



Methodology for Determining System Operating Limits for the Planning Horizon

(NERC Standard FAC-010-3)

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Version 2

Document Revision History

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1. Introduction

This document is to provide the System Operating Limit (SOL) methodology as required in NERC FAC-010-3. The BES in the New York Control Area consists of the BPS (NPCC Bulk Power System) system and the non-BPS system. The SOL methodology for the BPS system is defined in the Northeast Power Coordinating Council (NPCC) Directory #1 – Design and Operation of the Bulk Power System. The SOL methodology for the non-BPS BES is described within this document. Basic principles for this SOL non-BPS methodology include:

- This SOL methodology is applicable for developing SOLs in the planning horizon.
- SOLs shall not exceed associated Facility ratings.
- An Interconnection Reliability Operating Limit (IROL) would be defined as System Operating Limit that, if violated, could lead to instability, uncontrolled separation, or Cascading outages that adversely impact the reliability of the Bulk Electric System.
- An IROL T_v would be defined as described in FAC-014-2 and identified by the Reliability Coordinator.

2. Study Model

2.1. Generation Dispatch

The system generation representation for the NYCA, including but not limited to long term planned generation outages, additions and retirements, will be consistent with the current NYISO FERC Form No. 715 filing and NYISO “Load and Capacity Data” report (Gold Book). Local generation in the vicinity of the SOL may need to be adjusted to better determine the appropriate SOL.

2.2. Transmission System Topology

The transmission system topology for the NYCA, including but not limited to long term planned transmission outages, additions and retirements, should be consistent with the current NYISO FERC Form No. 715 filing and “Load and Capacity Data” report.

2.3. System Demand

The load forecast and model used in the determination of an SOL should be consistent with the current NYISO FERC Form No. 715 filing and “Load and Capacity Data” report. Load in the vicinity of the SOL may need to be adjusted to more appropriately determine the appropriate SOL. For example, the load level may be adjusted to a non-coincident peak level.

2.4. Projected Transmission Uses

The interchange schedule with external systems that is modeled in the NYISO FERC Form No. 715 cases is determined by the Eastern Interconnection Reliability Assessment Group Multi-Area Modeling Working Group (ERAG MMWG) and consistent with the current FERC Form No. 715 filing. PAR schedules used should be consistent with the NYISO FERC Form No. 715 filing cases; any changes to those schedules should be documented in the SOL determination and should not conflict with any contractual arrangements. There are no firm transfers within the NYCA.

2.5. SPS/RAS Uses

Any applicable SPS/RAS (Special Protection Scheme/Remedial Action Scheme) may be used consistent with the description for the SPS/RAS.

2.6. Parallel Path

The system representation explicitly models tie-line schedules between NYCA and all neighboring Areas (ISO-NE, IESO, PJM, and Hydro-Quebec); therefore, there is no loop flow adjustment required for the SOL determination. Any parallel path impacts on inter-regional and intra-regional interfaces

are captured in the simulation studies; any changes to those schedules should be documented in the SOL determination.

2.7. Reference Documents

In determining SOL's on the non-BPS, the assumptions and criteria applied as they may relate to the NYS BPS system, are consistent with the following NYISO planning and operation practices:

- NYISO Transmission Expansion and Interconnection Manual
 - Attachment F, NYISO Transmission Planning Guidelines #1-1, Guideline for System Reliability Impact Studies; Section 2.4.2 Impact on System Performance and Transfer Limits (Thermal, Voltage, and Stability)
 - Attachment G, NYISO Transmission Planning Guidelines #2-1, Guideline for Voltage Analysis and Determination of Voltage-Based Transfer Limits
 - Attachment H, NYISO Transmission Planning Guidelines #3-1, Guideline for Stability Analysis and Determination of Stability-Based Transfer Limits
- NYISO Emergency Operations Manual
 - Attachment A.7 Procedure for Relief of Potential Overloads on Non-ISO Controlled NERC Bulk Electric System (BES) Facilities

Also, when determining SOL's on the non-BPS, to the extent that BPS elements are impacted, the methodology for the BPS elements should be consistent with the following regional and state reliability criteria and rules:

- NPCC Directory #1 – Design and Operation of the Bulk Power System describes the transmission Design Criteria applicable to each Balancing Area within the NPCC Region;
- New York State Reliability Council (NYSRC) Reliability Rules for planning and operating the New York State Bulk Power System.

3. Contingency Description

3.1. Contingencies

Contingency selection for determination of SOLs shall be:

- NERC TPL Standard Table 1

These contingencies would be identified by the NYISO on the BPS system and the local Transmission Planner for the non-BPS BES system.

3.2. Monitored Facilities

Bulk Electric System elements will be monitored when determining an SOL.

4. Analysis

4.1. Pre-contingency

In the pre-contingency state and with all Facilities in service, the BES shall demonstrate transient, dynamic and voltage stability; all Facilities shall be within their Facility Ratings and within their thermal, voltage and stability limits.

4.2. Post-contingency

Following the single Contingencies identified below, the system shall demonstrate transient, dynamic and voltage stability; all Facilities shall be operating within their Facility Ratings and within their thermal, voltage and stability limits; and Cascading or uncontrolled separation shall not occur.

- Single line to ground or three-phase Fault (whichever is more severe), with Normal Clearing, on any Faulted generator, line, transformer, or shunt device.
- Loss of any generator, line, transformer, or shunt device without a Fault.
- Single pole block, with Normal Clearing, in a monopolar or bipolar high voltage direct current system.
- Any additional TPL-001-4 single contingency

Starting with all Facilities in service and following any of the multiple Contingencies identified in Reliability Standard TPL-001-4 the system shall demonstrate transient, dynamic and voltage stability;

all Facilities shall be operating within their Facility Ratings and within their thermal, voltage and stability limits; and Cascading or uncontrolled separation shall not occur.

4.3. Post-contingency adjustments

Starting with all Facilities in service, the system's response to a single Contingency, may include any of the following:

- Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the Faulted Facility or by the affected area.
- System reconfiguration through manual or automatic control or protection actions.

To prepare for the next Contingency, system adjustments may be made, including changes to generation, uses of the transmission system, and the transmission system topology.

In determining the system's response to any of the multiple Contingencies identified in Reliability Standard TPL-001-4, and in addition to the other actions noted in this Section 4.3, the following shall be acceptable:

Planned or controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted Firm (non-recallable reserved) electric power Transfers; all as consistent with the TPL standard.

5. Distribution and Notification of Methodology Document

5.1. Methodology Distribution

The issuance of the original or revised versions of this document will include an email notification for the following entities:

- Each Planning Coordinator (PC) adjacent to NYCA
- Each Reliability Coordinator and Transmission Operator that operates any portion of the NYCA.
- Each Transmission Planner (TP) within NYCA
- Any Planning Authority that indicates they have a reliability-related need for this methodology.

6. Appendix A (NERC Standard Mapping Table)

Table 1: NERC FAC-010-2.1 Standard Mapping Table

Requirement	Text of Requirement	Methodology Section
R1.	The Planning Authority shall have a documented SOL Methodology for use in developing SOLs within its Planning Authority Area. This SOL Methodology shall:	See Below
R1.1.	Be applicable for developing SOLs used in the planning horizon.	1
R1.2.	State that SOLs shall not exceed associated Facility Ratings.	1
R1.3.	Include a description of how to identify the subset of SOLs that qualify as IROLs.	1
R2	The Planning Authority's SOL Methodology shall include a requirement that SOLs provide BES performance consistent with the following:	See Below
R2.1	In the pre-contingency state and with all Facilities in service, the BES shall demonstrate transient, dynamic and voltage stability; all Facilities shall be within their Facility Ratings and within their thermal, voltage and stability limits. In the determination of SOLs, the BES condition used shall reflect expected system conditions and shall reflect changes to system topology such as Facility outages:	4.1
R2.2	Following the single Contingencies ¹ identified in Requirement 2.2.1 through Requirement 2.2.3, the system shall demonstrate transient, dynamic and voltage stability; all Facilities shall be operating within their Facility Ratings and within their thermal, voltage and stability limits; and Cascading or uncontrolled separation shall not occur:	See Below
R2.2.1	Single line to ground or three-phase Fault (whichever is more severe), with Normal Clearing, on any Faulted generator, line, transformer, or shunt device.	4.2
R2.2.2	Loss of any generator, line, transformer, or shunt device without a Fault	4.2
R2.2.3	Single pole block, with Normal Clearing, in a monopolar or bipolar high voltage direct current system	4.2
R2.3	Starting with all Facilities in service, the system's response to a single Contingency, may include any of the following:	See Below
R2.3.1	Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the Faulted Facility or by the affected area.	4.3
R2.3.2	System reconfiguration through manual or automatic control or protection actions.	4.3
R2.4	To prepare for the next Contingency, system adjustments may be made, including changes to generation, uses of the transmission system, and the transmission system topology.	4.3

Requirement	Text of Requirement	Methodology Section
R2.5	Starting with all Facilities in service and following any of the multiple Contingencies identified in Reliability Standard TPL-003 the system shall demonstrate transient, dynamic and voltage stability; all Facilities shall be operating within their Facility Ratings and within their thermal, voltage and stability limits; and Cascading or uncontrolled separation shall not occur.	4.3
R2.6	In determining the system's response to any of the multiple Contingencies, identified in Reliability Standard TPL-003, in addition to the actions identified in R2.3.1 and R2.3.2, the following shall be acceptable:	See Below
R2.6.1	Planned or controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, and/or the curtailment of contracted Firm (non-recallable reserved) electric power Transfers.	4.3
R3.	The Planning Authority's methodology for determining SOLs, shall include, as a minimum, a description of the following, along with any reliability margins applied for each:	See Below
R3.1.	Study model (must include at least the entire Planning Authority Area as well as the critical modeling details from other Planning Authority Areas that would impact the Facility or Facilities under study).	2 (all)
R3.2.	Selection of applicable Contingencies.	3.1 and 4.2
R3.3.	Level of detail of system models used to determine SOLs.	2.2
R3.4.	Allowed uses of Remedial Action Schemes.	2.5
R3.5	Anticipated transmission system configuration, generation dispatch and Load level.	2.1, 2.2, 2.3
R3.6.	Criteria for determining when violating a SOL qualifies as an Interconnection Reliability Operating Limit (IROL) and criteria for developing any associated IROL Tv.	1
R4.	The Planning Authority shall issue its SOL Methodology, and any change to that methodology, to all of the following prior to the effectiveness of the change:	See Below
R4.1.	Each adjacent Planning Authority and each Planning Authority that indicated it has a reliability-related need for the methodology.	5.1
R4.2.	Each Reliability Coordinator and Transmission Operator that operates any portion of the Planning Authority's Planning Authority Area.	5.1
R4.3.	Each Transmission Planner that works in the Planning Authority's Planning Authority Area.	5.1