



Establishing and Communicating System Operating Limits

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- **Project 2015-09 Background**
- **SOLs and SOL Exceedances: Changes to FAC-011, FAC-014, and Associated Definitions**
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Project 2015-09 Background



- **Project 2015-09 was established following a Periodic Review Project (Project 2015-03) for FAC-010, FAC-011 and FAC-014**
 - The Project 2015-03 Periodic Review Team proposed retirement of FAC-010 and revision of FAC-011 and FAC-014 in its Periodic Review Recommendation (PRR).

- **The Project 2015-09 Standard Drafting Team (SDT) began work in December 2015**
 - The project purpose was to revise requirements for determining and communicating System Operating Limits (SOLs) used in the reliable planning and operation of the Bulk Electric System (BES).
 - Standard revisions focus on aligning FAC standards and treatment of SOLs with the previously revised TOP and IRO Reliability Standards.



- **The proposed standards and definitions passed Final Ballot in April and May 2021.**
- **NERC petitioned FERC for approval in June 2021.**
- **The Acting Director of the FERC Office of Electric Reliability issued a letter order March 4, 2022 approving the proposed standards and definitions, as well as the retirement of FAC-010-3.**
- **In accordance with the Implementation Plan, the effective date for the new standards versions and definition is April 1, 2024.**
 - Reference the Implementation Plan for additional provisions relating to specific standards and requirements.



SOLs and SOL Exceedances: Changes to FAC-011, FAC-014 and Associated Definitions



- **NERC Project 2015-09 Establish and Communicate System Operating SOLs modified FAC standards that address SOLs.**
 - The new standard versions become effective April 1, 2024.
- **The revisions focus on aligning FAC standards and treatment of SOLs within the TOP and IRO Reliability Standards.**
- **FAC standards provide the methodology for establishing and communicating what the SOL “is” and the TOP and IRO standards will address how operators operate to those limits, using their Operating Plans.**



- **System Operating Limit (Revised Definition Effective 4/1/2024)** – All Facility Ratings, System Voltage Limits and stability limits, applicable to specified System configurations, used in Bulk Electric System operations for monitoring and assessing pre- and post-Contingency operating states.
- **System Voltage Limit (New Term Effective 4/1/2024)** – The maximum and minimum steady-state voltage limits (both normal and emergency) that provide for acceptable System performance.



- **FAC-011-4 R1 Requires Reliability Coordinators (RCs) to have a documented SOL methodology.**
- **FAC-011-4 R2-R5 give specific requirements for the SOL methodology for determining different types of limits.**
 - R2 addresses Facility Rating SOLs
 - R3 addresses System Voltage Limit SOLs
 - R4 addresses stability limit SOLs
 - R5 addresses the set of Contingency events to be used in determining stability limits. R5 also addresses the set of Contingency events to be used in performing Operational Planning Analysis (OPA) and Real-time Assessments (RTAs)



- **Who uses the RC's SOL methodology to establish SOLs?**
 - Each RC shall establish IROLs (FAC-014-3 R1)
 - Each TOP shall establish SOLs for its portion of the RC Area (FAC-014-3 R2)
 - Each TOP shall provide its SOLs to its RC (FAC-014-3 R3)
 - Each RC shall establish stability limits for instability impacting adjacent RC Areas or more than one TOP (FAC-014-3 R4)

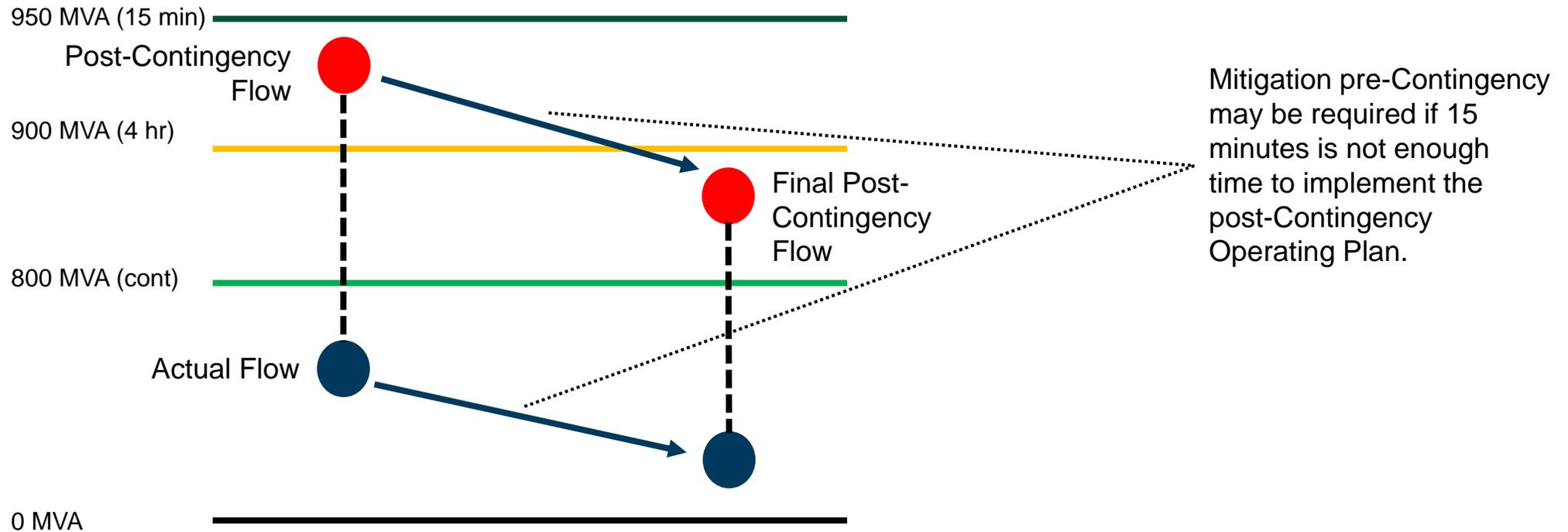
- **FAC-014-3 R5 and subparts require each RC to provide SOL and IROL information to PCs, TPs, TOPs, GOs and TOs.**



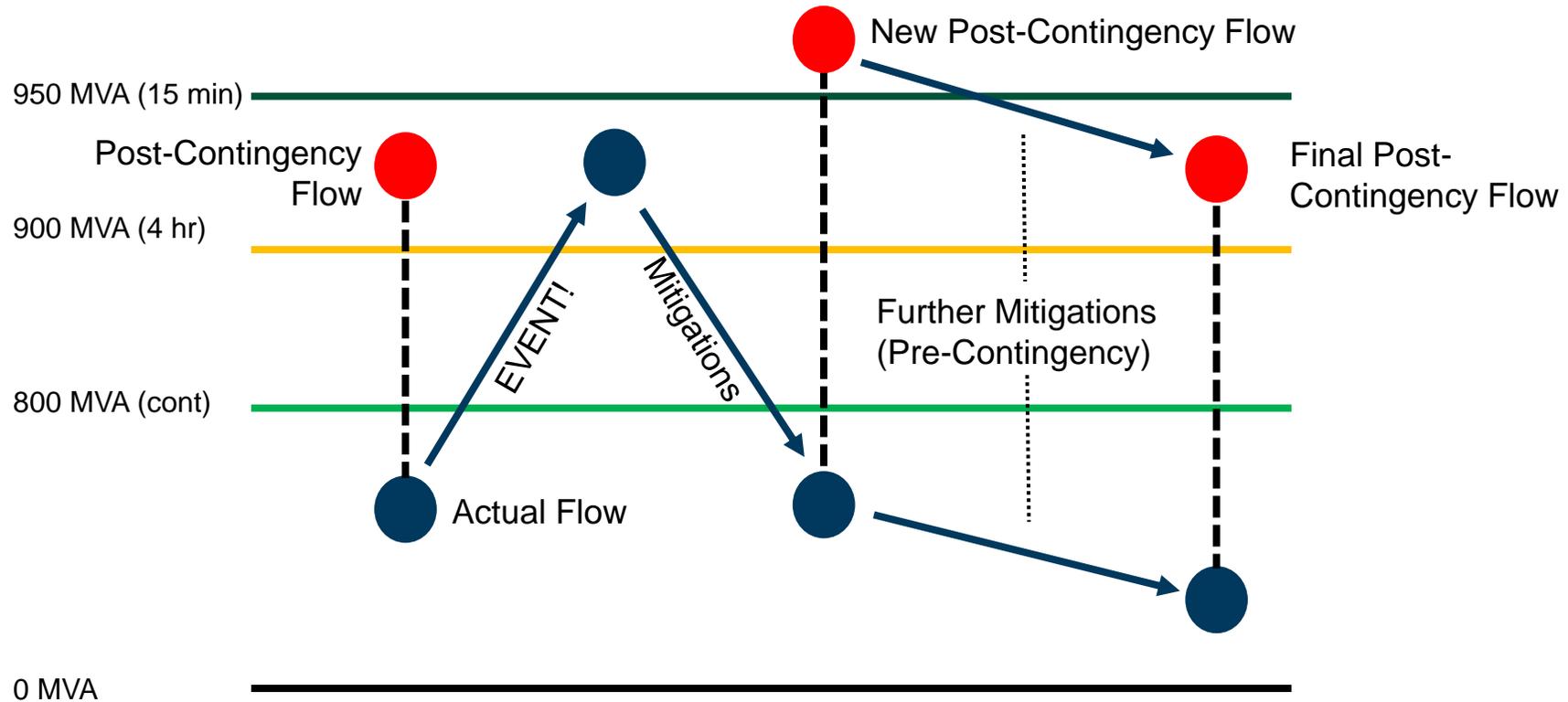
➤ What does it mean to exceed an SOL?

- FAC-011-4 R6 gives specific requirements for a performance framework for determining SOL exceedances.
- FAC-011-4 R7 requires the RC to document a risk-based approach for determining how exceedances must be communicated.
 - Sub-requirements describe specific types of SOL exceedances that must always be communicated.
 - Associated revisions to TOP-001 and IRO-008 specify that communications are to be made in accordance with the RC's SOL Methodology.
- Both pre-Contingency System conditions and expected post-Contingency System conditions can result in an SOL exceedance.

Scenario – Post-Contingency State May Require Pre-Contingency Mitigation



Scenario – An Actual Contingency Event Occurs



- **How are actual and potential SOL Exceedances identified?**
 - TOP-001-6 R25 (new) – The RC’s SOL methodology is to be used when determining SOL exceedances for Real-time Assessments (RTAs; R13), Real-time monitoring (R10), and Operational Planning Analysis (OPA; TOP-002-4 R1).
 - IRO-008-3 R7 (new) – The RC’s methodology is to be used when determining SOL exceedances for RTAs (R4), Real-time monitoring (R3) and OPA (R1).
- **Requirements to have and initiate Operating Plans are unmodified (TOP-001-3 R14, TOP-002-4 R2, IRO-008-2 R2)**
- **What communications are required when an actual or potential SOL Exceedance are identified?**
 - TOP-001-6 R15 (revised) – Notification requirements for the TOP to inform RC of actions taken when an SOL has been exceeded are established in the RC’s SOL methodology.
 - IRO-008-3 R5 and R6 (revised) – Notification requirements for the RC to notify impacted TOPs, BAs and RCs of SOL or IROL exceedances and the prevention or mitigation of SOL or IROL exceedances are established in the RC’s SOL methodology.



FAC-010 Retirement and New Framework for Communications Between Planning and Operations



- **FAC-010-3 Retired – Eliminating the concept of Planning Horizon SOLs and IROs**
- **New TP/PC Requirements R6-R8 in FAC-014-3**
 - R6 requires Facility Ratings, System steady-state voltage limits and stability criteria used in PC and TP Near Term Planning Assessments to be equally or more limiting the criteria in the RC's SOL methodology.
 - R7 requires the PC to communicate certain information to the impacted TOPs and RCs for CAPs developed to address instability.
 - R8 requires each PC and TP to annually communicate to impacted TOs and GOs lists of Facilities comprising planning event Contingencies that would cause instability, Cascading or uncontrolled separation adversely impacting the reliability of the BES.



- **FAC-003-5 – Consolidated R1 and R2 and revised <200kV Applicability to eliminate reference to Planning Coordinator IROs**
- **PRC-002-3 – Replaced “Responsible Entity” with RC in Applicability, R5, M5 and R11**
 - Eastern Interconnection applicability changing from PC to RC.
 - No Change in Western Interconnection.
- **PRC-023-5 – For the R6 annual PC assessment, Attachment B Criteria B.2 has been replaced to reflect the elimination of planning horizon IROs**
- **PRC-026-2 - The R1 annual PC notification criteria have been revised to reflect elimination of planning horizon SOLs**



Concluding Thoughts



- **Retirement of FAC-010-3 - The SDT agreed with the Project 2015-03 recommendation that SOLs are operational in nature and are not determined in “planning space”**
- **Revised SOL definition and new System Voltage Limit definition**
- **Revisions to FAC-011 and FAC-014 to improve handling of SOLs and SOL exceedances**
- **Associated changes to other standards**
- **Note: While Interconnection Reliability Operating Limits (IROLs) were an initial focus of the SDT, the absence of industry-vetted technical documentation on IROLs led to the establishment of the Methods for Establishing IROLs Task Force (MEITF)**



- **RCs likely need to update existing SOL Methodologies.**
- **TOPs should collaborate with their RC on developing and implementing the updated SOL Methodology.**
- **The planning criteria used by PCs and TPs must be at least as limiting as the SOL Methodology of the applicable RC.**
- **TOs and GOs should pay attention to communications from RCs and PCs regarding to changes to applicable Facilities for FAC-003, PRC-002, PRC-023, and PRC-026.**
- **Review and understand the Implementation Plan timeframes for applicable standards.**
- **Do not leave internal controls and evidence generation/retention as an afterthought.**



Questions & Answers

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