

**NERC**

NORTH AMERICAN ELECTRIC  
RELIABILITY CORPORATION

# Standards Authorization Request Justification

Project 2009-02 Real-time  
Monitoring and Analysis  
Capabilities

RELIABILITY | ACCOUNTABILITY



3353 Peachtree Road NE  
Suite 600, North Tower  
Atlanta, GA 30326  
404-446-2560 | [www.nerc.com](http://www.nerc.com)

# Table of Contents

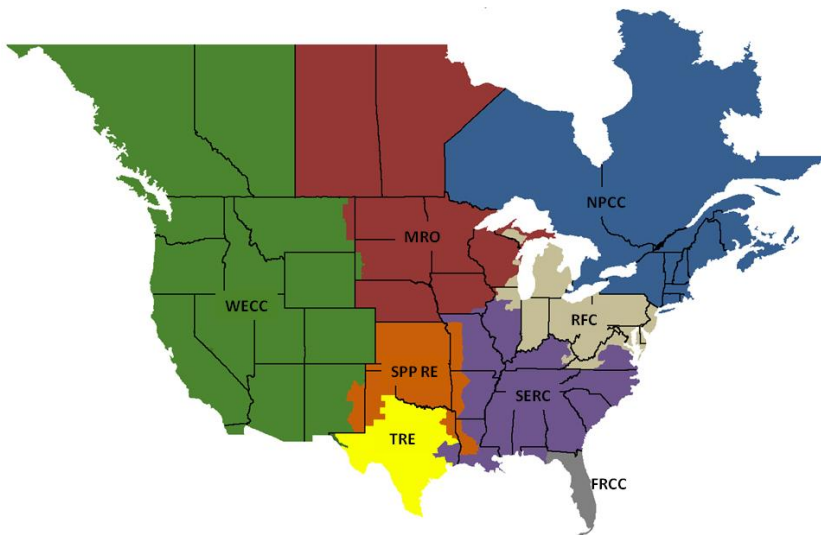
---

Table of Contents .....	2
Preface.....	3
Introduction.....	4
Chapter 1 – Background .....	5
BES Event Reports.....	5
2003 Blackout Report.....	5
2011 Southwest Outage Report.....	6
FERC Directives .....	7
Independent Experts Review Project (IERP) Report .....	7
Proposed TOP and IRO Standards.....	7
Technical Conference.....	8
Chapter 2 – Project Scope .....	9
Project Purpose and Approach .....	9
Real-time Situational Awareness Concept.....	10
Appendix – Report Recommendations.....	<del>1312</del>

## Preface

The North American Electric Reliability Corporation (NERC) is a not-for-profit international regulatory authority whose mission is to ensure the reliability of the Bulk-Power System (BPS) in North America. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the BPS through system awareness; and educates, trains, and certifies industry personnel. NERC’s area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the electric reliability organization (ERO) for North America, subject to oversight by the Federal Energy Regulatory Commission (FERC) and governmental authorities in Canada. NERC’s jurisdiction includes users, owners, and operators of the BPS, which serves more than 334 million people.

The North American BPS is divided into several assessment areas within the eight Regional Entity (RE) boundaries, as shown in the map and corresponding table below.



<b>FRCC</b>	Florida Reliability Coordinating Council
<b>MRO</b>	Midwest Reliability Organization
<b>NPCC</b>	Northeast Power Coordinating Council
<b>RFC</b>	ReliabilityFirst Corporation
<b>SERC</b>	SERC Reliability Corporation
<b>SPP RE</b>	Southwest Power Pool Regional Entity
<b>TRE</b>	Texas Reliability Entity
<b>WECC</b>	Western Electric Coordinating Council

# Introduction

---

In April 2015, the Standards Committee appointed a new Standards Authorization Request (SAR) Drafting Team (SAR DT) for Project 2009-02 Real-time Monitoring and Analysis Capabilities. This project originated in 2009 in response to work done by the NERC Operating Committee's Real-time Tools Best Practices Task Force (RTBPTF). Several new Reliability Standards and defined terms have been approved or filed for approval in the years since Project 2009-02 was initiated, including the standards developed in Project 2014-03 Revisions to TOP and IRO Standards. As a result, many of the original issues identified by the RTBPTF for Project 2009-02 have been addressed. In addition, relevant observations and recommendations have emerged from more recent events on the Bulk Electric System (BES) and operating practices have evolved over time. The SAR DT has reviewed previous work done in Project 2009-02, new standards and defined terms, relevant industry report findings and recommendations including those contained in the 2011 Southwest Outage report, and industry observations and practices relevant to real-time situational awareness to assist in developing a comprehensive SAR.

This white paper describes the SAR DT's approach to developing the SAR and discusses the technical basis for developing Reliability Standards in Project 2009-02. This white paper and the associated SAR together are intended to fully describe the project purpose, industry need, and project scope.

# Chapter 1 – Background

---

FERC Order No. 693<sup>1</sup> highlights the need for a minimum set of capabilities to be available to assist operators in making real-time decisions. The work done by the RTBPTF, which was formed by NERC in response to the *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations*, became the basis for the Real-time Monitoring and Analysis Capabilities (RTMAC) standards development project when it was initiated in 2009. Although Reliability Standards affecting the operating reliability of the Bulk Electric System (BES) have improved significantly over the years since first becoming mandatory in 2007, a reliability issue has persisted in the area of real-time situational awareness capabilities as highlighted in BES event reports and an independent review of the NERC Reliability Standards. A review of industry reports and recommendations pertaining to real-time monitoring and analysis capabilities is provided in this document and in the Appendix. These recommendations, along with the FERC Order No. 693 directives, describe the industry need for the current RTMAC standards project.

## BES Event Reports

Project 2009-02, like some other Reliability Standards projects, is informed by the lessons learned from past outages. The two significant outages discussed below highlight issues in real-time situational awareness, among other reliability concerns. Many Communications (COM), Transmission Operations (TOP), and Interconnection Reliability Operations (IRO) standards have addressed event report recommendations to improve the way the BES is planned and operated. The scope of Project 2009-02 is intended to include remaining recommendations from the 2003 Blackout Report and the 2011 Southwest Outage Report that pertain to real-time monitoring and analysis capabilities.

## 2003 Blackout 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 U.S. and the Canadian province of Ontario. Severe impacts to electrical service lasted for nearly one week and an estimated 50 million people were affected. A comprehensive investigation conducted by U.S. and Canadian government and industry leaders identified a host of principal and contributing causes, including:

- Failure to maintain adequate reactive power support,
- Failure to ensure operation within secure limits,
- Inadequate vegetation management,
- Inadequate operator training,
- Failure to identify emergency conditions and communicate that status to neighboring systems, and
- Inadequate regional-scale visibility over the Bulk-Power System (BPS).

Among other causes, the 2003 blackout was linked to dysfunction of SCADA/EMS systems. Additionally, investigators pointed out that several deficiencies leading to the 2003 blackout were also identified weaknesses in previous outages, indicating the need for more effective response. Previous post-event reports included recommendations aimed at improving capabilities for visualizing changes to facilities within the system, and for visualizing changes to facilities in neighboring systems that could have a potential impact. A recurring recommendation also focused on providing capabilities for operators to evaluate courses of action. These

---

<sup>1</sup> *Mandatory Reliability Standards for the Bulk-Power System*, Order No. 693, 72 Fed. Reg. 16416 at P 1660 (Apr. 4, 2007), FERC Stats. And Regs. ¶ 31,242, *order on reh'g*, Order No. 693-A, 120 FERC ¶ 61,053 (2007) (Order No. 693).

observations led to the recommendation in the final report of the 2003 blackout for NERC to **evaluate and adopt better real-time tools for operators and reliability coordinators.**<sup>2</sup>

In response, the NERC Operating Committee organized the RTBPTF to study the real-time situational awareness practices in use within the electric power industry and make recommendations concerning the establishment of minimum capabilities necessary for reliable operations. The RTBPTF report *Real-time Tools Survey Analysis and Recommendations*,<sup>3</sup> completed in 2008, is the result of extensive information gathering and analysis and includes recommendations for new or enhanced Reliability Standards, operating guides, and areas for further analysis. This report became a basis for initiating the Real-time Monitoring and Analysis Capabilities project in 2009.

Although exhaustive and comprehensive, some of the RTBPTF recommendations go beyond the scope of situational awareness monitoring and capabilities. In addition, many other recommendations have been addressed in other subsequent standards projects. The appendix provides a description of RTBPTF report recommendations and the SAR DT's determination of applicability within the scope of Project 2009-02.

An early Concept White Paper describing potential performance, availability, quality, and maintenance parameters based on the RTBPTF Report was developed in 2011. The SAR DT reviewed the white paper and confirmed that, due to significant changes to Reliability Standards and operating practices since it was drafted, the 2011 Concept White Paper is no longer relevant to the current effort in Project 2009-02.

### **2011 Southwest Outage Report**

Like the 2003 blackout in the northeast, the blackout that occurred in the southwest in September 2011 was partly due to, or exacerbated by, inadequate real-time situational awareness. 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. Inadequate operations planning was a significant factor in the failure to maintain a secure N-1 state. However, the report also highlighted several concerns with entities and their ability to monitor, identify, and plan for the next most critical contingency in real-time.<sup>4</sup>

Project 2014-03 - Revisions to TOP and IRO Standards addressed many of the recommendations contained in the 2011 Southwest Outage Report related to operations planning and real-time situational awareness. A complete description is provided in the Southwest Outage Report mapping document for Project 2014-03.<sup>5</sup> Revised definitions and performance requirements for Real-time Assessments and Operational Planning Analysis and proposed requirements for developing and implementing Operating Plans to prevent and mitigate operating limit exceedances address most of the real-time situational awareness recommendations from the report. However some recommendations contain aspects pertaining to real-time capabilities that should be considered in Project 2009-02, as described in the appendix. Accordingly, Project 2009-02 will develop requirements to address remaining recommendations as described in the following chapter.

---

<sup>2</sup> *Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations*, Recommendation 22, available at <http://www.nerc.com/pa/rrm/ea/2003%20Blackout%20Final%20Report/Forms/AllItems.aspx>.

<sup>3</sup> *Real-Time Tools Survey Analysis and Recommendations* (March 13, 2008), available at <http://www.nerc.com/comm/OC/Realtime%20Tools%20Best%20Practices%20Task%20Force%20RTBPTF%20/Real-Time%20Tools%20Survey%20Analysis%20and%20Recommendations.pdf>.

<sup>4</sup> *Arizona-Southern California Outages on September 8, 2011* (April 2012), available at [http://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/AZOutage\\_Report\\_01MAY12.pdf](http://www.nerc.com/pa/rrm/ea/September%202011%20Southwest%20Blackout%20Event%20Document%20L/AZOutage_Report_01MAY12.pdf).

<sup>5</sup> See the project page for 2014-03, available at <http://www.nerc.com/pa/stand/pages/project-2014-03-revisions-to-top-and-iro-standards.aspx>.

## FERC Directives

In approving the original TOP and IRO standards in Order No. 693, FERC directed future improvements that would require a minimum set of capabilities be made available to operators.<sup>6</sup> FERC indicated that the intent of the directive is to ensure operating entities have adequate tools to perform their real-time reliability functions.<sup>7</sup>

- P 905: *Further, consistent with the NOPR, the 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 this requirement will ensure that a reliability coordinator has the tools it needs to perform its functions.*
- P 906: *[t]he Commission clarifies that the Commission's intent is to have the ERO develop a requirement that identifies capabilities, not actual tools or products. The Commission agrees that the latter approach is not appropriate as a particular product could become obsolete and technology improves over time.*
- P 1660: *We adopt our proposal to require the ERO to develop a modification [to TOP standards] related to the provision of a minimum set of analytical tools. In response to LPPC and others, 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.*

## Independent Experts Review Project (IERP) Report

In 2013, NERC retained a team of five industry experts to assess the quality of the enforceable body of standards and make recommendations for improvements that could be implemented by NERC and the industry.<sup>8</sup> Among the recommendations made by the panel of experts was the identification of potential risks to reliability that may not be adequately addressed in Reliability Standards. The report recommended resuming development of the Real-time Monitoring and Analysis Capabilities standards project.

## Proposed TOP and IRO Standards

Since Project 2009-02 was initiated in 2009, many standards and definitions have been revised or developed that address real-time situational awareness issues. In particular, the revised TOP and IRO standards in Project 2014-03, which are pending regulatory approval, include key provisions for real-time situational awareness and operations planning. In reviewing the RTBPTF report recommendations for applicability in the current Project 2009-02 effort, the SAR DT considered the Project 2014-03 standards as noted in the Appendix.

The proposed TOP and IRO standards in Project 2014-03 provide requirements for performing monitoring and analysis through the definition of Real-time Assessment, Operational Planning Analysis, and the relevant requirements. Accordingly, additional requirements to perform monitoring or analysis will not be included in the scope for Project 2009-02. Furthermore, requirements for data exchange to support real-time monitoring and analysis will not be included in scope for Project 2009-02 because they are addressed through data specification requirements in IRO-010-1, proposed IRO-010-2, and proposed TOP-003-3.

<sup>6</sup> Order No. 693 at P 905 (approving IRO-002-1 and directing modifications) and P 1665 (approving TOP-006-1 and directing modifications).

<sup>7</sup> Additionally, in approving VAR-001-1 - Voltage and Reactive Control, the Commission directed NERC to develop modifications to the standard to require periodic performance of voltage stability analysis to assist in real-time operations. The commission clarified that this could be accomplished through online tools where available, or offline simulation tools.

- §1875: *...[w]e direct the ERO, through its Reliability Standards development process, ...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.*

VAR-001 was revised in the Project 2013-04, however the revised standard did not include a requirement for periodic performance of voltage stability analysis because voltage stability analysis is performed per SOL Methodology developed under FAC standards.

<sup>8</sup> See The Standards Independent Experts Review Project report. Available at [www.nerc.com](http://www.nerc.com)

[/pa/Stand/\\_layouts/xlviewer.aspx?id=/pa/Stand/Documents/P81\\_and%20IERP\\_Recommendations\\_for\\_Retirement\\_010815.xlsx](#).



## Technical Conference

NERC and the SAR DT held a Technical Conference in Atlanta on June 4, 2015, to obtain industry input on reliability issues to be addressed in the proposed project. Participant subject matter experts representing a diverse mix of regional and functional entities shared their perspectives on the use of real-time situational awareness capabilities for reliable operations. There was consensus that many RTBPTF recommendations have been addressed in current or proposed TOP and IRO standards. However, Technical Conference participants agreed that issues identified by the RTBPTF pertaining to availability and information quality of real-time monitoring and analysis capabilities were still relevant.



## Chapter 2 – Project Scope

The SAR DT has reviewed all recommendations from the RTBPTF and relevant recommendations from event reports, along with the existing body of standards, to identify remaining issues that should be in the scope for Project 2009-02. Table 1 below shows the resulting recommendations to be addressed. Additionally, the project will address outstanding FERC directives discussed in the preceding chapter.

Table 1: Report Recommendations to Address in Project 2009-02			
Source	Recommendation	Discussion	Applicable Entity
2003 Blackout Report	Recommendation 22 - Evaluate and adopt better real-time tools for operators and reliability coordinators.	Project 2009-02 will develop requirements for real-time reliability monitoring and analysis capabilities to address issues not already addressed in other Reliability Standards. RTBPTF report recommendations will be considered in development.	RC, TOP, BA
2011 Southwest Outage Report	Recommendation 12 - [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.	Project 2009-02 will develop requirements to improve the adequacy and operation of real-time monitoring and analysis capabilities. Requirements addressing the frequency that real-time tools run are contained in other standards and are not in the scope of this project.	RC, TOP, BA
RTBPTF Report	S1 - Mandate the following reliability tools as mandatory monitoring and analysis tools. <ul style="list-style-type: none"> <li>Alarm Tools</li> <li>Telemetry Data Systems</li> <li>Network Topology Processor</li> <li>State Estimator</li> <li>Contingency Analysis</li> </ul>	Project 2009-02 will address requirements for Real-time monitoring and analysis capabilities. Prescription of specific tools is not in scope. Project approach is discussed below.	RC, TOP, BA as discussed below
RTBPTF Report	S7 - S8, S11-S12, S40 - Availability of various monitoring and analysis capability processes	Project 2009-02 will address the recommendation from the RTBPTF report to provide operator awareness when key monitoring <del>and analysis</del> -capabilities are not available (i.e., not performing their intended function).	RC, TOP, BA

### Project Purpose and Approach

Project 2009-02 will develop requirements for real-time monitoring and analysis capabilities used by operators in support of reliable System operations. Functional requirements for performing *monitoring* and *analysis* tasks are well established in Reliability Standards as discussed throughout this white paper. However, reliability could be improved by:

- Developing a common understanding of *monitoring* as it applies to real-time situational awareness of the BES,
- Providing operators with indication(s) of the quality of information being provided by *monitoring* and *analysis* capabilities, and

- Providing operators with notification(s) during unplanned loss of *monitoring and analysis* capabilities.

Project 2009-02 will develop requirements and definition(s), as needed, to accomplish these reliability objectives as discussed.

### **Real-time Situational Awareness Concept**

From the RTBPTF Report:

*Situational awareness, as RTBPTF understands it, 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.*

The Project 2009-02 SAR DT believes that situational awareness encompasses two broad capabilities: monitoring and analysis. To be effective in supporting real-time situational awareness, 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.

Project 2009-02 will develop new requirements and definition(s), as needed, that support this concept of situational awareness without duplicating aspects that are already addressed in the existing and proposed body of Reliability Standards. As discussed in the preceding chapter, requirements for the Reliability Coordinator (RC), Transmission Operator (TOP), and Balancing Authority (BA) to perform monitoring and analysis are covered under existing and proposed TOP and IRO standards. Therefore, Project 2009-02 will focus on developing requirements to address information quality and operator awareness of real-time monitoring and analysis capabilities. Table 2 shows reliability objectives that should be addressed in requirements for this project.

### ***Monitoring***

*Monitoring* BES facilities in real-time is a primary function of the RCs, TOPs, and BAs and is addressed in existing and proposed TOP and IRO standards. For RCs, proposed IRO-002-4 states:

*R3. Each Reliability Coordinator shall monitor Facilities, the status of Special Protection Systems, and non-BES facilities identified as necessary by the 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.*

For TOPs and BAs, proposed TOP-001-3 states:

*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.*

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.

The SAR DT understands *monitoring* capabilities may include both alarming and information visualization. Project 2009-02 will aim to develop a consistent understanding of *monitoring* within the industry. The project will also address recommendations from Table 1 by developing requirements to ensure operators are provided with an indication of the quality of information being provided by a monitoring system, and indication when a monitoring system is not operating normally.

**Analysis**

The *analysis* component of the Real-time situational awareness concept is described by the definition of Real-time Assessment, which is pending FERC approval along with the proposed TOP and IRO standards. The proposed definition is as follows:

**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.)

Requirements for performing Real-time Assessments are contained in proposed IRO-008-2 and TOP-001-3:

**Proposed IRO-008-2**

R4. Each Reliability Coordinator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.

**Proposed TOP-001-3**

R13. Each Transmission Operator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.

The SAR DT believes the proposed definition of Real-time Assessment and the requirements in proposed IRO-008-2 and TOP-001-3 provide RCs and TOPs with 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. Consequently, prescriptive requirements for real-time tools are not in scope for Project 2009-02.

The project will address recommendations from Table 1 by developing requirements to ensure operators are provided with an indication of the quality of the analysis ~~provided by used in a Real-time Assessment~~ and ~~notification when Real-time Assessment capabilities are not available.~~

**Table 2: Project 2009-02 Reliability Objectives**

	Monitoring Capabilities	Analysis Capabilities
Quality	Provide operator with indication of information quality and procedures to address data quality issues.	Provide operator with indication of information quality and procedures to address analysis quality issues.

<b>Availability</b>	Provide operator with notification any time monitoring system is not operating normally.	<del>Provide operator with notification any time Real-time Assessment capabilities are not available.</del> <u>N/A</u>
---------------------	--	---

## Appendix – Report Recommendations

The table below contains recommendations for improved real-time situational awareness capabilities found in relevant industry reports and how these recommendations have been addressed, if applicable. If recommendations have not been addressed fully, the table includes a description of how they should be addressed in Project 2009-02. The following industry reports are considered here<sup>9</sup>:

- 2003 Blackout Final Report
- 2011 Southwest Outage Report
- Real-time Tools Best Practices Task Force

Report Recommendation Mapping	
Report Recommendation	Applicable Standard(s)
2003 Blackout Final Report	
<b>Recommendation 1-21, 23-46</b>	Report recommendations do not apply to Real-time reliability monitoring and analysis capabilities.
<b>Recommendation 22 - Evaluate and adopt better real-time tools for operators and reliability coordinators.</b> Operating Committee to evaluate the real-time operating tools necessary for reliability operation and reliability coordination, including backup capabilities. The committee’s report is to address both minimum acceptable capabilities for critical reliability functions and a guide to best practices.	The Operating Committee established the RTBPTF to evaluate real-time operating tools and make recommendations for proposed standards.  Project 2009-02 should consider these recommendations as discussed below.
2011 Southwest Outage Report	
<b>Recommendation 1-10, 13-26</b>	Report recommendations do not apply to Real-time reliability monitoring and analysis capabilities.
<b>Recommendation 11 - TOPs should review their real-time monitoring tools, such as State Estimator and RTCA, to ensure that such tools represent critical facilities needed for the reliable operation of the BPS.</b>	Project 2014-03 developed the proposed definition of Real-time Assessment and proposed TOP-003-3 Requirement R1 which describes the requirements for a data specification that will provide all of the data that a TOP needs in order to fulfill its reliability function. Together, these address capabilities and required data TOPs must have to ensure adequate situational awareness.  <b>Real-time Assessment</b> - 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.)  <b>Proposed TOP-003-3, Requirement R1, Part 1.1:</b>

<sup>9</sup> All industry reports are available on the 2009-02 Project Page: <http://www.nerc.com/pa/Stand/Pages/Project-2009-02-Real-time-Reliability-Monitoring-and-Analysis-Capabilities.aspx>.

	<p>A list of data and information needed by the Transmission Operator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data as deemed necessary by the Transmission Operator.</p>
<p><b>Recommendation 12 - TOPs 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.</b></p>	<p>Project 2014-03 developed a requirement for the performance of a Real-time Assessment for Transmission Operators.</p> <p>Standards developed in Project 2009-02 will address the adequacy of tools as described in this recommendation.</p> <p><b>Proposed TOP-001-3, Requirement R13:</b> Each Transmission Operator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</p>
<p><b>Recommendation 27 - TOPs should have: (1) the tools necessary to determine phase angle differences following the loss of lines; and (2) mitigation and operating plans for reclosing lines with large phase angle differences.</b></p>	<p>Proposed definitions of Real-time Assessment (RTA) and Operational Planning Analysis (OPA) developed in Project 2014-03 specify that identified phase angle limitations must be considered and deal with applying phase angle information. Proposed TOP-002 Requirement R2 specifies that TOPs must have an Operating Plan(s) for next-day operations to address potential SOL exceedances identified in the OPA. Data specification requirements in approved IRO-010-1, proposed IRO-010-2, and proposed TOP-003-3 provide a means for RCs and TOPs to obtain phase angle information.</p> <p><b>Proposed Definition: Operational Planning Analysis:</b> An evaluation of projected system conditions to assess anticipated (pre-Contingency) and potential (post-Contingency) conditions for next-day operations. The evaluation shall reflect applicable inputs including, but not limited to, load forecasts; generation output levels; Interchange; known Protection System and Special Protection System status or degradation; Transmission outages; generator outages; Facility Ratings; and identified phase angle and equipment limitations. (Operational Planning Analysis may be provided through internal systems or through third-party services.)</p> <p><b>Proposed Definition: Real-time Assessment:</b> 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.)</p> <p><b>Proposed TOP-002-4</b> R2. Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System</p>

	Operating Limit (SOL) exceedances identified as a result of its Operational Planning Analysis as required in Requirement R1.
RTBPTF Report	
<p><b>S1 - Mandate the following reliability tools as mandatory monitoring and analysis tools.</b></p> <ul style="list-style-type: none"> <li>• Alarm Tools</li> <li>• Telemetry Data Systems</li> <li>• Network Topology Processor</li> <li>• State Estimator</li> <li>• Contingency Analysis</li> </ul>	Project 2009-02 will address requirements for Real-time monitoring and analysis capabilities. However, prescription of specific tools is not in scope.
<p><b>S2 - Compile and maintain a list of all bulk electric system elements within RC’s area of responsibility.</b></p>	Not in scope. Reliability objective is accomplished through monitoring and analysis requirements as discussed below.
<p><b>S3 - Add new requirements and measures pertaining to RC monitoring of the bulk electric system.</b></p>	<p><del>Addresses</del> <u>Addressed</u> in IRO standards (current and proposed).</p> <p><b>IRO-002-2</b> R5. Each Reliability Coordinator shall monitor Bulk Electric System elements (generators, transmission lines, buses, transformers, breakers, etc.) that could result in SOL or IROL violations within its Reliability Coordinator Area. Each Reliability Coordinator shall monitor both real and reactive power system flows, and operating reserves, and the status of Bulk Electric System elements that are or could be critical to SOLs and IROLs and system restoration requirements within its Reliability Coordinator Area.</p> <p><b>IRO-003-2</b> R1. Each Reliability Coordinator shall monitor all Bulk Electric System facilities, which may include sub-transmission information, within its Reliability Coordinator Area and adjacent Reliability Coordinator Areas, as necessary to ensure that, at any time, regardless of prior planned or unplanned events, the Reliability Coordinator is able to determine any potential System Operating Limit and Interconnection Reliability Operating Limit violations within its Reliability Coordinator Area.</p> <p><b>Proposed IRO-002-4</b> R3. Each Reliability Coordinator shall monitor Facilities, the status of Special Protection Systems, and non-BES facilities identified as necessary by the 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.</p>
<p><b>S4 - Develop data-exchange standards.</b></p>	<p>Addressed in proposed TOP-001-3 and IRO-002-4.</p> <p><b>Proposed TOP-001-3</b> R19. Each Transmission Operator shall have data exchange capabilities with the entities that it has identified that it needs data from in order to maintain reliability in its Transmission Operator Area.</p>



	<p>R20. Each Balancing Authority shall have data exchange capabilities with the entities that it has identified that it needs data from in order to maintain reliability in its Balancing Authority Area.</p> <p><b>Proposed IRO-002-4</b>  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.</p>
<p><b>S5 - Develop data-availability standards and a process for trouble resolution and escalation.</b></p>	<p>Data availability and trouble resolution is addressed in IRO-010-1 and proposed IRO-010-2 and TOP-003-3.</p> <p><b>IRO-010-1</b>  R1. The Reliability Coordinator shall have a documented specification for data and information to build and maintain models to support Real-time monitoring, Operational Planning Analyses, and Real-time Assessments of its Reliability Coordinator Area to prevent instability, uncontrolled separation, and cascading outages. The specification shall include the following:  R1.1. List of required data and information needed by the Reliability Coordinator to support Real-Time Monitoring, Operational Planning Analyses, and Real-Time Assessments. ...</p> <p><b>Proposed TOP-003-3</b>  R1. Each Transmission Operator shall maintain a documented specification for the data necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include, but not be limited to:  1.1. A list of data and information needed by the Transmission Operator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data as deemed necessary by the Transmission Operator.  ...</p> <p><b>Proposed IRO-010-2</b>  R1. The Reliability Coordinator shall maintain a documented specification for the data necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include but not be limited to:  1.1. A list of data and information needed by the Reliability Coordinator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data, as deemed necessary by the Reliability Coordinator.</p>
<p><b>S6 - Develop a new weather data requirement related to situational awareness and real-time operational capabilities.</b></p>	<p>EOP-010-1 covers space weather dissemination. The SAR DT views monitoring other weather information as common utility practice that does not require a reliability standard.</p>
<p><b>S7 - Specify and measure minimum availability for alarm tools.</b></p>	<p>The RTBPTF recommended a requirement be developed to provide operator awareness when key monitoring and</p>

	<p>alarming tools are not performing their intended functions. Project 2009-02 will address the recommendation from the RTBPTF report to provide operator awareness when key monitoring <u>and</u>, <del>alarming,</del> <del>and analysis</del> tools are not available (i.e. not performing their intended function).  <u>Availability notification for analysis tools is addressed in IRO-008-1, and proposed IRO-008-2 proposed TOP-001-3 from Project 2014-30.</u></p> <p><b><u>IRO-008-1</u></b>  <u>R2. Each Reliability Coordinator shall perform a Real-Time Assessment at least once every 30 minutes to determine if its Wide Area is exceeding any IROs or is expected to exceed any IROs.</u></p> <p><b><u>Proposed IRO-008-2</u></b>  <u>R4. Each Reliability Coordinator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</u></p> <p><b><u>Proposed TOP-001-3</u></b>  <u>R13. Each Transmission Operator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</u></p>
<p><b>S8 - Specify and measure minimum availability for network topology processor.</b></p>	<p>The RTBPTF recommended a requirement be developed to provide operator awareness when key monitoring and alarming tools are not performing their intended functions. Project 2009-02 will address the recommendation from the RTBPTF report to provide operator awareness when key monitoring <u>and</u>, <del>alarming,</del> <del>and analysis</del> tools are not available (i.e. not performing their intended function).</p>
<p><b>S9 - Establish a uniform formal process to determine the “wide area view boundary” and show boundary data/results.</b></p>	<p>Wide-area is now a defined term. Recommendation has been addressed.</p>
<p><b>S10 - Develop compliance measures for verification of the usage of “wide-area overview display” visualization tools.</b></p>	<p>IRO standards revisions have addressed compliance measures.</p>
<p><b>S11 - Specify and measure minimum availability for state estimator, including a requirement for solution quality.</b></p>	<p>The RTBPTF recommended a requirement be developed to provide operator awareness when key monitoring and alarming tools are not performing their intended functions. Project 2009-02 will address the recommendation from the RTBPTF report to provide operator awareness when key monitoring <u>and</u>, <del>alarming,</del> <del>and analysis</del> tools are not available (i.e. not performing their intended function).</p>
<p><b>S12 - Specify and measure minimum availability for contingency analysis, including a requirement for solution quality.</b></p>	<p>The RTBPTF recommended a requirement be developed to provide operator awareness when key monitoring and alarming tools are not performing their intended functions. Project 2009-02 will address the recommendation to provide operator awareness when key monitoring, <u>and</u> <del>alarming,</del> <del>and analysis</del> tools are not available (i.e. not performing their intended function).</p>
<p><b>S13 - Specify criteria and develop measures for defining contingencies.</b></p>	<p>Not in scope; Addressed in approved TPL and FAC standards.</p>

<p><b>S14 - Perform one-hour-ahead power-flow simulations to assess approaching SOL and IROL violations and corresponding measures.</b></p>	<p>Requirements for assessing pre- and post-contingency system conditions are addressed in Real-time Assessment (RTA) and Operational Planning Analysis (OPA) definitions. Requirements for performing RTA and OPA are contained in proposed TOP-001-3, TOP-002-4, IRO-008-2, and approved IRO-008-1.</p> <p><b>Proposed TOP-002-4</b>  R2. Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) exceedances identified as a result of its Operational Planning Analysis as required in Requirement R1.</p> <p>R4. Each Balancing Authority shall have an Operating Plan(s) for the next-day that addresses:  4.1 Expected generation resource commitment and dispatch  4.2 Interchange scheduling  4.3 Demand patterns  4.4 Capacity and energy reserve requirements, including deliverability capability</p> <p><b>Proposed IRO-008-2</b>  R2. Each Reliability Coordinator shall have a coordinated Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) exceedances identified as a result of its Operational Planning Analysis as performed in Requirement R1 while considering the Operating Plans for the next-day provided by its Transmission Operators and Balancing Authorities.</p> <p>R4. Each Reliability Coordinator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</p> <p><b>Proposed TOP-001-3</b>  R13. Each Transmission Operator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</p> <p><b>IRO-008-1</b>  R2. Each Reliability Coordinator shall perform a Real-Time Assessment at least once every 30 minutes to determine if its Wide Area is exceeding any IROLs or is expected to exceed any IROLs.</p> <p><b>Proposed definition</b>  <b>Operational Planning Analysis</b> - An evaluation of projected system conditions to assess anticipated (pre-Contingency) and potential (post-Contingency) conditions for next-day operations. The evaluation shall reflect applicable inputs including, but not limited to, load forecasts; generation output levels; Interchange; known Protection System and</p>
---	---

	<p>Special Protection System status or degradation; Transmission outages; generator outages; Facility Ratings; and identified phase angle and equipment limitations. (Operational Planning Analysis may be provided through internal systems or through third-party services.)</p> <p><b>Proposed definition</b>  <b>Real-time Assessment</b> - 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.)</p>
<p><b>S15 - Provide real-time awareness of load-shed capability to address potential or actual IROL violations.</b></p>	<p>Addressed in proposed EOP-011-1, approved IRO-010-1 and proposed IRO-010-2 and TOP-003-3.</p> <p><b>Proposed EOP-011-1</b></p> <p>R1. Each Transmission Operator shall develop, maintain, and implement one or more Reliability Coordinator-reviewed Operating Plan(s) to mitigate operating Emergencies in its Transmission Operator Area. The Operating Plan(s) shall include the following, as applicable:</p> <ul style="list-style-type: none"> <li>1.1. Roles and responsibilities for activating the Operating Plan(s);</li> <li>1.2. Processes to prepare for and mitigate Emergencies including: <ul style="list-style-type: none"> <li>1.2.1. Notification to its Reliability Coordinator, to include current and projected conditions, when experiencing an operating Emergency;</li> <li>1.2.2. Cancellation or recall of Transmission and generation outages;</li> <li>1.2.3. Transmission system reconfiguration;</li> <li>1.2.4. Redispatch of generation request;</li> <li>1.2.5. Provisions for operator-controlled manual Load shedding that minimizes the overlap with automatic Load shedding and are capable of being implemented in a timeframe adequate for mitigating the Emergency; and</li> <li>1.2.6. Reliability impacts of extreme weather conditions.</li> </ul> </li> </ul> <p>R2. Each Balancing Authority shall develop, maintain, and implement one or more Reliability Coordinator-reviewed Operating Plan(s) to mitigate Capacity Emergencies and Energy Emergencies within its Balancing Authority Area. The Operating Plan(s) shall include the following, as applicable:</p> <ul style="list-style-type: none"> <li>2.1. Roles and responsibilities for activating the Operating Plan(s);</li> </ul>

	<p>2.2. Processes to prepare for and mitigate Emergencies including:</p> <p>2.2.1. Notification to its Reliability Coordinator, to include current and projected conditions when experiencing a Capacity Emergency or Energy Emergency;</p> <p>2.2.2. Requesting an Energy Emergency Alert, per Attachment 1;</p> <p>2.2.3. Managing generating resources in its Balancing Authority Area to address:</p> <p>2.2.3.1. capability and availability;</p> <p>2.2.3.2. fuel supply and inventory concerns;</p> <p>2.2.3.3. fuel switching capabilities; and</p> <p>2.2.3.4. environmental constraints.</p> <p>2.2.4. Public appeals for voluntary Load reductions;</p> <p>2.2.5. Requests to government agencies to implement their programs to achieve necessary energy reductions;</p> <p>2.2.6. Reduction of internal utility energy use;</p> <p>2.2.7. Use of Interruptible Load, curtailable Load and demand response;</p> <p>2.2.8. Provisions for operator-controlled manual Load shedding that minimizes the overlap with automatic Load shedding and are capable of being implemented in a timeframe adequate for mitigating the Emergency; and</p> <p>2.2.9. Reliability impacts of extreme weather conditions.</p> <p><b>IRO-010-1</b></p> <p>R1. The Reliability Coordinator shall have a documented specification for data and information to build and maintain models to support Real-time monitoring, Operational Planning Analyses, and Real-time Assessments of its Reliability Coordinator Area to prevent instability, uncontrolled separation, and cascading outages. The specification shall include the following:</p> <p>R1.1. List of required data and information needed by the Reliability Coordinator to support Real-Time Monitoring, Operational Planning Analyses, and Real-Time Assessments. ...</p> <p><b>Proposed TOP-003-3</b></p> <p>R1. Each Transmission Operator shall maintain a documented specification for the data necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include, but not be limited to:</p> <p>1.1. A list of data and information needed by the Transmission Operator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data as deemed necessary by the Transmission Operator.</p> <p>...</p> <p><b>Proposed IRO-010-2</b></p> <p>R1. The Reliability Coordinator shall maintain a documented specification for the data necessary for it to</p>
--	--

	<p>perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include but not be limited to:</p> <p>1.1. A list of data and information needed by the Reliability Coordinator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data, as deemed necessary by the Reliability Coordinator.</p>
<p><b>S16 - Require BAs to monitor contingency reserves and calculate contingency reserves at a minimum periodicity of 10 seconds.</b></p>	<p>BA responsibilities for managing Contingency Reserve are addressed in the approved BAL-002-1 standard which is under revision in Project 2010-014. 1.</p> <p><b>BAL-002-1</b></p> <p>R1. Each Balancing Authority shall have access to and/or operate Contingency Reserve to respond to Disturbances. Contingency Reserve may be supplied from generation, controllable load resources, or coordinated adjustments to Interchange Schedules.</p>
<p><b>S17 - Revise the current-day operations requirements to delineate specific, independent requirements for monitoring operating and reactive reserves.</b></p>	<p>Addressed in VAR-001-4, BAL-002, and proposed IRO-002-4 and TOP-001-3.</p> <p><b>VAR-001-4</b></p> <p>R4. Each Transmission Operator shall operate or direct the Real-time operation of devices to regulate transmission voltage and reactive flow as necessary.</p> <p><b>BAL-002-1</b></p> <p>R1. Each Balancing Authority shall have access to and/or operate Contingency Reserve to respond to Disturbances. Contingency Reserve may be supplied from generation, controllable load resources, or coordinated adjustments to Interchange Schedules.</p> <p><b>Proposed IRO-002-4</b></p> <p><b>R3.</b> Each Reliability Coordinator shall monitor Facilities, the status of Special Protection Systems, and non-BES facilities identified as necessary by the 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.</p> <p><b>Proposed TOP-001-3</b></p> <p>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.</p>
<p><b>S18 - Establish document plans and procedures for conservative operations.</b></p>	<p>Addressed in proposed EOP-011-1 Requirement R1.</p> <p><b>Proposed EOP-011-1</b></p> <p>R1. Each Transmission Operator shall develop, maintain, and implement one or more Reliability Coordinator-</p>

	<p>reviewed Operating Plan(s) to mitigate operating Emergencies in its Transmission Operator Area. The Operating Plan(s) shall include the following, as applicable:</p> <ol style="list-style-type: none"> <li>1.1. Roles and responsibilities for activating the Operating Plan(s);</li> <li>1.2. Processes to prepare for and mitigate Emergencies including:             <ol style="list-style-type: none"> <li>1.2.1. Notification to its Reliability Coordinator, to include current and projected conditions, when experiencing an operating Emergency;</li> <li>1.2.2. Cancellation or recall of Transmission and generation outages;</li> <li>1.2.3. Transmission system reconfiguration;</li> <li>1.2.4. Redispatch of generation request;</li> <li>1.2.5. Provisions for operator-controlled manual Load shedding that minimizes the overlap with automatic Load shedding and are capable of being implemented in a timeframe adequate for mitigating the Emergency; and</li> <li>1.2.6. Reliability impacts of extreme weather conditions.</li> </ol> </li> </ol> <p>R2. Each Balancing Authority shall develop, maintain, and implement one or more Reliability Coordinator-reviewed Operating Plan(s) to mitigate Capacity Emergencies and Energy Emergencies within its Balancing Authority Area. The Operating Plan(s) shall include the following, as applicable:</p> <ol style="list-style-type: none"> <li>2.1. Roles and responsibilities for activating the Operating Plan(s);</li> <li>2.2. Processes to prepare for and mitigate Emergencies including:             <ol style="list-style-type: none"> <li>2.2.1. Notification to its Reliability Coordinator, to include current and projected conditions when experiencing a Capacity Emergency or Energy Emergency;</li> <li>2.2.2. Requesting an Energy Emergency Alert, per Attachment 1;</li> <li>2.2.3. Managing generating resources in its Balancing Authority Area to address:                 <ol style="list-style-type: none"> <li>2.2.3.1. capability and availability;</li> <li>2.2.3.2. fuel supply and inventory concerns;</li> <li>2.2.3.3. fuel switching capabilities; and</li> <li>2.2.3.4. environmental constraints.</li> </ol> </li> <li>2.2.4. Public appeals for voluntary Load reductions;</li> <li>2.2.5. Requests to government agencies to implement their programs to achieve necessary energy reductions;</li> <li>2.2.6. Reduction of internal utility energy use;</li> <li>2.2.7. Use of Interruptible Load, curtailable Load and demand response;</li> <li>2.2.8. Provisions for operator-controlled manual Load shedding that minimizes the overlap with automatic Load shedding and are capable of being implemented in a timeframe adequate for mitigating the Emergency; and</li> <li>2.2.9. Reliability impacts of extreme weather conditions.</li> </ol> </li> </ol>
--	--



<p><b>S19 - Restore system operations from an unknown operating state to proven and reliable limits within 30 minutes.</b></p>	<p>Addressed in proposed TOP-001-3, and IRO-008-2 and the proposed definitions for Operational Planning Analysis and Real-time Assessment.</p> <p><b>Proposed TOP-001-3</b></p> <p>R12. Each Transmission Operator shall not operate outside any identified Interconnection Reliability Operating Limit (IROL) for a continuous duration exceeding its associated IROL <math>T_v</math>.</p> <p>R13. Each Transmission Operator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</p> <p>R14. Each Transmission Operator shall initiate its Operating Plan to mitigate an SOL exceedance identified as part of its Real-time monitoring or Real-time Assessment.</p> <p><b>Proposed IRO-008-2</b></p> <p>R4. Each Reliability Coordinator shall ensure that a Real-time Assessment is performed at least once every 30 minutes.</p> <p>R5. Each Reliability Coordinator shall notify impacted Transmission Operators and Balancing Authorities within its Reliability Coordinator Area, and other impacted Reliability Coordinators as indicated in its Operating Plan, when the results of a Real-time Assessment indicate an actual or expected condition that results in, or could result in, a System Operating Limit (SOL) or Interconnection Reliability Operating Limit (IROL) exceedance within its Wide Area.</p> <p><b>Proposed definition</b>  <b>Operational Planning Analysis</b> - An evaluation of projected system conditions to assess anticipated (pre-Contingency) and potential (post-Contingency) conditions for next-day operations. The evaluation shall reflect applicable inputs including, but not limited to, load forecasts; generation output levels; Interchange; known Protection System and Special Protection System status or degradation; Transmission outages; generator outages; Facility Ratings; and identified phase angle and equipment limitations. (Operational Planning Analysis may be provided through internal systems or through third-party services.)</p> <p><b>Proposed definition</b>  <b>Real-time Assessment</b> - 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</p>
--	--

	<p>provided through internal systems or through third-party services.)</p>
<p><b>S20 - Develop formal operating guides (mitigation plans) and measures for each IROL and any SOL or other conditions having a potential impact on reliability.</b></p>	<p>Addressed in proposed TOP-002-4 and IRO-008-2.</p> <p><b>Proposed TOP-002-4</b>  R2. Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) exceedances identified as a result of its Operational Planning Analysis as required in Requirement R1.</p> <p>R4. Each Balancing Authority shall have an Operating Plan(s) for the next-day that addresses:  4.1 Expected generation resource commitment and dispatch  4.2 Interchange scheduling  4.3 Demand patterns  4.4 Capacity and energy reserve requirements, including deliverability capability</p> <p><b>Proposed IRO-008-2</b>  R2. Each Reliability Coordinator shall have a coordinated Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) exceedances identified as a result of its Operational Planning Analysis as performed in Requirement R1 while considering the Operating Plans for the next-day provided by its Transmission Operators and Balancing Authorities.</p>
<p><b>S21 - Review and update operating guides (mitigation plans) when day-ahead or current day studies indicate the potential need to implement an operating guide.</b></p>	<p>Addressed in proposed TOP-002-4 and IRO-008-2.</p> <p><b>Proposed TOP-002-4</b>  R2. Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) exceedances identified as a result of its Operational Planning Analysis as required in Requirement R1.</p> <p>R4. Each Balancing Authority shall have an Operating Plan(s) for the next-day that addresses:  4.1 Expected generation resource commitment and dispatch  4.2 Interchange scheduling  4.3 Demand patterns  4.4 Capacity and energy reserve requirements, including deliverability capability</p> <p><b>Proposed IRO-008-2</b>  R2. Each Reliability Coordinator shall have a coordinated Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) exceedances identified as a result of its Operational Planning Analysis as performed in Requirement R1 while considering the Operating Plans for</p>

	<p>the next-day provided by its Transmission Operators and Balancing Authorities.</p>
<p><b>S22 - Provide temporary operating guides (mitigation plans) with control actions for situations that could affect reliability but that have not been identified previously.</b></p>	<p>Addressed in proposed TOP-002-4 and IRO-008-2.</p> <p><b>Proposed TOP-002-4</b>  R2. Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) exceedances identified as a result of its Operational Planning Analysis as required in Requirement R1.</p> <p>R4. Each Balancing Authority shall have an Operating Plan(s) for the next-day that addresses:  4.1 Expected generation resource commitment and dispatch  4.2 Interchange scheduling  4.3 Demand patterns  4.4 Capacity and energy reserve requirements, including deliverability capability</p> <p><b>Proposed IRO-008-2</b>  R2. Each Reliability Coordinator shall have a coordinated Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) exceedances identified as a result of its Operational Planning Analysis as performed in Requirement R1 while considering the Operating Plans for the next-day provided by its Transmission Operators and Balancing Authorities.</p>
<p><b>S23 - Develop joint operating guides (mitigation plans) for situations that could require more than one RC or more than one TOP to execute actions.</b></p>	<p>Addressed in IRO-014-2, proposed IRO-014-3 and proposed IRO-008-2.</p> <p><b>IRO-014-2</b>  R1. Each Reliability Coordinator shall have Operating Procedures, Operating Processes, or Operating Plans for activities that require notification, exchange of information or coordination of actions that may impact other Reliability Coordinator Areas to support Interconnection reliability. These Operating Procedures, Processes, or Plans shall collectively address the following: ...</p> <p><b>Proposed IRO-014-3</b>  R1. Each Reliability Coordinator shall have and implement Operating Procedures, Operating Processes, or Operating Plans, for activities that require notification or coordination of actions that may impact adjacent Reliability Coordinator Areas, to support Interconnection reliability. These Operating Procedures, Operating Processes, or Operating Plans shall include, but are not limited to, the following: ...</p> <p><b>Proposed IRO-008-2</b>  R2. Each Reliability Coordinator shall have a coordinated Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) exceedances identified as</p>

	a result of its Operational Planning Analysis as performed in Requirement R1 while considering the Operating Plans for the next-day provided by its Transmission Operators and Balancing Authorities.
<b>S24 - Develop a formal procedure to document the processes for developing, reviewing, and updating operating guides (mitigation plans).</b>	Not in scope; this is administrative in nature.
<b>S25 - Incorporate verifiable and traceable elements such as titles, document numbers, revision numbers, revision history, approvals, and dates when modifying operating guides (mitigation plans).</b>	Not in scope; this is administrative in nature.
<b>S26 - Write operating guides (mitigation plans) in clear, unambiguous language, leaving nothing to interpretation.</b>	Not in scope. This is administrative in nature.
<b>S27 - State the specific purpose of existence for each operating guide (mitigation plan).</b>	Not in scope. This is administrative in nature.
<b>S28 - Summarize the specific situation assessment and address the method of performing the assessment in each operating guide (mitigation plan).</b>	Not in scope. This is administrative in nature.
<b>S29 - Identify all appropriate preventive and remedial control actions in each operating guide (mitigation plan).</b>	Not in scope. This is administrative in nature.
<b>S30 - Develop criteria in operating guides (mitigation plans) to support decisions regarding whether a specific control action should be taken.</b>	Not in scope. This is administrative in nature.
<b>S31 - Incorporate on-line tools that utilize on-line data when operating guides (mitigation plans) require calculations.</b>	Not in scope. Recommendation is appropriate as a guideline rather than a reliability standard.
<b>S32 - Make operating guides (mitigation plans) readily available via a quick-access method such as Web-based help, EMS display notes, or on-line help systems.</b>	Not in scope. This is administrative in nature.
<b>S33 - Provide the location, real-time status, and MWs of load available to be shed.</b>	<p>Addressed in proposed EOP-011-1 Requirement R1 Part 1.2.5 and proposed TOP-003-3.</p> <p><b>Proposed EOP-011-1</b>  R1. Each Transmission Operator shall develop, maintain, and implement one or more Reliability Coordinator-reviewed Operating Plan(s) to mitigate operating Emergencies in its Transmission Operator Area. The Operating Plan(s) shall include the following, as applicable:  1.1. Roles and responsibilities for activating the Operating Plan(s);  1.2. Processes to prepare for and mitigate Emergencies including:  1.2.1. Notification to its Reliability Coordinator, to include current and projected conditions, when experiencing an operating Emergency;  1.2.2. Cancellation or recall of Transmission and generation outages;  1.2.3. Transmission system reconfiguration;  1.2.4. Redispatch of generation request;  1.2.5. Provisions for operator-controlled manual Load shedding that minimizes the overlap with automatic Load shedding and are capable of being implemented in a timeframe adequate for mitigating the Emergency; and</p>

	<p>1.2.6. Reliability impacts of extreme weather conditions.</p> <p><b>Proposed TOP-003-3</b></p> <p>R1. Each Transmission Operator shall maintain a documented specification for the data necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include, but not be limited to:</p> <p>1.1. A list of data and information needed by the Transmission Operator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data as deemed necessary by the Transmission Operator. ...</p>
<p><b>S34 - Establish documented procedures for the reassessment and re-posturing of the system following an event.</b></p>	<p>Addressed in proposed TOP-002-4 and IRO-008-2, and approved EOP-005-2 and EOP-006-2.</p> <p><b>Proposed TOP-002-4</b></p> <p>R2. Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) exceedances identified as a result of its Operational Planning Analysis as required in Requirement R1.</p> <p>R4. Each Balancing Authority shall have an Operating Plan(s) for the next-day that addresses:</p> <p>4.1 Expected generation resource commitment and dispatch</p> <p>4.2 Interchange scheduling</p> <p>4.3 Demand patterns</p> <p>4.4 Capacity and energy reserve requirements, including deliverability capability</p> <p><b>Proposed IRO-008-2</b></p> <p>R2. Each Reliability Coordinator shall have a coordinated Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) and Interconnection Reliability Operating Limit (IROL) exceedances identified as a result of its Operational Planning Analysis as performed in Requirement R1 while considering the Operating Plans for the next-day provided by its Transmission Operators and Balancing Authorities.</p> <p><b>EOP-005-2</b></p> <p>R1. Each Transmission Operator shall have a restoration plan approved by its Reliability Coordinator. The restoration plan shall allow for restoring the Transmission Operator’s System following a Disturbance in which one or more areas of the Bulk Electric System (BES) shuts down and the use of Blackstart Resources is required to restore the shut down area to service, to a state whereby the choice of the next Load to be restored is not driven by the need to control frequency or voltage regardless of whether the Blackstart Resource is located within the Transmission Operator’s System. The restoration plan shall include: ...</p>

	<p><b>EOP-006-2</b>  R1. Each Reliability Coordinator shall have a Reliability Coordinator Area restoration plan. The scope of the Reliability Coordinator’s restoration plan starts when Blackstart Resources are utilized to re-energize a shut down area of the Bulk Electric System (BES), or separation has occurred between neighboring Reliability Coordinators, or an energized island has been formed on the BES within the Reliability Coordinator Area. The scope of the Reliability Coordinator’s restoration plan ends when all of its Transmission Operators are interconnected and its Reliability Coordinator Area is connected to all of its neighboring Reliability Coordinator Areas. The restoration plan shall include: ...</p>
<p><b>S35 - Provide information to operators to maintain awareness of the availability and capability of the blackstart generators and transmission restoration paths.</b></p>	<p>Addressed in approved IRO-010-1, proposed TOP-003-3, proposed IRO-010-2, approved EOP-005-2, and approved EOP-006-2.</p> <p><b>IRO-010-1</b>  R1. The Reliability Coordinator shall have a documented specification for data and information to build and maintain models to support Real-time monitoring, Operational Planning Analyses, and Real-time Assessments of its Reliability Coordinator Area to prevent instability, uncontrolled separation, and cascading outages. The specification shall include the following:  R1.1. List of required data and information needed by the Reliability Coordinator to support Real-Time Monitoring, Operational Planning Analyses, and Real-Time Assessments. ...  R1.6. Reporting requirements for the entities within the Reliability Coordinator Area during a restoration event.  ...</p> <p><b>Proposed TOP-003-3</b>  R1. Each Transmission Operator shall maintain a documented specification for the data necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include, but not be limited to:  1.1. A list of data and information needed by the Transmission Operator to support its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments including non-BES data and external network data as deemed necessary by the Transmission Operator.  ...</p> <p><b>Proposed IRO-010-2</b>  R1. The Reliability Coordinator shall maintain a documented specification for the data necessary for it to perform its Operational Planning Analyses, Real-time monitoring, and Real-time Assessments. The data specification shall include but not be limited to:  1.1. A list of data and information needed by the Reliability Coordinator to support its Operational Planning Analyses,</p>

	<p>Real-time monitoring, and Real-time Assessments including non-BES data and external network data, as deemed necessary by the Reliability Coordinator.</p> <p><b>EOP-005-2</b>  R1. Each Transmission Operator shall have a restoration plan approved by its Reliability Coordinator. The restoration plan shall allow for restoring the Transmission Operator’s System following a Disturbance in which one or more areas of the Bulk Electric System (BES) shuts down and the use of Blackstart Resources is required to restore the shut down area to service, to a state whereby the choice of the next Load to be restored is not driven by the need to control frequency or voltage regardless of whether the Blackstart Resource is located within the Transmission Operator’s System. The restoration plan shall include: ...  R1.4. Identification of each Blackstart Resource and its characteristics including but not limited to the following: the name of the Blackstart Resource, location, megawatt and megavar capacity, and type of unit.  ...  R15. Each Generator Operator with a Blackstart Resource shall notify its Transmission Operator of any known changes to the capabilities of that Blackstart Resource affecting the ability to meet the Transmission Operator’s restoration plan within 24 hours following such change.</p> <p><b>EOP-006-2</b>  R1. Each Reliability Coordinator shall have a Reliability Coordinator Area restoration plan. The scope of the Reliability Coordinator’s restoration plan starts when Blackstart Resources are utilized to re-energize a shut down area of the Bulk Electric System (BES), or separation has occurred between neighboring Reliability Coordinators, or an energized island has been formed on the BES within the Reliability Coordinator Area. The scope of the Reliability Coordinator’s restoration plan ends when all of its Transmission Operators are interconnected and its Reliability Coordinator Area is connected to all of its neighboring Reliability Coordinator Areas. The restoration plan shall include: ...</p>
<p><b>S36 - Plan and coordinate scheduled outages of blackstart generators and transmission restoration paths.</b></p>	<p>Addressed in approved EOP-005-2 and proposed IRO-017-1 - Outage Coordination.</p> <p><b>EOP-005-2</b>  R15. Each Generator Operator with a Blackstart Resource shall notify its Transmission Operator of any known changes to the capabilities of that Blackstart Resource affecting the ability to meet the Transmission Operator’s restoration plan within 24 hours following such change.</p> <p><b>Proposed IRO-017-1</b>  R1. Each Reliability Coordinator shall develop, implement, and maintain an outage coordination process for generation</p>



	and Transmission outages within its Reliability Coordinator Area. The outage coordination process shall: ...
<b>S37 - Maintain a Critical Equipment Monitoring Document to identify tools and procedures for monitoring critical equipment.</b>	Not in scope. This is administrative in nature.
<b>S38 - Maintain event logs pertaining to critical equipment status for a period of one year.</b>	Not in scope. This recommendation is to write a requirement for 'critical equipment', which the RTBPTF considered to be “installed equipment that makes up infrastructure and systems (including communication networks, data links, hardware, software applications, and data bases) that are directly used as critical real-time tools”. Project 2009-02 will address capabilities, and not specific tools. Therefore the recommendation is not applicable to the project.
<b>S39 - Maintain a Critical Equipment Maintenance and Testing Document identifying tools and procedures for maintenance, modification, and testing of critical equipment.</b>	Not in scope. This recommendation is to write a requirement for 'critical equipment', which the RTBPTF considered to be “installed equipment that makes up infrastructure and systems (including communication networks, data links, hardware, software applications, and data bases) that are directly used as critical real-time tools”. Project 2009-02 will address capabilities, and not specific tools. Therefore the recommendation is not applicable to the project.
<b>S40 - Monitor and maintain awareness of critical equipment status to ensure that lack of availability of critical equipment does not impair reliable operation.</b>	Project 2009-02 will address the recommendation from the RTBPTF report to provide operator awareness when key monitoring and analysis capabilities are not available (i.e., not performing their intended function).