

June 8, 2016

**VIA ELECTRONIC FILING**

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Re: *North American Electric Reliability Corporation*

Dear Ms. Morphy:

The North American Electric Reliability Corporation hereby submits Notice of Filing of the North American Electric Reliability Corporation of Proposed Reliability Standards IRO-018-1 and TOP-010-1.

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

Respectfully submitted,

/s/ Holly A. Hawkins

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Enclosure

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**BEFORE THE  
CROWN INVESTMENT CORPORATION  
OF THE PROVINCE OF SASKATCHEWAN**

**NORTH AMERICAN ELECTRIC )  
RELIABILITY CORPORATION )**

**NOTICE OF FILING OF THE  
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION OF PROPOSED  
RELIABILITY STANDARDS  
IRO-018-1 AND TOP-010-1**

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June 8, 2016

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**BEFORE THE  
CROWN INVESTMENT CORPORATION  
OF THE PROVINCE OF SASKATCHEWAN**

**NORTH AMERICAN ELECTRIC )  
RELIABILITY CORPORATION )**

**NOTICE OF FILING OF THE  
NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION OF PROPOSED  
RELIABILITY STANDARDS  
IRO-018-1 AND TOP-010-1**

The North American Electric Reliability Corporation (“NERC”) hereby submits proposed Reliability Standards IRO-018-1 – Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities and TOP-010-1 – Real-time Reliability Monitoring and Analysis Capabilities. The proposed Reliability Standards (**Exhibit A**) are just, reasonable, not unduly discriminatory or preferential, and in the public interest.<sup>1</sup> NERC also provides notice of the associated implementation plan (**Exhibit B**) and the associated Violation Risk Factors and Violation Severity Levels for the proposed standards (**Exhibit D**).

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 H**). The proposed Reliability Standards were adopted by the NERC Board of Trustees on May 5, 2016.

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

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<sup>1</sup> 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](http://www.nerc.com/files/Glossary_of_Terms.pdf).

background on the regulatory structure governing the Reliability Standards approval process. This section also provides information on the development of the proposed Reliability Standards through Project 2009-02, Real-time Reliability Monitoring and Analysis Capabilities and the Federal Energy Regulatory Commission (“FERC”) directives and report recommendations considered as part of the scope for this project. Section IV of the filing provides a detailed discussion of the proposed Reliability Standards and explains how the proposed standards address report recommendations and satisfy certain outstanding FERC directives related to Real-time monitoring and analysis capabilities.

## I. EXECUTIVE SUMMARY

Inadequate situational awareness has been cited as one of the causes of the August 2003 blackout affecting the northeastern United States and Canada and the 2011 blackout affecting the southwestern United States and Baja, Mexico. Reports prepared following these events have provided recommendations for new and revised Reliability Standards to enhance Real-time situational awareness and address the other primary and contributing causes of these events. Over the last several years, NERC has addressed many of the recommendations from these reports. As a result, Reliability Standards affecting the operating reliability of the Bulk Electric System have improved significantly since first becoming mandatory in 2007. Among other things, the revised Transmission Operations (“TOP”) and Interconnection Reliability Operations and Coordination (“IRO”) Reliability Standards submitted by NERC on March 25, 2015 and approved by FERC in Order No. 817<sup>2</sup> (referred to herein as the “revised TOP and IRO

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<sup>2</sup> Order No. 817, *Transmission Operations Reliability Standards and Interconnection Reliability Operations and Coordination Reliability Standards*, 153 FERC ¶ 61,178 (2015) (“Order No. 817”). In Order No. 817, FERC approved Reliability Standards TOP-001-3, TOP-002-4, TOP-003-3, IRO-001-4, IRO-002-4, IRO-008-2, IRO-010-2, IRO-014-3, and IRO-017-1. However, FERC directed that NERC make certain modifications to the standards within 18 months of the effective date of the Final Rule. *See* Order No. 817 at P 35, 47, and 51. These directives are currently being considered through Project 2016-01 Modifications to TOP and IRO Standards.

Reliability Standards”) provide rigorous functional requirements for Real-time monitoring and analysis.

In reviewing these reports and FERC’s outstanding directives from Order No. 693,<sup>3</sup> NERC identified further opportunity to enhance reliability and complement the existing functional requirements for Real-time monitoring and analysis. Specifically, NERC developed proposed Reliability Standards IRO-018-1 and TOP-010-1 to improve Real-time situational awareness capabilities and enhance reliable operations by requiring Reliability Coordinators, Transmission Operators, and Balancing Authorities to provide operators with awareness of monitoring and analysis capabilities, including alarm availability, so that operators may take appropriate steps to protect reliability. The proposed standards accomplish this as follows. First, the proposed standards require applicable entities to provide notification to operators of Real-time monitoring alarm failures. Second, the proposed standards require applicable entities to implement Operating Processes or Operating Procedures to: (i) provide operators with indication(s) of the quality of information being provided by their monitoring and analysis capabilities; and (ii) address deficiencies in the quality of information being provided by their monitoring and analysis capabilities.

The proposed Reliability Standards address certain FERC directives from Order No. 693 related to requiring a minimum set of capabilities be made available to operators.<sup>4</sup> Further, the proposed Reliability Standards address certain recommendations from the 2008 report of the NERC Operating Committee Real-time Tools Best Practices Task Force (“RTBP Task Force”)

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<sup>3</sup> Order No. 693, *Mandatory Reliability Standards for the Bulk-Power System*, FERC Stats. & Regs. ¶ 31,242 (“Order No. 693”), *order on reh’g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007).

<sup>4</sup> See Order No. 693 at PP 905, 1660, and 1875 and *infra* Section III.C.

relating to the availability of key Real-time monitoring and analysis capabilities.<sup>5</sup> The proposed Reliability Standards also address a recommendation from the joint FERC and NERC report on the 2011 Arizona-Southern California outage that entities take steps to ensure the adequacy and operation of their Real-time tools.<sup>6</sup> As such, the proposed Reliability Standards represent an important addition to the body of Reliability Standards for the reliability of the Bulk Power System.

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<sup>5</sup> See RTBP Task Force, *Real-Time Tools Survey Analysis and Recommendations* (Mar. 2008) (“2008 RTBP Task Force Report”), included as Exhibit G-2 to this filing. The report is available on NERC’s website at: <http://www.nerc.com/comm/OC/Realtime%20Tools%20Best%20Practices%20Task%20Force%20RTBP%20TF%20/Real-Time%20Tools%20Survey%20Analysis%20and%20Recommendations.pdf>.

As explained in further detail below, the RTBP Task Force was initiated in response to Recommendation 22 of the final report on the August 2003 blackout. See U.S.-Canada Power System Outage Task Force, *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations* (Apr. 2004) (“August 2003 Blackout Report”), available at <http://energy.gov/sites/prod/files/oeprod/DocumentsandMedia/BlackoutFinal-Web.pdf>. For convenience, the August 2003 Blackout Report is also included as Exhibit G-1 to this filing.

<sup>6</sup> See FERC and NERC, *Arizona-Southern California Outages on September 8, 2011, Causes and Recommendations* (Apr. 2012) (“2011 Southwest Outage Report”), included as Exhibit G-3 to this filing. The report is also available on NERC’s website at: [http://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/AZ%20Outage\\_Report\\_01MAY12.pdf](http://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/AZ%20Outage_Report_01MAY12.pdf).



## II. NOTICES AND COMMUNICATIONS

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## 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.<sup>7</sup>

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 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 authority for approval.

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<sup>7</sup> 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](http://www.nerc.com/comm/SC/Documents/Appendix_3A_StandardsProcessesManual.pdf).

## **B. FERC Directives Relating to Real-time Monitoring and Analysis Capabilities**

NERC submitted the original TOP and IRO Reliability Standards on April 4, 2006. In Order No. 693, FERC approved 83 Reliability Standards, including the original TOP and IRO Reliability Standards. While approving those standards, FERC directed NERC to develop modifications to ensure that operating entities would have adequate tools to perform their Real-time reliability functions.

First, FERC directed NERC to develop modifications to Reliability Standard IRO-002-1 – Reliability Coordination – Facilities<sup>8</sup> as follows:

[T]he Commission directs the ERO to modify IRO-002-1 to require a minimum set of tools that must be made available to the reliability coordinator. We believe that this requirement will ensure that a reliability coordinator has the tools it needs to perform its functions. Further...such a requirement promotes a more proactive approach to maintaining reliability.<sup>9</sup>

As “a particular product could become obsolete and technology improves over time,” FERC clarified that its intent behind this directive was “to have the ERO develop a requirement that identifies capabilities, not actual tools or products.”<sup>10</sup>

Second, FERC directed NERC to develop modifications to TOP-006-1 – Monitoring System Conditions.<sup>11</sup> Again, FERC stated that its intent was for NERC to identify minimum capabilities, not specific sets of tools:

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<sup>8</sup> Order No. 693 at P 905. NERC submitted IRO-002-2 on January 21, 2010. FERC approved the currently-effective version of the standard, IRO-002-2, in Docket No. RM10-15-000. See Order No. 748, *Mandatory Reliability Standards for Interconnection Reliability Operating Limits*, 134 FERC ¶ 61,213, *order on clarification*, Order No. 748-A, 136 FERC ¶ 61,030 (2011) (“Order No. 748”). NERC submitted Reliability Standard IRO-002-4 on March 25, 2015. In Order No. 817, FERC approved Reliability Standard IRO-002-4 – Reliability Coordination – Monitoring and Analysis, to become effective April 1, 2017.

<sup>9</sup> Order No. 693 at P 905.

<sup>10</sup> Order No. 693 at P 906.

<sup>11</sup> Order No. 693 at P 1660. NERC submitted TOP-006-2 Reliability Standard on January 21, 2010. FERC approved the currently-effective version of the standard, TOP-006-2, in Order No. 748. In Order No. 817, FERC

We adopt our proposal to require the ERO to develop a modification related to the provision of a minimum set of analytical tools . . . we note that our intent was not to identify specific sets of tools, but rather the minimum capabilities that are necessary to enable operators to deal with real-time situations and to ensure reliable operation of the Bulk-Power System.<sup>12</sup>

In addition to the revisions to TOP and IRO standards, FERC directed NERC to develop a modification to Reliability Standard VAR-001-1 – Voltage and Reactive Control related to Real-time tools.<sup>13</sup> Specifically, FERC directed NERC to modify the standard to require periodic performance of voltage stability analysis “using online techniques where commercially available, and offline simulation tools where online tools are not available, to assist Real-time operations.”<sup>14</sup>

### **C. Report Recommendations Relating to Real-time Monitoring and Analysis Capabilities**

FERC’s Order No. 693 directives highlighted the need for a minimum set of capabilities to be available to assist operators in making Real-time decisions, a concern that has been echoed in reports prepared following the August 2003 blackout and the 2011 Southwest outage events. Reliability Standards relating to the operating reliability of the Bulk Power System have improved significantly since 2007, and many of the issues and recommendations highlighted in these reports have since been addressed. However, these reports provide additional considerations for improving Real-time monitoring and analysis capabilities, as discussed below.

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approved three TOP Reliability Standards to replace the existing suite of TOP standards, including Reliability Standard TOP-006-2, effective April 1, 2017. NERC had submitted the TOP standards on March 25, 2015.

<sup>12</sup> Order No. 693 at P 1660.

<sup>13</sup> Order No. 693 at P 1875. VAR-001 was most recently revised as part of Project 2013-04 – Voltage and Reactive Control and was approved by FERC in Docket No. RD14-11-000. *See N. Am. Elec. Reliability Corp.* (Aug. 1, 2014) (unpublished letter order) and *N. Am. Elec. Reliability Corp.*, Docket No. RD15-6-000 (Nov. 13, 2015) (unpublished letter order) (approving errata version VAR-001-4.1). NERC submitted the VAR-001 standard on June 12, 2014.

<sup>14</sup> *See* Order No. 693 at ¶ 1875.

1. The August 2003 Blackout Report and the 2008 RTBP Task Force Report

The largest blackout in history to affect North America began on the afternoon of August 14, 2003 and disrupted over 61,800 megawatts of electric load in the northeastern United States and the Canadian province of Ontario. The August 2003 Blackout Report identified inadequate situational awareness as one of the key causes of the blackout, among a number of principal and contributing causes.<sup>15</sup> The August 2003 blackout was linked to dysfunction of Supervisory Control and Data Acquisition and energy management systems.<sup>16</sup> Additionally, investigators pointed out that several deficiencies leading to the August 2003 blackout were identified as weaknesses in previous outages, indicating the need for more effective response.<sup>17</sup> A recurring recommendation focused on providing capabilities for operators to evaluate courses of action. These observations led to Recommendation 22 of the August 2003 Blackout Report for NERC to “evaluate and adopt better real-time tools for operators and reliability coordinators.”<sup>18</sup>

In response to this recommendation, NERC formed the RTBP Task Force in 2004. The RTBP Task Force was charged with identifying the best practices for Real-time reliability tools used to build and maintain Real-time network models, perform state estimation and contingency analysis, and maintain situational awareness in accordance with NERC Reliability Standards. The RTBP Task Force was also instructed to develop guidelines for minimally acceptable capabilities for these reliability tools and to recommend specific requirements to be included in Reliability Standards for these tools. In 2008, following extensive information gathering and

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<sup>15</sup> See August 2003 Blackout Report at 18.

<sup>16</sup> See, e.g., *id.* at 52.

<sup>17</sup> See *id.* at 159.

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

analysis, the RTBP Task Force issued a report which included recommendations for new and enhanced Reliability Standards, operating guidelines, and areas for further analysis.

In the years since the issuance of this report, many of its recommendations have been addressed by other Reliability Standards, including the revised TOP and IRO Reliability Standards. However, certain recommendations relating to Real-time monitoring and analysis capabilities were not fully addressed or remained to be considered.

Among these recommendations was the recommendation that NERC develop new or revised Reliability Standards to mandate certain tools as mandatory monitoring and analysis tools.<sup>19</sup> The RTBP Task Force also recommended developing new or revised Reliability Standards to address availability of various monitoring and analysis capability processes,<sup>20</sup> as well as to “monitor and maintain awareness of critical equipment status to ensure that lack of availability of critical equipment does not impair reliable operation.”<sup>21</sup>

Collectively, these recommendations center on developing Reliability Standards that would enhance situational awareness by providing operator awareness of key monitoring and analysis capabilities, including when alarms are not available or performing their intended function.

## 2. The 2011 Southwest Outage Report

The need for improved Real-time monitoring and analysis capabilities was again highlighted in the 2011 Southwest Outage Report. On the afternoon of September 8, 2011, the loss of a single 500 kV line led to widespread cascading outages affecting 2.7 million customers in Arizona, Southern California, and Baja, Mexico. Like the August 2003 blackout, this event

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<sup>19</sup> Specifically, alarm tools, telemetry data systems, network topology processor, state estimator, and contingency analysis. *See* 2008 RTBP Task Force Report at Summary of Recommendations (Recommendation S1).

<sup>20</sup> *See, e.g., id.* Recommendation S7 (“Specify and measure minimum availability for alarm tools.”).

<sup>21</sup> *See id.* Recommendation S40.

was partly due to, or exacerbated by, inadequate Real-time situational awareness. Inadequate operations planning was a significant factor in the failure to maintain a secure N-1 state.<sup>22</sup>

However, the 2011 Southwest Outage Report also highlighted several concerns with entities and their ability to monitor, identify, and plan for the next critical contingency in Real-time.<sup>23</sup>

Recommendation 12 of this report states that entities “should take measures to ensure that their real-time tools are adequate, operational, and run frequently enough to provide their operators the situational awareness necessary to identify and plan for contingencies and reliably operate their systems.”<sup>24</sup> While the 2011 Southwest Outage Report’s recommendations relating to operations planning, Real-time situational awareness, and frequency of Real-time monitoring and analysis have been primarily addressed by the revised TOP and IRO Reliability Standards,<sup>25</sup> the parts of Recommendation 12 relating to adequacy and operation of Real-time tools are not explicitly covered by Reliability Standard requirements and therefore present areas for improvement.

#### **D. Project 2009-02, Real-time Reliability Monitoring and Analysis Capabilities**

Project 2009-02 was formed to address issues relating to Real-time reliability monitoring and analysis capabilities, as highlighted in FERC’s Order No. 693 directives and the report recommendations discussed in the preceding section. Project 2009-02 was first initiated in 2009 in response to the work of the RTBP Task Force and used the 2008 RTBP Task Force Report as the basis for the initial work. A Standard Authorization Request (“SAR”) drafting team worked to develop a SAR and a concept white paper to establish requirements for the “functionality,

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<sup>22</sup> 2011 Southwest Outage Report at 5.

<sup>23</sup> *Id.*

<sup>24</sup> *Id.* at 89.

<sup>25</sup> See *Notice of Filing of the North American Electric Reliability Corporation of Proposed Transmission Operations and Interconnection Reliability Operations and Coordination Reliability Standards*, (Mar. 25, 2015) at Ex. F (Mapping Document of Proposed Reliability Standards to Southwest Outage Report Recommendations).

performance, and maintenance of Real-time Monitoring and Analysis Capabilities.”<sup>26</sup> In early 2011, formal development on Project 2009-02 was paused to prioritize efforts on other projects, including other projects to revise the TOP and IRO Reliability Standards.

NERC resumed work on Project 2009-02 in early 2015. As many Reliability Standards and definitions had been developed or revised in the intervening years, including the revised TOP and IRO Reliability Standards, it was necessary to develop a new project scope to determine which issues had been addressed through other projects and which issues remained to be addressed through Project 2009-02.

To develop the new project scope, the Project 2009-02 drafting team reviewed the prior work on the project, FERC’s directives from Order No. 693 relating to Real-time monitoring and analysis capabilities, and the findings and recommendations of the August 2003 Blackout Report and the 2008 RTPB Task Force Report. The drafting team also reviewed the 2011 Southwest Outage Report, which was issued after the initial work on Project 2009-02 was paused in 2011, as well as recently-developed Reliability Standards addressing Real-time situational awareness.<sup>27</sup> In June 2015, the drafting team hosted a technical conference to obtain industry input on reliability issues to be addressed in this project and to hear industry perspectives on the use of Real-time situational awareness capabilities for reliable operations.

Based on its comprehensive review and outreach, the Project 2009-02 drafting team determined that identified reliability issues persist in the area of Real-time situational awareness capabilities. The Project 2009-02 drafting team determined that reliability could be improved by:

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<sup>26</sup> See Ex. H (Summary of Development and Complete Record of Development) Item 15, April 2010 Standard Authorization Request.

<sup>27</sup> To assist in its work, the drafting team prepared a comprehensive mapping document to show which report recommendations relating to Real-time monitoring and analysis capabilities had been addressed through other Reliability Standards and which recommendations remained to be considered. See Exhibit F (Standard Authorization Request Justification, Project 2009-02) Appendix – Report Recommendations.

(i) promoting a common understanding of monitoring as it applies to Real-time situational awareness; (ii) providing operators with indication(s) of the quality of information being provided by monitoring and analysis capabilities; and (iii) providing operators with notification(s) during unplanned loss of monitoring capabilities.

Although certain recommendations from the 2008 RTBP Task Force Report recommended developing Reliability Standards to require a minimum set of tools, the Project 2009-02 drafting team concluded that prescriptive requirements for Real-time tools should not be within the scope of Project 2009-02. The revised definition of Real-time Assessment and the requirements in Reliability Standards IRO-008-2 and TOP-001-3, discussed below, provide applicable entities with the flexibility to determine which Real-time tools, such as state estimator, contingency analysis, and stability applications, are necessary to meet their Real-time reliability functions. Therefore, rather than prescribing specific tools, the Project 2009-02 drafting team determined that it would be appropriate to address the recommendations by developing technology-neutral Reliability Standards.

The drafting team began work on proposed Reliability Standards IRO-018-1 and TOP-010-1 in August 2015. Following two comment and ballot periods, the proposed standards were approved by the ballot pool in February 2016. The NERC Board of Trustees adopted the proposed standards on May 5, 2016.

#### IV. **JUSTIFICATION**

As discussed in **Exhibit C** and below, proposed Reliability Standards IRO-018-1 and TOP-010-1 satisfy the Reliability Standards criteria, and are just, reasonable, not unduly discriminatory or preferential, and in the public interest.

Maintaining adequate situational awareness is essential for the reliable operation of the Bulk Power System. As described in the 2008 RTBP Task Force Report, situational awareness



means “ensuring that accurate information on current system conditions, including the likely effects of future contingencies, is continuously available in a form that allows operators to quickly grasp and fully understand actual operating conditions and take corrective action when necessary to maintain or restore reliable operations.”<sup>28</sup> Situational awareness may be thought of as encompassing two broad capabilities: monitoring and analysis. To be effective in support of situational awareness, Real-time monitoring and analysis must:

- be performed with sufficient frequency to allow operators to understand operating conditions and take corrective actions when necessary;
- provide awareness of information quality to allow operators to assess the accuracy of information being received on system conditions and take corrective actions when necessary; and
- indicate when monitoring or analysis processes are not operating normally or are unavailable in order to provide operator awareness of the accuracy of the information being provided.<sup>29</sup>

The existing Reliability Standards, including the revised TOP and IRO Reliability Standards and revised definition of Real-time Assessment, provide rigorous requirements for performing Real-time monitoring and analysis to support the reliable operation of the Bulk Power System. However, reliability would be improved by instituting requirements to provide operator awareness of monitoring, alarming, and analysis quality and tool availability to perform as intended. Proposed Reliability Standards IRO-018-1 and TOP-010-1 support effective Real-time monitoring and analysis and thereby enhance reliable operations by ensuring that:

- operators are provided with indications of the quality of information being provided by monitoring and analysis capabilities;
- applicable entities have procedures in place to identify and address high-priority data and analysis quality issues; and
- operators receive notifications during unplanned loss of alarming capabilities.

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<sup>28</sup> 2008 RTBP Task Force Report at 3.

<sup>29</sup> *See* Ex. F (Standard Authorization Request Justification, Project 2009-02) at 10.

In this section, NERC: (i) describes how the proposed Reliability Standards complement the revised TOP and IRO Reliability Standards and definitions submitted on March 25, 2015, and approved by FERC in Order No. 817 to improve Real-time situational awareness;<sup>30</sup> (ii) discusses the requirements of the proposed standards on a requirement-by-requirement basis; and (iii) explains how the proposed standards address the report recommendations and FERC directives related to Real-time monitoring and awareness capabilities.

**A. Overview of Requirements Relating to Real-time Monitoring and Analysis Capabilities**

Real-time monitoring, or monitoring the Bulk Electric System in Real-time, is a primary function of Reliability Coordinators, Transmission Operators, and Balancing Authorities as required by TOP and IRO Reliability Standards. As used in TOP and IRO Reliability Standards, monitoring involves observing operating status and operating values in Real-time for awareness of system conditions. Real-time monitoring may include the following activities performed in Real-time:

- Acquisition of operating data;
- Display of operating data as needed for visualization of system conditions;
- Audible or visual alerting when warranted by system conditions; and
- Audible or visual alerting when monitoring and analysis capabilities degrade or become unavailable.

Requirements for the Reliability Coordinator, Transmission Operator, and Balancing Authority to perform Real-time monitoring are specified in Reliability Standards IRO-002-4<sup>31</sup>

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<sup>30</sup> Requirements for Real-time monitoring and analysis are also contained in currently-effective Reliability Standards which are pending retirement under the Project 2014-03 implementation plan. Please refer to Exhibit E (Consideration of Directives) for the currently-effective requirements.

<sup>31</sup> See IRO-002-4 Requirement R3:

Each Reliability Coordinator shall monitor Facilities, the status of Special Protection Systems, and non-BES facilities identified as necessary by the

(Reliability Coordinator); TOP-001-3<sup>32</sup> (Transmission Operator); and TOP-001-3<sup>33</sup> and the BAL standards (Balancing Authority).

The analysis component of Real-time situational awareness is described by the revised definition of Real-time Assessment:

**Real-time Assessment**

An evaluation of system conditions using Real-time data to assess existing (pre-Contingency) and potential (post-Contingency) operating conditions. The assessment shall reflect applicable inputs including, but not limited to: load, generation output levels, known Protection System and Special Protection System status or degradation, Transmission outages, generator outages, Interchange, Facility Ratings, and identified phase angle and equipment limitations. (Real-time Assessment may be provided through internal systems or through third-party services.)

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Reliability Coordinator, within its Reliability Coordinator Area and neighboring Reliability Coordinator Areas to identify any System Operating Limit exceedances and to determine any Interconnection Reliability Operating Limit exceedances within its Reliability Coordinator Area.

<sup>32</sup> See TOP-001-3 Requirement R10:

R10. Each Transmission Operator shall perform the following as necessary for determining System Operating Limit (SOL) exceedances within its Transmission Operator Area:

10.1. Within its Transmission Operator Area, monitor Facilities and the status of Special Protection Systems, and

10.2. Outside its Transmission Operator Area, obtain and utilize status, voltages, and flow data for Facilities and the status of Special Protection Systems.

<sup>33</sup> See TOP-001-3 Requirement R11:

R11. Each Balancing Authority shall monitor its Balancing Authority Area, including the status of Special Protection Systems that impact generation or Load, in order to maintain generation-Load-interchange balance within its Balancing Authority Area and support Interconnection frequency.

Requirements for the Reliability Coordinator to perform Real-time Assessments are specified in IRO-008-2,<sup>34</sup> and requirements for the Transmission Operator to perform Real-time Assessments are specified in TOP-001-3.<sup>35</sup>

The Reliability Coordinator uses a set of Real-time data identified in IRO-010-2 Requirement R1 to perform its Real-time monitoring and Real-time Assessments, whereas the Transmission Operator uses a set of Real-time data identified in TOP-003-3 Requirement R1. The Balancing Authority uses a set of Real-time data identified in TOP-003-3 Requirement R2 to perform its analysis functions and Real-time monitoring.

Proposed Reliability Standards IRO-018-1 and TOP-010-1 do not create new obligations to perform Real-time monitoring or analysis. Rather, the proposed standards build upon existing requirements to support effective Real-time monitoring and analysis and improved situational awareness and thereby enhance reliable operations. Proposed Reliability Standard IRO-018-1 is applicable to Reliability Coordinators. Proposed Reliability Standard TOP-010-1 contains Requirements which are applicable to Transmission Operators and Balancing Authorities.

## **B. Proposed Reliability Standard Requirements**

### **1. Requirements to Address Real-time Data Quality Issues: IRO-018-1 R1, TOP-010-1 R1, and TOP-010-1 R2**

As noted in the preceding section, existing Reliability Standards contain requirements to perform monitoring and Real-time Assessments. Proposed Reliability Standards IRO-018-1 Requirement R1, TOP-010-1 Requirement R1, and TOP-010-1 Requirement R2 build upon these

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<sup>34</sup> See IRO-008-2 Requirement R4:

Each Reliability Coordinator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.

<sup>35</sup> See revised definition of Real-time Assessment and TOP-001-3 Requirement R13:

Each Transmission Operator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.

requirements to support effective situational awareness by requiring each Reliability Coordinator, Transmission Operator, and Balancing Authority to implement an Operating Process<sup>36</sup> or Operating Procedure<sup>37</sup> to address the quality of the Real-time data necessary to perform its Real-time data monitoring and Real-time Assessments or analysis functions. Entities continue to address lower-priority data quality issues (i.e. data quality issues not affecting Real-time monitoring or analysis) according to their operating practices.

These requirements, along with the proposed requirements discussed in the subsequent sections, address recommendations from the 2008 RTBP Task Force Report by specifying monitoring and analysis capabilities for situational awareness. Further, the proposed requirements address the 2011 Southwest Outage Report's recommendation that entities should take measures to ensure the adequacy and operation of their Real-time tools.

The specific requirements are as follows.

IRO-018-1 Requirement R1, applicable to Reliability Coordinators, provides:

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<sup>36</sup> Operating Process is defined in the *Glossary of Terms Used in NERC Reliability Standards* ("Glossary") as:  
A document that identifies general steps for achieving a generic operating goal. An Operating Process includes steps with options that may be selected depending upon Real-time conditions. A guideline for controlling high voltage is an example of an Operating Process.

<sup>37</sup> Operating Procedure is defined in the Glossary as:  
A document that identifies specific steps or tasks that should be taken by one or more specific operating positions to achieve specific operating goal(s). The steps in an Operating Procedure should be followed in the order in which they are presented, and should be performed by the position(s) identified. A document that lists the specific steps for a system operator to take in removing a specific transmission line from service is an example of an Operating Procedure.

### **IRO-018-1**

**R1.** Each Reliability Coordinator shall implement an Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform its Real-time monitoring and Real-time Assessments. The Operating Process or Operating Procedure shall include: [*Violation Risk Factor: Medium*] [*Time Horizon: Real-time Operations*]

- 1.1. Criteria for evaluating the quality of Real-time data;
- 1.2. Provisions to indicate the quality of Real-time data to the System Operator; and
- 1.3. Actions to address Real-time data quality issues with the entity(ies) responsible for providing the data when data quality affects Real-time Assessments.

Proposed Reliability Standard TOP-010-1 Requirement R1 contains identical requirements applicable to Transmission Operators.

Similarly, proposed Reliability Standard TOP-010-1 Requirement R2 requires each Balancing Authority to implement an Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform its required analysis functions and Real-time monitoring as follows:

### **TOP-010-1**

**R2.** Each Balancing Authority shall implement an Operating Process or Operating Procedure to address the quality of the Real-time data necessary to perform its analysis functions and Real-time monitoring. The Operating Process or Operating Procedure shall include: [*Violation Risk Factor: Medium*] [*Time Horizon: Real-time Operations*]

- 2.1. Criteria for evaluating the quality of Real-time data;
- 2.2. Provisions to indicate the quality of Real-time data to the System Operator; and
- 2.3. Actions to address Real-time data quality issues with the entity(ies) responsible for providing the data when data quality affects its analysis functions.

The Operating Process or Operating Procedure required by proposed IRO-018-1 Requirement R1 and proposed TOP-010-1 Requirements R1 and R2 consists of three parts. First,

the Operating Process or Operating Procedure must contain criteria for evaluating the quality of Real-time data. As described in the Guidelines and Technical Basis section of the proposed standards, the criteria support identification of data quality issues, which may include: (i) data outside of a prescribed data range; (ii) analog data not updated within a predetermined time period; (iii) data entered manually to override telemetered information; or (iv) data otherwise identified as invalid or suspect.

Second, the Operating Process or Operating Procedure must include provisions for indicating the quality of Real-time data to operating personnel. To satisfy this requirement, the applicable entity could use descriptions of quality indicators such as display color codes, data quality flags, or other such indicators as found in Real-time monitoring specifications.

Third, the required Operating Process or Operating Procedure must include actions to address Real-time data quality issues affecting the Reliability Coordinator or Transmission Operator's Real-time Assessments, or in the case of the Balancing Authority, Real-time data quality issues affecting its analysis functions.

In drafting these requirements, the Project 2009-02 drafting team recognized that the applicable entity may have limited ability to resolve (or correct) bad or suspect data coming from a third party. Therefore, the proposed requirements provide applicable entities with the flexibility to determine which steps are appropriate to maintain adequate situational awareness. The actions an entity may take to address Real-time data quality issues could be the same as the process used to resolve data conflicts required by IRO-010-2 Requirement R3 Part 3.2 or TOP-003-3 Requirement R5 Part 5.2, provided that this process addresses Real-time data quality issues. Other examples of actions to address data quality issues include, but are not limited to: (i) notifying the entities that are providing the Real-time data; (ii) taking corrective actions on the

applicable entity's own data; (iii) changing data sources or other inputs so the data quality issue no longer affects Real-time Assessments; or (iv) entering data manually and updating as necessary.

2. Requirements to Address the Quality of Analysis used in Real-time Assessments: IRO-018-1 R2 and TOP-010-1 R3

Proposed Reliability Standards IRO-018-1 Requirement R2 and TOP-010-1 Requirement R3 ensure that Reliability Coordinators and Transmission Operators implement Operating Processes or Operating Procedures to address issues related to the quality of the analysis used in Real-time Assessments. As discussed above, requirements to perform Real-time Assessments appear in other Reliability Standards. Examples of the type of analysis used in Real-time Assessments may include state estimation, Real-time contingency analysis, stability analysis, or other studies used for Real-time Assessments.

Proposed IRO-018-1 Requirement R2, applicable to Reliability Coordinators, provides as follows:

**R2.** Each Reliability Coordinator shall implement an Operating Process or Operating Procedure to address the quality of analysis used in its Real-time Assessments. The Operating Process or Operating Procedure shall include: [*Violation Risk Factor: Medium*] [*Time Horizon: Real-time Operations*]

- 2.1.** Criteria for evaluating the quality of analysis used in its Real-time Assessments;
- 2.2.** Provisions to indicate the quality of analysis used in its Real-time Assessments; and
- 2.3.** Actions to address analysis quality issues affecting its Real-time Assessments.

Proposed Reliability Standard TOP-010-1 Requirement R3 contains identical requirements applicable to Transmission Operators.

These requirements have the same general structure as the proposed requirements for data quality issues. First, the Reliability Coordinator or Transmission Operator's Operating Process or



Operating Procedure must include criteria for evaluating the quality of analysis. Examples of the types of criteria that may be used to evaluate the quality of analysis include, but are not limited to, solution tolerances, correlation with Real-time data, or the number of contingencies analyzed from the set of potential contingencies.

Second, the Operating Process or Operating Procedure must describe how the quality of analysis results used in Real-time Assessments will be shown to operating personnel. Operating personnel includes System Operators and staff responsible for supporting Real-time operations.

Third, the Operating Process or Operating Procedure must include actions to address those analysis quality issues affecting its Real-time Assessments. Similar to the requirements for data quality issues, Reliability Coordinators and Transmission Operators have flexibility to determine the appropriate actions to take in situations where analysis quality issues are affecting their ability to perform Real-time Assessments.

3. Requirements for Alarm Processor Failure Monitoring: IRO-018-1 R3, TOP-010-1 R4

In the 2008 RTBP Task Force Report, the RTBP Task Force recommended developing a requirement to specify minimum availability of alarm tools (Recommendation S7). Proposed Reliability Standards IRO-018-1 Requirement R3 and TOP-010-1 Requirement R4 address the situational awareness objectives associated with this recommendation by providing for operator awareness when key alarming tools are not performing as intended.

Proposed Reliability Standard IRO-018-1 Requirement R3, applicable to Reliability Coordinators, states:

**R3.** Each Reliability Coordinator shall have an alarm process monitor that provides notification(s) to its System Operators when a failure of its Real-time monitoring alarm processor has occurred. [*Violation Risk Factor: Medium*] [*Time Horizon: Real-time Operations*]

Proposed TOP-010-1 Requirement R4 contains an identical requirement applicable to Transmission Operators and Balancing Authorities.

As specified in the Guidelines and Technical Basis section of the proposed Reliability Standards, the alarm process monitor should be designed and implemented such that a stall of the Real-time monitoring alarm processor does not cause a failure of the alarm process monitor. The proposed requirements provide applicable entities with flexibility to determine whether to use an alarm process monitor that is a separate system or an application within a Real-time monitoring system.

### **C. Consideration of FERC Directives**

As discussed in Section III.C above, FERC directed NERC in Order No. 693 to modify TOP and IRO Reliability Standards to require a minimum set of capabilities be made available to operators.<sup>38</sup> Although FERC contemplated modifications to specific Reliability Standards, NERC submits that proposed Reliability Standards IRO-018-1 and TOP-010-1, together with other currently-effective and Reliability Standards, address the reliability concerns underlying FERC's directives in an equally effective and efficient manner, as set forth below.

#### **1. Order No. 693 P 905 Directive**

In Order No. 693, FERC directed NERC to modify IRO-002-1 to develop a requirement that identifies the minimum capabilities that must be made available to the Reliability Coordinator to ensure "that a reliability coordinator has the tools it needs to perform its functions."<sup>39</sup> The monitoring and analysis capabilities required by proposed Reliability Standard

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<sup>38</sup> Order No. 693 at P 905-906 (directing NERC to modify IRO-002-1) and P 1660 (directing NERC to modify TOP-006-1).

<sup>39</sup> Order No. 693 at P 905.

IRO-018-1 and other IRO Reliability Standards ensure Reliability Coordinators have the capabilities to maintain Real-time situational awareness.

***Monitoring capabilities.*** Requirements for the Reliability Coordinator to perform Real-time monitoring are specified in Reliability Standard IRO-002-4.<sup>40</sup> As discussed in the preceding section, proposed Reliability Standard IRO-018-1 Requirement R1 addresses the quality of the Real-time data needed by the Reliability Coordinator to perform its monitoring and Real-time Assessments by requiring each Reliability Coordinator to implement a documented procedure to address data quality issues. Proposed IRO-018-1 Requirement R3 addresses capabilities for operator awareness of failures in Real-time monitoring alarm processes by requiring Reliability Coordinators to have an alarm process monitor.

***Analysis Capabilities.*** Requirements for the Reliability Coordinator to perform Real-time Assessments are specified in Reliability Standard IRO-008-2 and the approved revised definition of Real-time Assessment. Under proposed Reliability Standard IRO-018-1 Requirement R2, each Reliability Coordinator is required to implement a documented procedure to address the quality of the analysis used in its Real-time Assessments.

## 2. Order No. 693 P 1660 Directive

In Order No. 693, FERC directed NERC to develop a modification to Reliability Standard TOP-006-1 related to the provision of a minimum set of analytical tools (i.e. capabilities) “that are necessary to enable operators to deal with real-time situations and to ensure reliable operation of the Bulk-Power System.”<sup>41</sup> As discussed below, the monitoring and analysis capabilities required by proposed TOP-010-1 and other TOP Reliability Standards

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<sup>40</sup> As noted above, please refer to Exhibit E (Consideration of Directives) for the currently-effective requirements for Real-time monitoring and analysis.

<sup>41</sup> Order No. 693 at P 1660.

ensure that Transmission Operators and Balancing Authorities have the capabilities to maintain Real-time situational awareness and thus address FERC’s directive in an equally effective and efficient manner.

***Monitoring Capabilities.*** Requirements for Transmission Operators and Balancing Authorities to perform Real-time monitoring are specified in Reliability Standard TOP-001-3 and the BAL Reliability Standards. As discussed in the preceding section, proposed Reliability Standard TOP-010-1 Requirements R1 and R2 address the quality of the Real-time data needed by Transmission Operators and Balancing Authorities to perform their Real-time monitoring and Real-time Assessments or analysis functions by requiring these entities to implement a documented procedure for addressing data quality issues. Proposed Reliability Standard TOP-010-1 Requirement R4 addresses capabilities for operator awareness of failures in Real-time monitoring alarm processes by requiring Transmission Operators and Balancing Authorities to have an alarm process monitor.

***Analysis Capabilities.*** Requirements for the Transmission Operator to perform Real-time Assessments are specified in Reliability Standard TOP-001-3. Under proposed Reliability Standard TOP-010-1 Requirement R3, each Transmission Operator is required to implement a documented procedure to address the quality of the analysis used in its Real-time Assessments.

### 3. Order No. 693 P 1875 Directive

In addition to the two directives discussed above, FERC also directed NERC to modify Reliability Standard VAR-001-1 to “to include Requirements to perform voltage stability analysis periodically, using online techniques where commercially-available, and offline simulation tools where online tools are not available, to assist real-time operations.”<sup>42</sup>

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<sup>42</sup> Order No. 693 at P 1875.

This directive was considered in establishing the scope of Project 2009-02. However, NERC maintains that this directive has now been addressed by other TOP, IRO, and VAR standards. Accordingly, Project 2009-02 did not develop additional requirements to address this directive. The concerns underlying this directive have been addressed in an equally effective and efficient manner through the framework provided by these other standards.

Reliability Standard VAR-001 was most recently revised in Project 2013-04 Voltage & Reactive Control.<sup>43</sup> Reliability Standard VAR-001-4.1 Requirement R1 provides that the Transmission Operator shall specify a system voltage schedule as part of its plan to operate within System Operating Limits (“SOLs”) and Interconnection Reliability Operating Limits (“IROLs”). Reliability Standard VAR-001-4.1 does not include an explicit requirement for periodic performance of voltage stability analysis because “such analysis would be performed pursuant to the SOL methodology developed under FAC standards.”<sup>44</sup>

Reliability Coordinators and Transmission Operators are required to periodically perform Real-time Assessments consisting of an evaluation of system conditions “to assess existing (pre-Contingency) and potential (post-Contingency) operating conditions.”<sup>45</sup> Requirements for performing Real-time Assessments are contained in currently-effective Reliability Standard IRO-008-1 and Reliability Standards IRO-008-2 and TOP-001-3 as discussed above. Real-time Assessments assist operators in maintaining operations within established SOLs and IROLs, to include voltage stability criteria. Under these requirements, applicable entities must use whatever analysis is necessary to obtain an evaluation of system conditions, which may include Real-time

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<sup>43</sup> Reliability Standard VAR-001-4 was approved by FERC in Docket No. RD14-11-000. *See N. Am. Elec. Reliability Corp.* (Aug. 1, 2014) (unpublished letter order). FERC approved the currently-effective errata version VAR-001-4.1 in Docket No. RD15-6-000. *See N. Am. Elec. Reliability Corp.* (Nov. 13, 2015) (unpublished letter order). NERC submitted the VAR-001 standard on June 12, 2014.

<sup>44</sup> Reliability Standard VAR-001-4.1, Guidelines and Technical Basis.

<sup>45</sup> *See* revised definition of Real-time Assessment.

voltage stability analysis. These requirements do not prescribe the use of specific techniques or tools.

In light of the comprehensive and flexible framework that is now in place, NERC submits that FERC's underlying concern from Order No. 693 has been addressed, and that it is no longer necessary to modify the VAR-001 Reliability Standard to specifically require the performance of voltage stability analysis using online techniques when available or offline simulation tools when not available.

#### **D. 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 VRFs and VSLs 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 D**. Below, NERC provides additional detail to explain how the proposed VRF assignments meet these guidelines.

Each of the Requirements in proposed Reliability Standards IRO-018-1 and TOP-010-1 were assigned a “Medium” VRF. Under NERC's criteria for VRFs, a Medium Risk Requirement is defined as follows:

A requirement that, if violated, could directly affect the electrical state or the capability of the Bulk Electric System, or the ability to effectively monitor and control the Bulk Electric System. However, violation of a medium risk requirement is unlikely to lead to Bulk Electric System instability, separation, or cascading failures; or, a requirement in a planning time frame that, if violated, could, under

emergency, abnormal, or restorative conditions anticipated by the preparations, directly and adversely affect the electrical state or capability of the Bulk Electric System, or the ability to effectively monitor, control, or restore the Bulk Electric System. However, violation of a medium risk requirement is unlikely, under emergency, abnormal, or restoration conditions anticipated by the preparations, to lead to Bulk Electric System instability, separation, or cascading failures, nor to hinder restoration to a normal condition.

FERC has set forth several guidelines for evaluating proposed VRFs.<sup>46</sup> First, for Reliability Standard Requirements addressing areas identified in the August 2003 Blackout Report as causes of previous blackouts, FERC looks to determine whether the assigned VRFs “appropriately reflect their historical critical impact on the reliability of the Bulk Power System.” Second, FERC looks to whether the assigned VRFs are consistent within the Reliability Standard. Third, FERC evaluates whether the assigned VRFs are consistent among other Reliability Standards with similar Requirements. Fourth, FERC evaluates whether the proposed VRF assignments are consistent with NERC’s definition of the VRF level. Lastly, where a single Requirement co-mingles higher and lower risk reliability objectives, FERC evaluates whether the VRF has been “watered down” to reflect the lower risk level.

Under these guidelines, NERC’s proposed assignment of “Medium” VRFs for the proposed Reliability Standard Requirements is appropriate. First, the proposed Requirements are not directly connected to the conclusions or critical areas identified in the August 2003 Blackout Report, but rather address specific recommendations from a NERC technical committee. With respect to the final guideline, the proposed VRF assignments do not reflect the lower of multiple reliability objectives as each requirement contains one reliability objective. With respect to the second, third, and fourth guidelines, the proposed VRF assignments are consistent within the

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<sup>46</sup> See *N. Am. Electric Reliability Corp., Order on Violation Risk Factors*, 119 FERC ¶ 61,145 (2007).

proposed Reliability Standards, among other Reliability Standards with similar Requirements, and with the NERC definition of the VRF level, as discussed below.

The proposed Medium VRF assignments are consistent with the NERC definition. The purpose of the proposed Reliability Standards is to address recommendations regarding Real-time situational awareness and to require entities to take steps to address data or analysis quality concerns to the extent that it affects their ability to perform Real-time monitoring and analysis. The requirements in IRO-018-1 and TOP-010-1 address issues related to the quality and availability of monitoring and analysis capabilities used by Reliability Coordinators, Transmission Operators, and Balancing Authorities in maintaining reliable operations. Violation of any of these requirements could directly affect the ability to effectively monitor and control the Bulk Electric System. However, violation of any of these requirements is unlikely to lead to Bulk Electric System instability, separation, or cascading failures.

Further, NERC's proposed assignment of Medium VRFs is both consistent within the proposed Reliability Standards, which contain similar responsibilities for different applicable entities, and with other Reliability Standards that involve effective monitoring and control of the Bulk Electric System. For example, Reliability Standards TOP-003-3 Requirement 5 and IRO-010-2 Requirement R3, which provide that applicable entities shall provide the data necessary for Transmission Operators and Reliability Coordinators to perform Real-time monitoring and Real-time Assessments, have each been assigned a Medium VRF. Reliability Standard TOP-001-3 Requirement R9, which requires Transmission Operators and Balancing Authorities to notify Reliability Coordinators and others of planned and unplanned outages of monitoring and assessment capabilities, has also been assigned a Medium VRF.<sup>47</sup>

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<sup>47</sup> In addition, NERC's proposed VRF assignments are appropriate in light of the VRF assignments for related Reliability Standards. The proposed requirements relate to implementing Operational Processes or Operational



In addition to the proposed VRFs and VSLs, the proposed Reliability Standards also include Measures that support each 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**

NERC respectfully requests approval of the proposed implementation plan attached to this filing as **Exhibit B**. NERC proposes a single implementation plan, to govern implementation of both proposed Reliability Standards IRO-018-1 and TOP-010-1. Under this plan, the proposed Reliability Standards would become effective the first day of the first calendar quarter that is 18 months following regulatory approval or as otherwise provided for in a jurisdiction where approval by an applicable governmental authority is required for a standard to go into effect. Where approval by an applicable governmental authority is not required, all Requirements shall become effective on the first day of the first calendar quarter that is 18 months after the date the standards are adopted by the NERC Board of Trustees or as otherwise provided for in that jurisdiction.

The proposed implementation period is designed to allow applicable entities sufficient time to develop and implement the required Operating Processes or Procedures and, if necessary, implement any upgrades to their Real-time monitoring systems.

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Procedures to address Real-time data quality and analysis issues. The actual Requirements to perform Real-time Assessments have been assigned a High VRF. *See, e.g.*, TOP-001-3 Requirement 13. Requirements to maintain data specifications for the data needed to perform Real-time monitoring and Real-time Assessments have been assigned a Low VRF. *See, e.g.*, TOP-003-3 Requirement R1.

Respectfully submitted,

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**EXHIBITS A-B AND E-I**

(Available on the NERC Website at

*[http://www.nerc.com/FilingsOrders/ca/Canadian%20Filings%20and%20Orders%20DL/IRO-018-1%20and%20TOP-010-1\\_exhibits.pdf](http://www.nerc.com/FilingsOrders/ca/Canadian%20Filings%20and%20Orders%20DL/IRO-018-1%20and%20TOP-010-1_exhibits.pdf)*)

## Exhibit C

### Reliability Standards Criteria

The discussion below explains how the proposed Reliability Standards have 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 proposed Reliability Standards achieve specific reliability goals via sound methods. Proposed Reliability Standards IRO-018-1– Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities and TOP-010-1– Real-time Reliability Monitoring and Analysis Capabilities establish requirements for Real-time monitoring and analysis capabilities to support reliable System operations. Reliability Standard IRO-018-1 addresses issues related to the quality and availability of Reliability Coordinator (RC) monitoring and analysis capabilities. Reliability Standard TOP-010-1 contains similar proposed requirements for Transmission Operators (TOPs) and Balancing Authorities (BAs).

Existing Reliability Standards contain functional requirements to perform Real-time monitoring and analysis. However, reliability would be improved by instituting requirements to provide operator awareness of monitoring, alarming, and analysis quality and tool availability to perform as intended.

Proposed Reliability Standards IRO-018-1 and TOP-010-1 would support effective Real-time monitoring and analysis and thereby enhance reliable operations by ensuring that: (i) operators are provided with indications of the quality of information being provided by monitoring and analysis capabilities; (ii) entities have procedures in place to identify and address high-priority data and analysis quality issues; and (iii) operators receive notifications during unplanned loss of alarming capabilities.

- 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.**

Proposed Reliability Standard IRO-018-1 applies to Reliability Coordinators and is clear and unambiguous as to what is required and who is required to comply. The requirements clearly state who is required to comply with the standard.

Proposed Reliability Standard TOP-010-1 applies to Transmission Operators and Balancing Authorities and is clear and unambiguous as to what is required and who is required to comply. The requirements clearly state who is required to comply with the standard.

- 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 (“VRF”) and Violation Severity Levels (“VSL”) for each of the proposed standards 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 and the VSLs should ensure uniformity and consistency in the determination of penalties. The VSLs 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 contain 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 ensure that the

requirements will be enforced in a clear, consistent, and non-preferential manner and without prejudice to any party.

**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 the reliability goals effectively and efficiently. The proposed Reliability Standards address specific recommendations from a NERC technical committee relating to Real-time monitoring and analysis capabilities as well as certain FERC directives from Order No. 693.

The proposed Reliability Standards are technology neutral and complement existing functional requirements for Real-time monitoring and analysis contained in the TOP and IRO Reliability Standards approved by FERC in Order No. 817. Proposed Reliability Standards IRO-018-1 and TOP-010-1 would improve Real-time situational awareness capabilities and thereby enhance reliable operations by requiring Reliability Coordinators, Transmission Operators, and Balancing Authorities to provide operators with awareness of monitoring and analysis capabilities, including alarm availability, so they may take appropriate steps to protect reliability.

The proposed standards would accomplish this as follows. First, the proposed standards would require entities to provide notification to operators of Real-time monitoring alarm failures. Second, the proposed standards would require entities to implement Operating Processes or Operating Procedures to: (i) provide operators with indication(s) of the quality of information being provided by their monitoring and analysis capabilities; and (ii) address deficiencies in the quality of information being provided by their monitoring and analysis capabilities. The proposed standards thus achieve their stated reliability goals effectively and efficiently.

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 proposed Reliability Standards complement the rigorous functional requirements for Real-time monitoring and analysis in existing Reliability Standards by requiring applicable entities to provide operators with awareness of monitoring and analysis capabilities, including alarm availability, so they may take appropriate steps to protect reliability.

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 do not restrict the available 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 standards against

the reasonableness of the time allowed for those who must comply to develop necessary procedures, software, facilities, staffing or other relevant capability.

The proposed 18 month implementation period for both Reliability Standards will allow applicable entities adequate time to ensure compliance with the requirements, including time to implement any upgrades to their Real-time monitoring systems. The proposed effective dates are explained 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 and definitions were developed in accordance with NERC's ANSI- accredited processes for developing and approving Reliability Standards.

**Exhibit H** includes a summary of the Reliability Standard development proceedings, and details the processes followed to develop the standard.

These processes included, among other things, multiple comment periods, pre-ballot review periods, and balloting periods. Additionally, all meetings of the drafting team were properly noticed and open to the public. The additional and final ballots both achieved a quorum and exceeded the required ballot pool approval levels.



**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 these proposed Reliability Standards. No comments were received that indicated the proposed Standards conflict with other vital public interests.

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

No other negative factors relevant to whether the proposed Reliability Standards are just and reasonable were identified.