

# Summary of Proposed Revisions

## Project 2015-09 Establish and Communicate System Operating Limits

**Do not** use this form for submitting comments. Use the [electronic form](#) to submit comments on **Project 2015-09 Establish and Communicate System Operating Limits (SOL)**. The electronic form must be submitted by **8 p.m. Eastern, Friday, August 12, 2016**.

Additional information is available on the [project page](#). If you have questions, contact Lacey Ourso, Standards Developer by [email](#) or phone at 404.446.2581.

### **Background Information regarding Project 2015-09 Establish and Communicate System Operating Limits**

The Facilities Design, Connections, and Maintenance (FAC) Reliability Standards fulfill an important reliability objective for determining and communicating System Operating Limits (SOLs) and Interconnection Reliability Operating Limits (IROLs) used in the reliable operation of the Bulk Electric System (BES). The purpose of Project 2015-09 – Establish and Communicate System Operating Limits is to revise these requirements. Revisions are necessary to eliminate overlap with approved Transmission Planning (TPL) requirements,<sup>1</sup> enhance consistency with Transmission Operations (TOP)<sup>2</sup> and Interconnection Reliability Operations (IRO)<sup>3</sup> standards, and address other concerns in the existing FAC standards regarding the determination and communication of SOLs and IROLs. As outlined in the [Standards Authorization Request \(SAR\)](#), the scope of the standards development project includes development of new or revised requirements and/or NERC Glossary definitions to provide clarity and consistency for establishing SOLs and IROLs, and to address potential reliability issues resulting from application of the current NERC Glossary definitions for SOL and IROL.<sup>4</sup>

### **High-level Overview of Proposed Revisions to FAC Reliability Standards**

In developing revisions to the FAC Reliability Standards and definitions related to SOL and IROL, the standard drafting team (SDT) has focused on alignment with how SOLs and IROLs are treated in the approved TOP and IRO Reliability Standards (enforceable beginning April 1, 2017). The SDT believes this shift is critical to align the approach for how the System is actually operated as a result of the wholesale

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<sup>1</sup> See, TPL-001-4

<sup>2</sup> See, TOP-001-3, TOP-002-4, TOP-003-3

<sup>3</sup> See, IRO-001-4, IRO-002-4, IRO-008-2, IRO-010-2, IRO-014-3, IRO-017-1

<sup>4</sup> The SAR was sponsored and submitted by the [Project 2015-03 -Periodic Review of System Operating Limit Standards](#) periodic review team (PRT).

revisions to the TOP and IRO Reliability Standards and reflects the manner in which operations are currently conducted. Below is a detailed explanation of how the proposed revisions complement the TOP/IRO revisions. The proposed changes to the FAC standards support a more reliable, dynamic approach to operating within actual limits that exist on the system, as opposed to reliance on “operating limits” that were set well in advance.

### **Overview of How Proposed Revisions Align with Revised TOP and IRO Reliability Standards**

The revisions proposed to the FAC standards were designed to work together with the approved TOP and IRO Reliability Standards. The combination of the proposed revisions to the FAC standards and the TOP and IRO Reliability Standards, including the defined terms contained in those standards (Operational Planning Analysis (OPA)<sup>5</sup>, Real-time Assessment (RTA)<sup>6</sup>, and Operating Plans) when executed together will result in maintaining reliable BES performance. Thus, it is imperative that your review of the proposed revisions to the FAC standards is conducted with a full understanding of how these standards will work together with the approved TOP and IRO Reliability Standards. The proposed FAC revisions standing alone will not provide a complete picture of how different functional entities will work together to establish the appropriate operational limits, and then actually operate to them.

#### Under the approved TOP and IRO Reliability Standards:

- TOP-002-4 Requirement R1 requires the TOP to have an OPA that will allow it to assess whether its planned operations for the next day will exceed any of its SOLs.
- TOP-002-4 Requirement R2 requires that the TOP have an Operating Plan to address potential “SOL exceedances” identified as a result of its OPA.
- TOP-001-3 Requirement R13 requires that the TOP perform a RTA at least once every 30 minutes.

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<sup>5</sup> NERC Glossary defines Operational Planning Analysis (OPA) as, “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.)” [NERC Glossary as of June 24, 2016]

<sup>6</sup> NERC Glossary defines Real-time Assessment (RTA) as, “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.)” [NERC Glossary as of June 24, 2016]

- [TOP-001-3 Requirement R14](#) requires that the TOP initiate its Operating Plan to mitigate an “SOL exceedance” identified as part of its Real-time monitoring or RTA.

For more information on the TOP/IRO revisions, please visit the Project 2014-03 Revisions to TOP/IRO Reliability Standards [project page](#).

### **Overview of Proposed Revisions to FAC-011-3, FAC-014-2 and Defined Terms SOL and SOL Exceedance**

As outlined in greater detail below, the SDT is proposing to revise the existing definition of SOL and create a new [NERC Glossary](#) definition for “SOL Exceedance.” The new definitions support the conceptual distinction between operating practices and the SOL itself. The SOL is the actual set of Facility Ratings, System voltage limits, or stability limitations that are to be monitored for the pre- and post-Contingency state. How an entity operates to those SOLs can vary depending on the planning strategies, operating practices, and mechanisms employed by the entity. The revised definition of SOL and new definition of “SOL Exceedance” will work together with the future-enforceable TOP and IRO Reliability Standards, including the definitions of OPA, RTA and Operating Practices as follows:

- The TOP is required to have an OPA to assess whether its planned operations for the next day will exceed any of its SOLs (*see*, TOP-002-4, Requirement R1). If the OPA identifies potential SOL exceedances, the TOP is required to have an Operating Plan to address those potential SOL exceedances (*see*, TOP-002-4, Requirement R2).
- Additionally, the TOP is required to perform a RTA at least once every 30 minutes (*see*, TOP-001-3 Requirement R13). If the TOP identifies that an SOL is being exceeded in Real-time operations, the TOP will implement the mitigating strategies identified in its Operating Plan (*see*, TOP-001-3 Requirement R14).
- In other words, an “SOL Exceedance” is simply unacceptable system performance that must be mitigated in accordance with the action plan the TOP has laid out in its Operating Plan.
- A potential SOL Exceedance may be identified by an OPA, or an actual SOL Exceedance may be identified by an RTA.
- The Operating Plan can include specific Operating Procedures or more general Operating Processes. The TOP Operating Plans include both pre- and post- Contingency mitigation plans and strategies. The pre-Contingency strategies are implemented before the Contingency occurs to prevent the potential negative impacts on reliability of the Contingency. Post-Contingency mitigation plans and strategies are actions that the TOP will implement after the Contingency occurs to bring the system back within limits.
- The Operating Plans contain adequate details regarding the appropriate timelines to escalate the level of mitigation to ensure BES performance is maintained as required by the RC SOL Methodology.

The proposed definition of SOL Exceedance (described in further detail below) provides clarity regarding what is deemed to be “unacceptable system performance.” When the conditions identified in the definition of SOL Exceedance occur, the TOP must be prepared

to implement its action plan outlined in its Operating Plan to mitigate that particular condition and return the system back within acceptable limits.

The SDT believes that the proposed definitions and revisions to the FAC standards will eliminate confusion between the operating practices used by the TOP and the actual limits themselves. The revisions provide clarity regarding (1) what the limits are, (2) what it means to exceed them, and (3) how an “SOL Exceedance” should be addressed by the TOP in operations planning (TOP-002-4 Requirement R2) and Real-time operations (TOP-001-3 Requirement R14).

### **Purpose of 30-day Informal Comment Period**

As outlined above, the scope of Project 2015-09 includes revision of the requirements for determining and communicating SOLs and IROLs used in the reliable planning and operation of the BES. This informal 30-day posting does not encompass the entire scope of work that the SDT will undertake for the project. Rather, this is only a piece of the complete work. However, the SDT believes it to be the most critical area. The direction taken with regard to these standards set the foundation for building a proper SOL methodology to ensure that SOLs are established and communicated in a manner that will later ensure reliable BES operation when carried out in operations.

Reliability Standards and definitions that **are included** (as part of this limited, informal posting):

- FAC-011-3 – System Operating Limits Methodology for the Operations Horizon
- FAC-014-2 – Establish and Communicate System Operating Limits
- Revisions to definition of System Operating Limit (SOL)
- New definition of SOL Exceedance

Reliability Standards and definitions that **are NOT included** (as part of this limited, informal posting):

- FAC-010-3 – System Operating Limits Methodology for the Planning Horizon
- Revisions to definition of Interconnection Reliability Operating Limit (IROL)
- Necessary revisions to existing Reliability Standards to incorporate concepts included in new defined term “SOL Exceedance” (*i.e.*, TOP-002-4 – capitalize SOL Exceedance to incorporate usage of defined term).

Although this is only an informal posting, the SDT underscores the importance of this posting. The SDT believes that the revisions proposed represent a significant improvement in how the industry works together to ensure reliability by establishing SOLs and operating to them in a manner that is reflective of the changing technology, and dynamic manner where entities have the ability to assess pre- and post-

Contingency performance in Real-time based on actual operating conditions. For these reasons, the SDT requests that commenters please take the time to review the [background materials](#) from the Project 2015-09 SOL Technical Conference which outline all of the various issues that were considered by the team, and discussed in an open forum with industry members. The SDT believes that we have captured the essence of the direction that the industry would like to take, but this is the opportunity for the team to continue to improve on proposed revisions by obtaining early feedback. The SDT looks forward to hearing and understanding your perspective for each of the very specific issues and associated questions raised below. In order for the SDT to thoroughly understand and incorporate your feedback into the future standard development, please do not simply provide yes or no responses. Please provide us with your perspective. Give us as much detail as you can. If you disagree with the SDT's direction, please provide an alternative approach that you believe will be superior to the one that the SDT proposed.

## Proposed Revisions, Background Information and Questions

### A. Definitions

Proposed Revisions to Definition of System Operating Limits (SOL)		
Proposed Revised Definition	Explanation of Proposed Revision	Relevant Definition(s) or Standards Impacted By Proposed Revision
<p>System Operating Limits: Reliability limits used for operations, to include Facility Ratings, System voltage limits, and stability limitations.</p>	<p>The current definition of SOL (and the related FAC standards) presume an operating paradigm whereby a study or analysis is performed ahead of time to establish an SOL; the SOL is then communicated to operators; and the operators are given an operating plan to operate below the SOL with the presumption that doing so will result in acceptable pre- and post-Contingency system performance in Real-time operations. However, due to changes in the TOP and IRO Reliability Standards, along with advancements in technology from the time that the FAC standards were originally drafted, this is not reflective of how the system is actually operated. Today, entities continuously assess system performance and identify potential events in Real-time, based on <i>actual</i> operating conditions.</p> <p>The proposed revisions to the SOL definition, coupled with the proposed new definition of SOL Exceedance (see below) and the revisions to the FAC standards will support the concept that the SOL is the actual operating parameter; and eliminate confusion between “what the limits are” verses “how the system should be operated given the limits.”</p>	<p><u>Existing definition of SOL:</u>            “The value (such as MW, Mvar, amperes, frequency or volts) that satisfies the most limiting of the prescribed operating criteria for a specified system configuration to ensure operation within acceptable reliability criteria. System Operating Limits are based upon certain operating criteria. These include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• Facility Ratings (applicable pre- and post-Contingency Equipment Ratings or Facility Ratings)</li> <li>• transient stability ratings (applicable pre- and post-Contingency stability limits)</li> <li>• voltage stability ratings (applicable pre- and post-Contingency voltage stability)</li> </ul>

**Proposed Revisions to Definition of System Operating Limits (SOL)**

Proposed Revised Definition	Explanation of Proposed Revision	Relevant Definition(s) or Standards Impacted By Proposed Revision
	<p>Given this shift, there is no need for the existing SOL definition language that includes concepts of “the most limiting criteria,” “specified system configuration,” “operation within acceptable reliability criteria,” and “pre- and post-Contingency.” These concepts are covered in the future-enforceable TOP and IRO Reliability Standards (including the defined terms contained therein: OPA, RTA, and Operating Plans), along with the proposed revisions to the FAC standards. As a result of the proposed revisions, the Facility Ratings, System voltage limits, and stability limitations are SOLs, all of the time, regardless of which one is “the most limiting.” Also, as detailed below, the definition of “SOL Exceedance” will complement the revised definition of SOL by specifically identifying operating conditions that are deemed unacceptable, and require action by the TOP to mitigate.</p> <p>The proposed revisions use the term “stability limitation” rather than “transient stability limit,” “voltage stability limit” or the Glossary term “Stability Limit.” The intent of the SDT is that “stability limitation” is intentionally broad and can be used to encompass a number of different types of stability-related limitations or phenomenon, including, but not limited to, weighted short-circuit ratio (WSCR), sub-synchronous resonance (SSR), phase angle limitations, fault-interrupting capability of breakers, transient voltage limitations on equipment, and geomagnetic-induced currents on equipment. The Glossary term “Stability Limits” is not appropriate because it is limited to the maximum power flow value; this is too restrictive and not technology-neutral, as tools allow entities</p>	<ul style="list-style-type: none"> <li>• system voltage limits (applicable pre- and post-Contingency voltage limits)”</li> </ul>

**Proposed Revisions to Definition of System Operating Limits (SOL)**

Proposed Revised Definition	Explanation of Proposed Revision	Relevant Definition(s) or Standards Impacted By Proposed Revision
	<p>to monitor and control parameters other than maximum power flow values in order to demonstrate reliable stability performance.</p> <p>For more information regarding the proposed revisions to the SOL definition (and the definition of SOL Exceedance), please reference the Project 2014-03 – TOP and IRO Reliability Standards white paper entitled, "<a href="#">System Operating Limit Definition and Exceedance Clarification.</a>"</p>	

**Proposed New Definition of SOL Exceedance**

Proposed New Definition	Explanation of Proposed New Definition	Relevant Definition(s) or Standards Impacted By Proposed New Definition
<p>SOL Exceedance: An operating condition characterized by any of the following:</p> <ul style="list-style-type: none"> <li>• Actual or pre-Contingency flow on a Facility is above the Normal Rating;</li> <li>• Calculated post-Contingency flow on a Facility is above the highest Emergency Rating;</li> </ul>	<p>As explained above, under the proposed revisions, the SOL is the actual set of Facility Ratings, System voltage limits, or stability limitations that are to be monitored for the pre- and post-Contingency state. How an entity remains within those SOLs will vary depending upon the particular Operating Plan of the entity. When the operating conditions listed in the definition of SOL Exceedance are identified – through an OPA or RTA – the TOP will take the actions outlined in its Operating Plan to mitigate the condition. The SDT did not include specific timing requirements for each condition listed in the definition, because the appropriate timing for operator response can vary depending upon the particular facts and</p>	<p><b><u>Mapping to existing FAC standards or definitions under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <b><u>FAC-011-3 Requirement R2 (Parts 2.1 and 2.2)</u></b>- Identifies performance requirements that RC SOL Methodology shall include.</li> </ul> <p>If the definition of SOL Exceedance is pursued by the SDT, the definition would be incorporated into existing standards that currently rely on the concept of an</p>



Proposed New Definition of SOL Exceedance		
Proposed New Definition	Explanation of Proposed New Definition	Relevant Definition(s) or Standards Impacted By Proposed New Definition
<ul style="list-style-type: none"> <li>Calculated post-Contingency flow on a Facility is above a Facility Rating for which there is not sufficient time to reduce the flow to acceptable levels should the Contingency occurs;</li> <li>Actual or pre-Contingency bus voltage is outside normal System voltage limits;</li> <li>Calculated post-Contingency bus voltage is outside the emergency system voltage limits;</li> <li>Calculated post-Contingency bus voltage is outside emergency system voltage limits for which there is not sufficient time to relieve the condition should the Contingency occurs; or,</li> <li>Operating parameters indicate the next Contingency could result in instability.</li> </ul>	<p>circumstances. However, it is expected (and required) that the TOP Operating Plan specifically identify the allowable response time, along with the specific actions to be taken by the operator, in mitigating the condition.</p> <p>The bulleted items carry forward the types of limitations that are identified in the current definition of SOL, and incorporate the concepts of acceptable/unacceptable system performance, as currently contained in FAC-011-3 Requirement R2.</p> <p><u>For bullet item 3:</u> This operating condition exists when the calculated post-Contingency flow falls below the highest Emergency Rating; however, the flow remains at a level where there is not sufficient time to reduce the flow to an acceptable level after the Contingency occurs. In this operating condition, the operator would be required to take pre-Contingency action, and could not rely on a post-Contingency mitigation plan. Because pre-Contingency action is required, the condition is deemed to be an “SOL Exceedance.”</p> <p><u>For bullet items 4 and 5:</u> Normal and emergency System voltage limits must respect the voltage limitations specified in the TO or GO Facility Ratings methodology (pursuant to FAC-008-3). Normal voltage limits are typically applicable for the pre-Contingency state, while emergency voltage limits are applicable for the post-Contingency state. “SOL Exceedance” with respect to these voltage</p>	<p>“SOL exceedance.” The intent is not to change the meaning of the existing standards, rather the SDT believes that the proposed definition captures the existing meaning, but simply provides greater clarity through listing the specific types of conditions in the “SOL Exceedance” definition. In concert with proposing the new “SOL Exceedance” definition, the SDT would propose revisions (only as necessary) to existing standards to incorporate the newly defined Glossary term. Below are a few examples, but are not intended to represent a comprehensive or complete listing:</p> <ul style="list-style-type: none"> <li><u>TOP-002-4 Requirement R1</u> - Each Transmission Operator shall have an Operational Planning Analysis that will allow it to assess whether its planned operations for the next day within its Transmission Operator Area will result in an SOL Exceedance of its System Operating Limits (SOLs).</li> </ul>

Proposed New Definition of SOL Exceedance		
Proposed New Definition	Explanation of Proposed New Definition	Relevant Definition(s) or Standards Impacted By Proposed New Definition
	<p>limits occurs when either actual bus voltage is outside acceptable pre-Contingency (normal) bus voltage limits, or when Real-time Assessments indicate that bus voltages are expected to fall outside acceptable emergency limits in response to a Contingency event. Real-time Assessments recognize whether auto-reactive devices are sufficient for maintaining voltage within acceptable limits pre- or post-Contingency.</p>	<ul style="list-style-type: none"> <li>• <u>TOP-002-4 Requirement R2</u> - Each Transmission Operator shall have an Operating Plan(s) for next-day operations to address potential System Operating Limit (SOL) Exceedance(s) identified as a result of its Operational Planning Analysis as required in Requirement R1.</li> <li>• <u>TOP-001-3 Requirement R14</u> - Each Transmission Operator shall initiate its Operating Plan to mitigate a SOL Exceedance identified as part of its Real-time monitoring or Real-time Assessment.</li> </ul>

## B. Proposed Revisions to FAC-011-3

### Proposed Reliability Standard: FAC-011-4, Requirement R1

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R1.</b> Each Reliability Coordinator shall have a methodology for establishing SOLs (“SOL Methodology”) within its Reliability Coordinator Area.</p>	<p>As outlined above, the SDT has incorporated the concepts contained in the existing FAC-011-3 Requirement R1 into the proposed revisions to the definitions of SOL and SOL Exceedance, along with the proposed revisions to FAC-011 and FAC-14. The existing Parts 1.1 through 1.3 are incorporated into the proposed new requirements, as detailed below.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R1</u> – Sentence 1.</li> </ul>

### Proposed Reliability Standard: FAC-011-4, Requirement R2

Proposed New/Revised Requirement	Explanation / Rationale for Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R2.</b> Each Reliability Coordinator shall include in its SOL Methodology the method for Transmission Operators to determine the applicable Facility Ratings to be used in operations. The method shall address the use of common Facility Ratings between the Reliability Coordinator and</p>	<p>Under FAC-008-3, Facility Ratings are established by Facility owners (TOs and GOs) consistent with the owner’s methodology. These Facility Ratings are communicated to the RCs and TOPs. RCs and TOPs incorporate these ratings into their tools and processes and use the ratings in establishing their SOLs. Because TOs and GOs are not required to use any sort of continent-wide methodology for establishing the Facility</p>	<p><b><u>Background regarding existing standards not under revision by SDT:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-008-3 Requirements R1, R2 and R3</u>– GOs and TOs are required to have a methodology for developing Facility Ratings.</li> <li>• <u>FAC-008-3 Requirement R6</u>– GOs and TOs shall establish Facility Ratings consistent with its methodology.</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R2**

Proposed New/Revised Requirement	Explanation / Rationale for Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p>the Transmission Operators in its Reliability Coordinator Area.</p>	<p>Ratings, it is possible for owners to use varying/different methodologies. This can create problems in establishing the appropriate SOL because the variations in Facility Rating methodologies may result in different or inconsistent types of Facility Ratings used in operations. If the RCs and TOPs are using different sets of Facility Ratings in conducting their respective outage coordination studies, OPAs, and RTAs, this may create a potential risk to reliability.</p> <p>The intent of Requirement R2 is for the RC SOL Methodology to identify the method that its TOPs will use in determining which of the Facility Ratings provided by the owner (under FAC-008-3) are appropriate for use in establishing SOLs for use in operations. As outlined above, under the revised definition of SOL, the Facility Ratings will be the SOL.</p> <p>The second sentence of Requirement R2 is intended to ensure that the RC and the TOP are using the same Facility Ratings, which will eliminate the risk identified above.</p>	<ul style="list-style-type: none"> <li>• <u>FAC-008-3 Requirements R7 and R8</u>– must provide their Facility Ratings to the RC, TOP and other functional entities.</li> </ul> <p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R1</u>- RC SOL Methodology must state that SOLs shall not exceed associated Facility Ratings.</li> <li>• <u>FAC-011-3 Requirement R2 (Parts 2.1 and 2.2)</u>- RC SOL Methodology shall include requirement that SOLs provide BES performance, and following certain prescribed conditions/states, remain within their Facility Ratings.</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R3**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R3.</b> Each Reliability Coordinator shall include in its SOL Methodology the method for Transmission Operators to determine the applicable steady-state System voltage limits to be used in operations. The method shall:</p> <p><b>3.1.</b> Require that System voltage limits are not outside of the Facility voltage ratings;</p> <p><b>3.2.</b> Require that System voltage limits are not outside of voltage limits identified in Nuclear Plant Interface Requirements;</p> <p><b>3.3.</b> Require that System voltage limits are above UVLS relay settings;</p> <p><b>3.4.</b> Identify the lowest allowable System voltage limit;</p> <p><b>3.5.</b> Address the use of common System voltage limits between the Reliability Coordinator and the Transmission Operators in its Reliability Coordinator Area; and,</p>	<p>There is no Reliability Standard that specifically requires establishment and communication of System voltage limits; however, System voltage limits are used in the definition of SOL and are an important aspect of reliable operations. The SDT believes it is important for the Reliability Standards to assign responsibility for the establishment and communication of System voltage limits. Like Facility Ratings, System voltage limits should be consistent between TOPs and RCs throughout all operations processes.</p> <p>The proposed Requirement R3 will result in the RC SOL Methodology requiring the TOP to determine System voltage limits for use in operations, consistent with the RC methodology.</p>	<p><b><u>Background regarding existing standards not under revision by SDT:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-008-3</u> – Requires Facility Owner to establish Facility Ratings, which includes voltage ratings.<sup>7</sup></li> <li>• <u>VAR-001-4 Requirement R1</u> – The TOP specifies the system voltage schedule (which is either a range or a target value associated with a tolerance band) as part of its plan to operate within SOLs (and IROLs).</li> </ul> <p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R2 (Parts 2.1 and 2.2)</u> - RC SOL Methodology shall include requirement that SOLs provide BES performance with regard to certain prescribed conditions (pre-Contingency state, following certain identified single-</li> </ul>

<sup>7</sup> Definition of Facility Ratings: The maximum or minimum voltage, current, frequency, or real or reactive power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility.

**Proposed Reliability Standard: FAC-011-4, Requirement R3**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>3.6.</b> Address coordination of System voltage limits between adjacent Transmission Operators in its Reliability Coordinator Area.</p>		<p>Contingencies) and remain within their thermal and voltage limits. <b>[Proposed definitions of SOL and SOL Exceedance and Requirement R3 carry this forward.]</b></p> <ul style="list-style-type: none"> <li>• <b>FAC-011-3 Requirement R1- RC SOL Methodology</b> must state that SOLs shall not exceed associated Facility Ratings. <b>[Proposed Part 3.1 carries this forward.]</b></li> <li>• Parts 3.2-3.6 were not clearly identified in the previous FAC standards; these are “new” requirements added by the SDT to provide clarity regarding steady-state system voltage limits.</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R4**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R4.</b> Each Reliability Coordinator shall include in its SOL Methodology the method for</p>	<p>As detailed above, the existing definition of SOL provides that the SOL is “based upon” certain criteria, including transient stability ratings. The proposed</p>	<p><b><u>Background regarding existing standards not under revision by SDT:</u></b></p>

**Proposed Reliability Standard: FAC-011-4, Requirement R4**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p>determining the stability limitations to be used in operations. The method shall:</p> <p><b>4.1.</b> Specify stability performance criteria for single Contingencies and for multiple Contingencies (as identified in Requirement R5), including any margins applied. The criteria shall consider the following:</p> <p><b>4.1.1.</b> steady-state voltage stability;</p> <p><b>4.1.2.</b> transient voltage response;</p> <p><b>4.1.3.</b> angular stability; and,</p> <p><b>4.1.4.</b> System damping.</p> <p><b>4.2.</b> Require that stability limitations are established to meet the BES performance criteria specified in Part 4.1 for the following Contingencies:</p> <p><b>4.2.1.</b> Loss of one of the following either by single phase or three phase Fault to ground with normal clearing, or without a Fault:</p> <ul style="list-style-type: none"> <li>• generator;</li> </ul>	<p>revisions to the SOL definition make clear that the SOLs “are” the reliability limits, which include stability limitations.</p> <p>Additionally, under the current standards, there are no set continent-wide stability limitations criteria for use in determining SOLs. Under existing FAC-011-3 Requirement R2, the RC has flexibility with regard to establishing stability limitations; provided the system performance requirements in the standard are met. While the existing language in Requirement R2 (and portions of Requirement R3) do provide some “continent-wide” uniformity, the requirements do not provide sufficient clarity regarding the distinction between establishing stability limitations and acceptable system performance requirements/response. The proposed revisions continue to allow the RC to have flexibility in its SOL Methodology for developing stability limitations. This ensures the RC is able to appropriately tailor the methodology to meet the particular needs of its system, since a “one size fits all” approach is not appropriate for stability limitations. However, the proposed requirement does set a number of minimum</p>	<ul style="list-style-type: none"> <li>• <u>IRO-005-3.1a, Requirement R1 (Parts 1.2 and 1.3)</u> – Each RC should monitor its RC Area parameters, including pre and post contingent element stability conditions.</li> <li>• <u>IRO-008-2, Requirement R1</u> – Each RC shall perform an OPA that will assess whether next day planned operations will exceed SOLs or IROLs within its Wide-area.</li> <li>• <u>MOD-001-2, Requirement R1 (Part 1.1)</u> – Each TOP that calculates TFC or TTC shall have a written methodology that describes how those values are calculated, including the pre- and post-Contingency limitations for transient and voltage stability limits and other SOLs.</li> </ul> <p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-014-2, Requirement R6 (Parts 6.1 and 6.2)</u> – Planning Authority shall provide multiple contingencies causing stability limits, and the limits, to the</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R4**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<ul style="list-style-type: none"> <li>• Transmission circuit;</li> <li>• transformer;</li> <li>• shunt device;</li> <li>• single pole of a direct current line.</li> </ul> <p>4.2.2. Loss of any multiple Contingencies identified in Requirement R5.</p> <p>4.3. Describe how instability risks are identified, considering realistic levels of transfers, Load and generation dispatch;</p> <p>4.4. Consider the stability limitations (and corresponding multiple Contingencies) provided by the Planning Coordinator in accordance with FAC-014-3 Requirement R8;</p> <p>4.5. Include a description of the study models, including the level of detail that is required and allowed uses of Remedial Action Schemes (RAS); and,</p> <p>4.6. Specify how stability limitations will be established when there is an impact to</p>	<p>required attributes (specific to stability limitations) that must be contained within the RC SOL Methodology.</p> <p>The proposed approach by the SDT is for the RC SOL Methodology to continue to set the method for how stability limitations for its RC Area must be established. Under proposed Requirement R4, the RC SOL Methodology must:</p> <p><u>Part 4.1</u> - Specify the stability performance criteria for single Contingencies and multiple Contingencies, including any margins applied.</p> <p><u>Part 4.2</u> - Meet the performance criteria for certain identified Contingencies (listed in the standard).</p> <p><u>Part 4.3</u> - Describe how instability risks are identified. The SDT changed the existing language of “anticipated” to “realistic.” (See, FAC-011-3 Part 3.6) The SDT believes “anticipated” could be broadly interpreted to mean anticipated by the planners (in planning horizon), instead of what is realistically anticipated by the operators in the operations time horizon.</p> <p><u>Part 4.4</u> – Incorporates concepts from the existing FAC-011-3 Part 3.3, and requires the RC to consider the</p>	<p>Reliability Coordinator, or note to the RC if there are none. <i>[Maps to proposed Part 4.4]</i></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R2 (Part 2.1)</u> - <i>[Maps to proposed Part 4.1, with new requirement providing specific types of criteria that must be considered.]</i></li> <li>• <u>FAC-011-3 Requirement R2 (Part 2.2)</u> - <i>[Maps to proposed Part 4.2]</i></li> <li>• <u>FAC-011-3 Requirement R2 (Part 3.6)</u> - <i>[Maps to proposed Part 4.3]</i></li> <li>• <u>FAC-011-3 Requirement R3 (Parts 3.1 and 3.5)</u> - <i>[Maps to proposed Part 4.5]</i></li> </ul>



**Proposed Reliability Standard: FAC-011-4, Requirement R4**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p>more than one TOP in its Reliability Coordinator Area.</p>	<p>stability limitations provided by the Planning Coordinator.</p> <p><u>Part 4.5</u> – This language combines some components of existing FAC-011-3 Parts 3.1, 4.3, and 3.5, but removes the blanket requirement for the study to include the entire RC Area. The revised language allows the RC to have flexibility to determine the appropriate study model, and required supporting details.</p> <p><u>Part 4.6</u> – The SDT believes that this Part will improve reliability by requiring the RC SOL Methodology to specify the appropriate manner to develop stability limitations, when those limitations impact more than one TOP in its RC Area. A companion requirement is FAC-014-3 Requirement R3, which requires the RC to determine the stability limitations when there is an impact to more than one TOP in its RC Area. (See, the proposed FAC-014-3 Requirement R3 for further explanation).</p>	

**Proposed Reliability Standard: FAC-011-4, Requirement R5**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R5.</b> Each Reliability Coordinator shall include in its SOL Methodology the method for determining the multiple Contingencies used in the evaluation for potential System instability, Cascading outages or uncontrolled separation.</p>	<p>Currently effective Reliability Standard TOP-004-2 Requirement R3 requires the TOP operate to protect against instability, uncontrolled separation, or cascading outages resulting from multiple outages, as specified by its RC. This requirement was retired by the TOP/IRO project because it was addressed by the new TOP-001-3 Requirements R12 and R14 (which are not limited by single or multiple contingencies) in combination with existing FAC-011-3 Part 3.3 and FAC-014-2 Requirement R6 (which work collectively to establish how multiple Contingencies are considered in IROLs and SOLs).</p> <p>The proposed Requirement R5 maintains the existing approach that the RC SOL Methodology shall specify the multiple Contingencies for use in establishing stability limitations and IROLs. Further, it improves upon the existing requirement by allowing the RC SOL Methodology to identify multiple Contingencies beyond those identified by the planners.</p>	<p><b><u>Background regarding existing standards not under revision by SDT:</u></b></p> <ul style="list-style-type: none"> <li>• <u>TOP-001-3 Requirements R12 and R14</u></li> </ul> <p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• FAC-011-3 Part 3.3</li> <li>• FAC-014-2 Requirement R6</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R6**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R6.</b> Each Reliability Coordinator shall include in its SOL Methodology the method and criteria for establishing Interconnection Reliability Operating Limits (IROLs). The criteria shall describe the severity and extent of reliability impact that warrants establishment of an IROL, including:</p> <ul style="list-style-type: none"> <li><b>6.1.</b> Unacceptable quantity of load loss due to System instability, Cascading outages or uncontrolled separation;</li> <li><b>6.2.</b> Unacceptable quantity of supply loss due to System instability, Cascading outages or uncontrolled separation;</li> <li><b>6.3.</b> Unacceptable thresholds for inter-area oscillations (including acceptable damping criteria and criteria for inter-area oscillations versus intra-area oscillations); and,</li> <li><b>6.4.</b> Unacceptable impacts on neighboring Reliability</li> </ul>	<p>Regional differences exist in the criteria for determining which subset of SOLs are IROLs. The SDT discussed the regional differences among the various RC Areas, and several similarities emerged, including: (1) loss of load criteria, (2) loss of generation criteria, (3) non-localized or uncontained instability, and (4) impact on neighboring RC Area. The SDT evaluated the potential positive and negative impacts of creating continent-wide requirements, and determined that establishing minimum criteria that must be considered as part of the RC Methodology would benefit reliability; while continuing to allow necessary flexibility. The proposed language provides greater uniformity by identifying the criteria to be considered by the RC in establishing IROLs. The criteria must describe, at a minimum, the severity and extent of what is/not allowable with regarding to: (1) loss of load, (2) quality of supply loss, (3) thresholds for inter-area oscillations, and (4) impacts on neighboring RC Areas within its Interconnection. This minimum IROL criteria will provide for greater continent-wide consistency as it ensures all RCs consider and identify what is allowable for each criteria. The SDT believes while this does change the current state – where no mandatory minimum criteria exist- it still allows for the RC to have the necessary flexibility to design its IROL</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <b><u>FAC-011-3 Requirement R1</u></b> – RC SOL Methodology must include a description of how to identify the subset of SOLs that qualify as IROLs.</li> <li>• <b><u>FAC-011-3 Requirement R3.7</u></b>- RC SOL Methodology must include a description of the criteria for determining when violating an SOL qualifies as an IROL</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R6**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
Coordinator Areas within an Interconnection.	methodology so that it can meet the reliability issues present in, and possibly unique to, its RC Area.	

**Proposed Reliability Standard: FAC-011-4, Requirement R7**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R7.</b> Each Reliability Coordinator shall include in its SOL Methodology the criteria for developing the IROL <math>T_v</math> for any IROLs in its Reliability Coordinator Area. Each IROL <math>T_v</math> shall be less than or equal to 30 minutes.</p>	<p>For the most part, the substance of this requirement is not changed from the existing standard; it was previously contained in a part (<i>i.e.</i>, FAC-011-3 Part 3.7) and is now a stand-alone requirement. The only change is that the 30 minute time-period is specifically identified, whereas in the previous requirement only stated <math>T_v</math>.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R3.7</u>- RC SOL Methodology must include a description of the criteria for determining when violating an SOL qualifies as an IROL and criteria for developing any associated IROL <math>T_v</math>.</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R8**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R8.</b> Each Reliability Coordinator shall include in its SOL Methodology the method to address a Real-time operating state, where the next Contingency has the potential to cause System instability, Cascading outages or uncontrolled separation, but was not identified one or more days prior to the current day. The method shall address:</p> <ul style="list-style-type: none"> <li><b>8.1.</b> Thresholds for initiating evaluation of potential impacts;</li> <li><b>8.2.</b> A description of when pre-Contingency Load shedding is warranted to mitigate the condition; and,</li> <li><b>8.3.</b> A review of the operating state experience for the purpose of determining whether an IROL should be established.</li> </ul>	<p>In <a href="#">Order No. 817</a>, FERC noted that, “operators do not always foresee the consequences of exceeding such SOLs and thus cannot be sure of preventing harm to reliability.” The SDT believes that in certain circumstances, such as in response to forced outages or similar unforeseen events, Real-time operating conditions can occur such that a RTA identifies an operating state where the next Contingency could result in instability, uncontrolled separation or Cascading outages. When this operating condition occurs in Real-time, it is clear that System Operator(s) are expected to take urgent action to mitigate the N-1 insecure operating state. What is unclear, however, is whether this operating condition constitutes some sort of an “IROL exceedance” or mandates that other IROL-related Reliability Standards should be applied.</p> <p>The proposed requirement requires the RC SOL Methodology to prescribe a method for how to address the above-described Real-time operating state. This will allow for consistency by System Operators within an RC Area in responding to the Real-time operating state when tools or analysis indicate abnormal post-Contingency conditions (e.g., unsolved Contingencies, high post-Contingency overloads). While the requirement treats the operating state similar to, and equally important to, what prepared response must be</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R3.7-</u> RC SOL Methodology must include a description of the criteria for determining when violating an SOL qualifies as an IROL and criteria for developing any associated IROL T<sub>v</sub>.</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R8**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
	<p>in place for resolving an IROL-type issue, the requirement does not focus on formally establishing the limit, but instead allowing the System Operator to act with urgency to address the temporary operating state at hand.</p> <p>Also Part 8.3 requires the RC Methodology prescribe an after-the-fact review of the operating state experience for the purpose of determining whether an IROL should be established in accordance with the RC SOL Methodology.</p>	

**Proposed Reliability Standard: FAC-011-4, Requirement R9**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R9.</b> Each Reliability Coordinator shall issue its SOL Methodology and any changes to the SOL Methodology, prior to the effective date, to:</p> <p><b>9.1.</b> Each adjacent Reliability Coordinator within an Interconnection, and each Reliability Coordinator that requested and indicated it has a reliability-related need for the SOL Methodology;</p>	<p>For the most part, the substance of this requirement is not changed from the existing standard. A clarification was added to Part 9.1 that RCs should issue its SOL Methodology, and any associated changes, to the other RCs <i>within</i> its Interconnection.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-011-3 Requirement R4</u> – Requires the RC to issue its SOL Methodology, and any changes to the methodology, to its adjacent RCs and any RCs indicating a reliability-related need; to each PC and TP that models portions of its</li> </ul>

**Proposed Reliability Standard: FAC-011-4, Requirement R9**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>9.2.</b> Each Planning Coordinator and Transmission Planner that models any portion of the Reliability Coordinator Area; and,</p> <p><b>9.3.</b> Each Transmission Operator that operates in the Reliability Coordinator Area.</p>		<p>RC Area; and, each TOP that operates in its RC Area.</p>

### C. Proposed Revisions to FAC-014-3

**Proposed Reliability Standard: FAC-014-3, Requirement R1**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R1.</b> Each Reliability Coordinator shall establish Interconnection Reliability Operating Limits (IROLs) for its Reliability Coordinator Area that are consistent with its System Operating Limit Methodology (“SOL Methodology”) as established in FAC-011-4.</p>	<p>The current FAC-014-2 Requirement R1 requires that the RC ensure SOLs and IROLs are established pursuant to its SOL Methodology. This creates a situation where the RC is responsible for “ensuring” actions out of its control. The proposed revisions do not change the intent of the standard –that the RC develop the SOL Methodology for establishing SOLs in its RC Area, and the TOP following the RC SOL Methodology in establishing those SOLs. Accordingly, the proposed Requirement R2 requires that the TOP establish SOLs as required by the RC SOL Methodology. The SDT believes this clarifies the appropriate responsibilities of the respective functional entities, while not creating ambiguity in the requirements in requiring the RC to do something that the TOP is, in all actuality, required to do.</p> <p>Additionally, this requirement carries forward the obligation of the RC to establish IROLs for its RC Area. The RC maintains primary responsibility for establishment of IROLs because these limits have the potential to impact a Wide-area.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-014-2 Requirement R1</u> – Requires the RC to ensure SOLs and IROLs are establishing for its RC Area, consistent with its SOL Methodology.</li> <li>• <u>FAC-014-2 Requirement R2</u> – Requires the TOP to establish SOLs consistent with the RC SOL Methodology.</li> </ul>



**Proposed Reliability Standard: FAC-014-3, Requirement R2**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R2.</b> Each Transmission Operator shall establish SOLs for its portion of the Reliability Coordinator Area consistent with its Reliability Coordinator’s SOL Methodology.</p>	<p>The SDT has removed language from the existing FAC-014-3 Requirement R2 that states the TOP, “shall establish SOLs (as directed by its Reliability Coordinator)” because it causes confusion and may be incorrectly understood to mean that the RC will issue a “Directive,” or that TOPs are only required to establish SOLs if they have been “directed to by their RC.” This is not the intended meaning of the requirement, thus, the drafting team has removed the unnecessary and potentially confusing language. The proposed language makes clear that the TOP is the entity responsible for establishing SOLs, and these SOLs must be established in accordance with (<i>i.e.</i>, pursuant to the “direction”) identified in the RC’s SOL Methodology.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-014-2 Requirement R1</u> – Requires the RC to ensure SOLs and IROLs are establishing for its RC Area, consistent with its SOL Methodology.</li> <li>• <u>FAC-014-2 Requirement R2</u> – Requires the TOP to establish SOLs consistent with the RC SOL Methodology.</li> </ul>

**Proposed Reliability Standard: FAC-014-3, Requirement R3**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R3.</b> Each Reliability Coordinator shall determine stability limitations to be used in operations when the limitation impacts</p>	<p>The proposed approach by the SDT is that the RC SOL Methodology will set the method for how all stability limitations for its RC Area must be established (see, proposed</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p>

**Proposed Reliability Standard: FAC-014-3, Requirement R3**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p>more than one Transmission Operator in its Reliability Coordinator Area consistent with its SOL Methodology.</p>	<p>FAC-011-4 Requirement R4). The RC SOL Methodology must, among other things, specify the stability performance criteria for single Contingencies and multiple Contingencies, including any margins applied (see, proposed FAC-011-4 Part 4.1); meet the performance criteria for certain identified Contingencies listed in the standard (see, proposed FAC-011-4 Part 4.2); and describe how instability risks are identified (see, proposed FAC-011-4 Part 4.3). The TOP is required to establish stability limitation SOLs in accordance with everything outlined in the RC SOL Methodology. However, in addition to what is outlined above, the SDT believes that to the extent there are stability limitations that may impact more than one TOP in its RC Area, the RC should be responsible for determining these stability limitations (in accordance with its RC SOL Methodology – see, proposed FAC-011-4 Part 4.6).</p> <p>The purpose of providing a separate requirement for the RC to address this specific type of stability limitation is to provide clarity that there may be a stability limitation that is not appropriately labeled an “IROL,” and thus, would not be covered by proposed Requirement R1. It is the position of the SDT that not all stability limitations are automatically “IROLs.” For example, there may be instances of local, contained instability that are not appropriately designated</p>	<ul style="list-style-type: none"> <li>• <u>N/A</u>: This proposed requirement addresses what the SDT believes to be a gap in the existing requirements.</li> </ul>

**Proposed Reliability Standard: FAC-014-3, Requirement R3**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
	<p>an “IROL,” because labeling it as an IROL may require the TOP to take actions such as pre-Contingency load shedding, that is not warranted, and could actually cause a bigger reliability impact. However, when the stability limitation impacts more than one TOP, the SDT believes the RC should have primary responsibility for establishing that SOL.</p>	

**Proposed Reliability Standard: FAC-014-3, Requirement R4**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R4.</b> Each Reliability Coordinator shall provide the SOLs for its RC Area to adjacent Reliability Coordinators within an Interconnection and Reliability Coordinators who request and indicate a reliability-related need for those limits, and to the Transmission Operators, Transmission Planners, and Planning Coordinators within its Reliability Coordinator Area.</p> <p><b>4.1.</b> The Reliability Coordinators shall provide any updates to the SOL</p>	<p>The proposed Requirement R4 maintains the part of existing FAC-014-3 Requirement R5 which requires the TC to send the SOLs for its RC Area to adjacent RCs. The SDT has created a new/separate requirement related to communicating established IROLs (see proposed FAC-014-4 Requirement R5).</p> <p>The SDT added Part 4.1 to require the RC to provide updates to the SOLs to the impacted TOPs. It is expected that the RC and TOPs will establish a mutually agreeable means (pursuant to IRO-010-2 and TOP-003-3) for exchanging dynamically determined Facility Ratings or stability limitations.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <b><u>FAC-014-2 Requirement R5</u></b> – Requires the TOP to establish SOLs consistent with the RC SOL Methodology.</li> </ul>

**Proposed Reliability Standard: FAC-014-3, Requirement R4**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p>values established as part of Requirement R1 or Requirement R3 to impacted TOPs in its Reliability Coordinators Area in a mutually agreeable periodicity and format.</p>		

**Proposed Reliability Standard: FAC-014-3, Requirement R5**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R5.</b> Each Reliability Coordinator with an established IROL shall provide the following IROL information to adjacent Reliability Coordinators within an Interconnection, to other Reliability Coordinators that indicate a reliability-related need for the information, and to the Transmission Operators, Transmission Planners, and Planning Coordinators within its Reliability Coordinator Area:</p> <p><b>5.1.</b> Identification of the Facilities that are critical to the derivation of the IROL.</p>	<p>See above explanation. This requirement was previously combined with the requirement to provide updates to both SOLs and IROLs (existing FAC-014-3 Requirement R5). The SDT separated these into two requirements – one for SOL and one for IROL – so that greater detail could be provided regarding the type of IROL-information that must be communicated by the RC.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <b><u>FAC-014-2 Requirement R5</u></b> – Requires the TOP to establish SOLs consistent with the RC SOL Methodology.</li> </ul>

**Proposed Reliability Standard: FAC-014-3, Requirement R5**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>5.2.</b> The value of the IROL and its associated IROL <math>T_v</math>.</p> <p><b>5.3.</b> The associated Contingency(ies).</p> <p><b>5.4.</b> The type of limitation represented by the IROL (<i>e.g.</i>, voltage collapse, angular stability).</p>		

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R6.</b> Each Reliability Coordinator with an established IROL shall provide the following IROL information to Transmission Owners and Generation Owners within its RC Area:</p> <p><b>6.1.</b> Identification of the Facilities that are owned by that entity, which are critical to the derivation of the IROL.</p>	<p>In <a href="#">FERC Order No. 777</a>, FERC directed NERC to develop a means to assure that IROLs are communicated to transmission owners (<i>see</i>, P6 and P41). The purpose of this proposed requirement is to address the concerns raised by FERC in Order No. 777. The RC is required to provide the IROL information identified in Part 6.1 to Transmission Owners and Generator Owners in its RC Area. The SDT included Generator Owners because it believes that GOs, in addition to TOs, need to receive information relating to facilities that are critical to the derivation of the IROL. The SDT did not combine this with proposed Requirement R5 because the team believes that the owners only need IROL information related to their facilities that are critical to the</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>N/A</u>: This proposed requirement is intended to address the issues raised in FERC Order No. 777.</li> </ul>

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
	derivation of the IROL. However, the owners do not need the information identified in proposed Parts 5.2 through Part 5.4, and further, this information may contain sensitive operator information not appropriate for open-ended sharing.	

**Proposed Reliability Standard: FAC-014-3, Requirement R7**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R7.</b> The Transmission Operator shall provide any SOLs and updates to those limits to its Reliability Coordinator and to the Transmission Service Providers that share its portion of the Reliability Coordinator Area.</p>	<p>The SDT did not make substantive changes to this requirement; however, the requirement previously existed as a “part” of a requirement and it is now a stand-alone requirement.</p>	<p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC-014-2 Part 5.2</u> – Requires the TOP to provide its SOLs to the RC and Transmission Service Providers in its portion of the RC Area.</li> </ul>

**Proposed Reliability Standard: FAC-014-3, Requirement R8**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)

**Proposed Reliability Standard: FAC-014-3, Requirement R8**

Proposed New/Revised Requirement	Explanation of Proposed Revision	Relevant Requirements in Existing Reliability Standard(s)
<p><b>R8.</b> Each Planning Coordinator and Transmission Planner shall communicate the results of the stability analysis identified in its Planning Assessment and Transfer Capability assessment to each affected Reliability Coordinator and Transmission Operator. This shall include:</p> <p><b>8.1.</b> The type of the instability (<i>e.g.</i>, voltage collapse, angular instability, transient voltage dip criteria violation);</p> <p><b>8.2.</b> The Contingencies which result in the instability;</p> <p><b>8.3.</b> Any Remedial Action Scheme action, under voltage load shedding (UVLS) action, under frequency load shedding (UFLS) action, interruption of Firm Transmission Service, or Non-Consequential Load Loss that was employed (or invoked) to address the instability; and,</p> <p><b>8.4.</b> Any Corrective Action Plan associated with the instability.</p>	<p>Under proposed FAC-011-4 Part 4.4, the RC SOL Methodology must consider the stability limitations provided by the Planning Coordinator. Also, proposed FAC-014-3 Requirements R2 and R3, the applicable entities are required to establish stability limitations (if any) in accordance with the RC SOL Methodology. This requirement is intended to complement proposed FAC-011-4 Part 4.4 by ensuring that the planning entities provide the results of their stability analysis, including a list of those contingencies that are expected to produce the more severe System impacts, to the affected RC and TOP.</p> <p>This information may be relevant to the operating conditions for which the RC and TOP are determining SOLs. Further, FAC-013-2 requires that the PC have a methodology and annual assessment that identifies the weaknesses and limiting Facilities that could limit the ability of the Transmission System to reliably transfer energy. The results of the assessment, including the methodology used in the analysis, may contain information that may be relevant to the RC and TOP analysis for determining SOLs (and IROLs).</p>	<p><b><u>Background regarding existing standards <i>not</i> under revision by SDT:</u></b></p> <ul style="list-style-type: none"> <li>• <u>TPL-001-4</u></li> <li>• <u>FAC-013-2</u></li> </ul> <p><b><u>Mapping to existing FAC standards under revision:</u></b></p> <ul style="list-style-type: none"> <li>• <u>FAC -011-3 Part 3.3</u></li> <li>• <u>FAC -014-2 Requirement R6</u></li> </ul>