposed Reliability Standards TOP-001-4 Requirements R20 and R23 and IRO-002-5 Requirement R2 Address FERC's Directive Regarding Redundancy and Diverse Routing of Data Exchange Capabilities

Proposed Reliability Standards TOP-001-4 Requirements R20 and R23 address FERC's Order No. 817 directive to modify TOP-001-3 Requirements R19 and R20 to require that the Transmission Operator and Balancing Authority data exchange capabilities be redundant and diversely routed.¹⁷ Proposed TOP-001-4 creates separate requirements for those data exchange capabilities that are needed to perform Operational Planning Analyses for next-day operations and those data exchange capabilities that are needed to exchange Real-time data in order to perform Real-time monitoring and analysis. This was done to provide clarity that only the latter capabilities require redundant and diversely routed data exchange infrastructure within the primary Control Center.

¹⁷ Order No. 817 at P 47.

Proposed TOP-001-4 modifies Reliability Standard TOP-001-3 to address FERC's

directive as follows:

R19. Each Transmission Operator shall have data exchange capabilities with the entities it has identified it needs data from in order to perform its Operational Planning Analyses. ~~the entities that it has identified that it needs data from in order to maintain reliability in its Transmission Operator Area.~~ [*Violation Risk Factor: High Medium*] [*Time Horizon: Operations Planning, Same-Day Operations, Real-time Operations*]

R20. Each Transmission Operator shall have data exchange capabilities, with redundant and diversely routed data exchange infrastructure within the Transmission Operator's primary Control Center, for the exchange of Real-time data with its Reliability Coordinator, Balancing Authority, and the entities it has identified it needs data from in order for it to perform its Real-time monitoring and Real-time Assessments. [*Violation Risk Factor: High*] [*Time Horizon: Same-Day Operations, Real-time Operations*]

R202. Each Balancing Authority shall have data exchange capabilities with the entities ~~that~~ it has identified ~~that~~ it needs data from in order to develop its Operating Plan for next-day operations. ~~maintain reliability in its Balancing Authority Area.~~ [*Violation Risk Factor: High Medium*] [*Time Horizon: Operations Planning, Same-Day Operations, Real-time Operations*]

R23. Each Balancing Authority shall have data exchange capabilities, with redundant and diversely routed data exchange infrastructure within the Balancing Authority's primary Control Center, for the exchange of Real-time data with its Reliability Coordinator, Transmission Operator, and the entities it has identified it needs data from in order for it to perform its Real-time monitoring and analysis functions. [*Violation Risk Factor: High*] [*Time Horizon: Same-Day Operations, Real-time Operations*]

In addition to directing requirements for the Transmission Operator and Balancing Authority, FERC directed NERC to clarify that "redundant infrastructure" for system monitoring in Reliability Standard IRO-002-4 Requirement R4 is equivalent to redundant and diversely routed data exchange. To maintain consistency with the requirements for Transmission Operators

and Balancing Authorities, the standard drafting team adopted a similar approach for clarifying the obligations of Reliability Coordinators in proposed IRO-002-5, which modifies Reliability Standard IRO-002-4 as follows:

- R1.** Each Reliability Coordinator shall have data exchange capabilities with its Balancing Authorities and Transmission Operators, and with other entities it deems necessary, for it to perform its Operational Planning Analyses, ~~Real-time monitoring, and Real-time Assessments.~~ [*Violation Risk Factor: HighMedium*] [*Time Horizon: Operations Planning, Same-Day Operations, Real-time Operations*]

- R2.** Each Reliability Coordinator shall have data exchange capabilities, with redundant and diversely routed data exchange infrastructure within the Reliability Coordinator's primary Control Center, for the exchange of Real-time data with its Balancing Authorities and Transmission Operators, and with other entities it deems necessary, for performing its Real-time monitoring and Real-time Assessments. [*Violation Risk Factor: High*] [*Time Horizon: Same-Day Operations, Real-time Operations*]

The proposed requirement clarifies that Reliability Coordinators shall have redundant and diversely routed data exchange capabilities and addresses FERC's underlying concerns in Order No. 817. Therefore, NERC submits that proposed IRO-002-5 Requirement R2 represents an equally effective and efficient alternative to FERC's directive to modify IRO-002-4 Requirement R4.

Proposed IRO-002-5 Requirement R2 and TOP-001-4 Requirements R20 and R23 require redundancy and diverse routing for the Real-time data exchange infrastructure within the applicable entity's primary Control Center. As explained in the Rationale for these Requirements, redundant and diversely routed data exchange capabilities consist of data exchange infrastructure components that would provide continued functionality despite failure or malfunction of an individual component within the applicable entity's primary Control Center. The requirements benefit reliability by ensuring that data exchange capabilities in primary

Control Centers are implemented in such a way as to preclude single points of failure from impacting the operator's ability to monitor and control the BES. The requirements allow for flexibility in how entities achieve redundancy and diverse routing, which may depend on the arrangement of the infrastructure or hardware within their primary Control Centers.

C. Proposed Reliability Standards IRO-002-5 Requirement R3 and TOP-001-4 Requirements R21 and R24 Address FERC's Directive for Testing of Data Exchange Capabilities used in Primary Control Centers

The proposed standards address FERC's Order No. 817 directive to address the testing of alternate or less frequently used data exchange capabilities through the addition of new requirements applicable to the Reliability Coordinator (IRO-002-5 Requirement R3), Transmission Operator (TOP-001-4 Requirement R21), and Balancing Authority (TOP-001-4 Requirement R24). The proposed new requirements read as follows:

IRO-002-5 Requirement R3:

- R3.** Each Reliability Coordinator shall test its primary Control Center data exchange capabilities specified in Requirement R2 for redundant functionality at least once every 90 calendar days. If the test is unsuccessful, the Reliability Coordinator shall initiate action within two hours to restore redundant functionality. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

TOP-001-4 Requirement R21:

- R21.** Each Transmission Operator shall test its primary Control Center data exchange capabilities specified in Requirement R20 for redundant functionality at least once every 90 calendar days. If the test is unsuccessful, the Transmission Operator shall initiate action within two hours to restore redundant functionality. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

TOP-001-4 Requirement 24:

- R24.** Each Balancing Authority shall test its primary Control Center data exchange capabilities specified in Requirement R23 for redundant functionality at least once every 90 calendar days. If the test is unsuccessful, the Balancing Authority shall initiate action within

two hours to restore redundant functionality. *[Violation Risk Factor: Medium] [Time Horizon: Operations Planning]*

Consistent with FERC’s directive, the proposed requirements establish a “data exchange capability testing framework for the data exchange capabilities used in the primary control centers.”¹⁸ The proposed requirements require Reliability Coordinators, Transmission Operators, and Balancing Authorities to test their primary Control Center data exchange capabilities for redundant functionality. These tests must be performed at least once every 90 calendar days. Testing on a quarterly basis appropriately balances the need to test redundant functionality with the applicable entity’s operating requirements.

As explained in the Rationale for each of these Requirements, a test for redundant functionality would demonstrate that data exchange capabilities would continue to operate despite the malfunction or failure of an individual component. Following an unsuccessful test, the applicable entity is required to initiate action within two hours to restore redundant functionality.

D. Replacement of Defined Term “Special Protection System” with “Remedial Action Scheme”

In addition to the revisions discussed above, the NERC Glossary term “Special Protection System” has been replaced with the NERC Glossary term “Remedial Action Scheme” throughout proposed Reliability Standards TOP-001-4 and IRO-002-5. The revised definition of Remedial Action Scheme was approved by FERC in 2015 in Order No. 818;¹⁹ FERC approved a revised definition of Special Protection System that refers the reader to the definition of

¹⁸ Order No. 817 at P 51.

¹⁹ Order No. 818, *Revisions to Emergency Operations Reliability Standards; Revisions to Undervoltage Load Shedding Reliability Standards; Revisions to the Definition of “Remedial Action Scheme” and Related Reliability Standards*, 153 FERC ¶ 61,228 (2015).

Remedial Action Scheme in 2016.²⁰ NERC determined that using the term “Remedial Action Scheme” in the proposed standards in lieu of the term “Special Protection System” would promote consistency and clarity in terminology in the Reliability Standards.

E. Enforceability of the Proposed Reliability Standards

The proposed Reliability Standards contain Violation Risk Factors (“VRFs”) and Violation Severity Levels (“VSLs”). The VSLs provide guidance on the way that NERC will enforce the Requirements of the proposed Reliability Standards. The VRFs are one of several elements used to determine an appropriate sanction when the associated Requirement is violated. The VRFs assess the impact to reliability of violating a specific Requirement. The new and revised VRFs and VSLs in the proposed standards comport with NERC and FERC guidelines related to their assignment. A description of how the proposed VRF and VSL assignments meet these guidelines is provided in **Exhibit E**.

In addition to the proposed VRFs and VSLs, the proposed Reliability Standards also include Measures that support each new and revised Requirement by clearly identifying what is required and how the Requirement will be enforced. These Measures help ensure that the Requirements will be enforced in a clear, consistent, and non-preferential manner and without prejudice to any party.

V. EFFECTIVE DATE

The proposed Implementation Plan is attached to this filing as **Exhibit B**. NERC proposes a single plan to govern implementation of both proposed Reliability Standards IRO-002-5 and TOP-001-4. As explained therein, the implementation periods are designed to provide entities with sufficient time to meet their new obligations under the proposed standards. Under

²⁰ *N. Am. Elec. Reliability Corp.*, Docket No. RD16-5-000 (Jun. 23, 2016) (delegated letter order).

this plan, for proposed Reliability Standard TOP-001-4, where approval by an applicable governmental authority is required, the standard shall become effective on the first day of the first calendar quarter that is 12 months after the effective date of the applicable governmental authority's order approving the standard, or as otherwise provided for by the applicable governmental authority. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is 12 months after the date the standard is adopted by the NERC Board of Trustees, or as otherwise provided for in that jurisdiction. For proposed Reliability Standard IRO-002-5, where approval by an applicable governmental authority is required, the standard shall become effective on the first day of the first calendar quarter that is three months after the effective date of the applicable governmental authority's order approving the standard, or as otherwise provided for by the applicable governmental authority. Where approval by an applicable governmental authority is not required, the standard shall become effective on the first day of the first calendar quarter that is three months after the date the standard is adopted by the NERC Board of Trustees, or as otherwise provided for in that jurisdiction. The proposed implementation plan also clarifies that the initial performance of the periodic testing of primary Control Center data exchange capabilities required by proposed IRO-002-5 Requirement R3 and TOP-001-4 Requirements R21 and R24 must be completed within 90 calendar days of the effective date of the standard. Reliability Standards IRO-002-4 and TOP-001-3 would be retired immediately prior to the effective date of the successor versions.

Respectfully submitted,

/s/ Lauren A. Perotti

Shamai Elstein
Senior Counsel
Lauren A. Perotti
Counsel
North American Electric Reliability Corporation
1325 G Street, N.W., Suite 600
Washington, D.C. 20005
(202) 400-3000
(202) 644-8099– facsimile
shamai.elstein@nerc.net
lauren.perotti@nerc.net

*Counsel for the North American Electric
Reliability Corporation*

March 10, 2017

EXHIBITS A-B and D-G

Exhibit C

Reliability Standards Criteria

Exhibit C — Reliability Criteria — Proposed Reliability Standards IRO-002-5 and TOP-001-4

Reliability Criteria

The discussion below explains how the proposed Reliability Standard has met or exceeded the Reliability Standards criteria.

1. Proposed Reliability Standards must be designed to achieve a specified reliability goal and must contain a technically sound means to achieve that goal.

The purpose of proposed Reliability Standard TOP-001-4, which is unchanged from approved TOP-001-3, is to prevent instability, uncontrolled separation, or Cascading outages that adversely impact the reliability of the Interconnection by ensuring prompt action to prevent or mitigate such occurrences. The purpose of proposed Reliability Standard IRO-002-5, which is substantively unchanged from approved IRO-002-4, is to provide System Operators with the capabilities necessary to monitor and analyze data needed to perform their reliability functions. The revisions reflected in the two proposed standards are responsive to FERC’s directives in Order No. 817 to address (i) monitoring of non-BES facilities by Transmission Operators; (ii) redundancy and diverse routing of data exchange capabilities; and (iii) testing of alternate or less frequently used data exchange capabilities.¹

Proposed Reliability Standard TOP-001-4 enhances reliability in three ways. First, the proposed standard improves upon currently-effective TOP-001-3 by requiring Transmission Operator monitoring of non-Bulk Electric System (BES) facilities for determining System Operating Limit exceedances within the Transmission Operator Area. This revision helps to ensure that all facilities that can adversely impact reliability are monitored. Second, the proposed standard enhances reliability by requiring the Transmission Operator and Balancing Authority’s

¹ Order No. 817, *Transmission Operations Reliability Standards and Interconnection Reliability Operations and Coordination Reliability Standards*, 153 FERC ¶ 61,178, 80 Fed.Reg. 73977 at PP 35, 47, 51 (2015) (“Order No. 817”).

data exchange capabilities for the exchange of Real-time data needed for Real-time monitoring and analysis have redundant and diversely routed data exchange infrastructure within the entity's primary Control Center. This helps support reliable operations by preventing a single point of failure in primary Control Center data exchange infrastructure from halting the flow of Real-time data used by operators to monitor and control the BES. Third, the proposed standard requires regular testing of these capabilities for redundant functionality. Proposed Reliability Standard IRO-002-5 enhances reliability by clarifying the Reliability Coordinator's obligation to have redundant and diversely routed data exchange capabilities. Thus, the proposed standards provide a technically sound means of achieving the stated reliability goals.

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

The proposed Reliability Standards are clear and unambiguous as to what is required and who is required to comply. Proposed Reliability Standard TOP-001-4 applies to Balancing Authorities, Transmission Operators, Generator Operators, and Distribution Providers, although the new and revised requirements in the proposed standard focus on the obligations of Transmission Operators and Balancing Authorities. Proposed Reliability Standard IRO-002-5 applies to Reliability Coordinators. The proposed standards clearly articulate the actions that each entity must take to comply.

3. A proposed Reliability Standard must include clear and understandable consequences and a range of penalties (monetary and/or non-monetary) for a violation.

The Violation Risk Factors (“VRFs”) and Violation Severity Levels (“VSLs”) for proposed Reliability Standard TOP-001-4 Requirements R10 and R19 through R24 and proposed Reliability Standard IRO-002-5 Requirements R1 through R3 are reflected in **Exhibit A** as supported by the justification attached as **Exhibit E.**² These VRFs and VSLs comport with NERC and FERC guidelines related to their assignment. The assignment of the severity level for each VSL is consistent with the corresponding Requirement. The VSLs are consistent with the corresponding requirement and do not use any ambiguous terminology, thereby supporting uniformity and consistency in the determination of similar penalties for similar violations. For these reasons, the proposed Reliability Standards include clear and understandable consequences.

4. A proposed Reliability Standard must identify clear and objective criterion or measure for compliance, so that it can be enforced in a consistent and non-preferential manner.

The proposed Reliability Standards include Measures that support each Requirement by clearly identifying what is required and how the Requirement will be enforced. These Measures help provide clarity regarding how the Requirements will be enforced, and help ensure that the Requirements will be enforced in a clear, consistent, and non-preferential manner and without prejudice to any party.

² No changes were made to the VRFs and VSLs for the remaining Reliability Standard Requirements.

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

The proposed Reliability Standards achieve their reliability goals effectively and efficiently. Consistent with FERC’s directives in Order No. 817, proposed Reliability Standards TOP-001-4 and IRO-002-5 improve upon the prior versions of the standards by addressing: (i) monitoring of non-BES facilities by Transmission Operators; (ii) redundancy and diverse routing of data exchange capabilities; and (iii) testing of alternate or less frequently used data exchange capabilities.³

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

The proposed Reliability Standards do not reflect a “lowest common denominator” approach. To the contrary, the revisions reflected in proposed Reliability Standards TOP-001-4 and IRO-002-5 provide significant benefits for the reliability of the Bulk Power System by: (i) requiring Transmission Operator monitoring of all facilities, BES and non-BES, that can adversely affect the reliability of the BPS; and (ii) by requiring Transmission Operators, Balancing Authorities, and Reliability Coordinators to have data exchange capabilities that would prevent a single point of failure in primary Control Center data exchange infrastructure from halting the flow of Real-time data used by operators to monitor and control the BES and to regularly test those capabilities for redundancy. The proposed Reliability Standards do not sacrifice excellence in operating system reliability for costs associated with implementation of the Reliability Standards.

³ See Order No. 817 at PP 35, 47, 51.

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

The proposed Reliability Standards apply throughout North America and do not favor one geographic area or regional model.

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

The proposed Reliability Standards have no undue negative effect on competition. The proposed Reliability Standards require the same performance by each of applicable entity. The proposed Reliability Standards do not unreasonably restrict the available generation or transmission capability or limit use of the Bulk-Power System in a preferential manner.

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

The proposed effective dates for the proposed Reliability Standards are just and reasonable and appropriately balance the urgency in the need to implement the proposed Reliability Standards against the reasonableness of the time allowed for those who must comply to develop necessary procedures, software, facilities, staffing or other relevant capability. NERC proposes an effective date for TOP-001-4 as provided in the Implementation Plan. The twelve-month implementation period in the Implementation Plan provides Transmission Operators with sufficient time to revise and distribute data specifications required by TOP-003-3 Requirement R1 to include non-BES data identified by the Transmission Operator, and to receive the data from entities responsible for providing it under TOP-003-3 Requirement R5. This implementation period also provides Transmission Operators and Balancing Authorities with time to establish and document data exchange capabilities that are redundant and diversely

routed and to implement testing processes and procedures. NERC proposes an effective date for IRO-002-5 as provided in the Implementation Plan. This three-month implementation period in the Implementation Plan provides Reliability Coordinators with time to establish and document data exchange capabilities that are redundant and diversely routed and to implement testing processes and procedures. The proposed effective dates are reflected in the proposed implementation plan, attached as **Exhibit B**.

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

The proposed Reliability Standards were developed in accordance with NERC's ANSI-accredited processes for developing and approving Reliability Standards. **Exhibit F** includes a summary of the Reliability Standards development proceedings, and details the processes followed to develop the proposed Reliability Standards. These processes included, among other things, comment periods, pre-ballot review periods, and balloting periods. Additionally, all meetings of the standard drafting team were properly noticed and open to the public.

11. NERC must explain any balancing of vital public interests in the development of proposed Reliability Standards.

NERC has identified no competing public interests regarding the request for approval of the proposed Reliability Standards. No comments were received indicating the proposed Reliability Standards are in conflict with other vital public interests.

12. Proposed Reliability Standards must consider any other appropriate factors.

No other factors relevant to whether the proposed Reliability Standards are just, reasonable, not unduly discriminatory or preferential were identified.