New York ISO
Independent System Operator

Loss of ISO-NE Source Impact on Post-Contingency Central-East Voltage Limits

A Report by the
New York Independent System Operator

December 2023

DRAFT – FOR DISCUSSION PURPOSES ONLY

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EXECUTIVE SUMMARY

This report reviews and recommends updates to the New England Source Contingency limits as a follow-up to the "Central-East Voltage Limit Study (CEVC-24)" report dated September 2023. The NYISO defines maximum Loss of ISO New England Source Contingency Limits on ISO New England's system operations to ensure that large capacity contingencies will not result in exceedance of voltage collapse limits on the New York Central East interface. New England sources do not contribute directly to Central East Voltage Collapse (CEVC) Transfer Limits, rather, they impact Central East flows post-contingency. The limits are defined in terms of a NE Source Contingency Limit and a Central East Post Contingency Offset.

From examination of post-contingency flows in this study it has been determined that the changes to the New York transmission system will support an increased limit. It is recommended that the minimum limit for the loss of ISO-NE source be increased to 1,500 MW from the present 1,320 MW. The post-contingency distribution factor was found to be 0.33, which results in a new post-contingency offset of 495 MW.

The recommended updates to the limits are shown in Figure 1 of this report and constitute a 180 MW increase in the maximum threshold limit for the permissible ISO New England Source Contingency Limit for the most common operating configurations. This increase can be attributed to system upgrades as part of the Segment A project that have significantly increased transfer capability on the Central-East interface. As the electric system evolves through time future evaluations may increase or decrease the ISO-NE source contingency that the NY system can support.

Introduction

NYISO staff have completed a voltage analysis to assess the loss of a ISO-NE source contingency on Central East voltage performance based on summer peak system conditions. This analysis was initiated to review and update the current New England Source Contingency Limits with respect to the limiting Central East Voltage Collapse Transfer Limits. The limits are based on an all-lines-in-service case.

The purpose of this study is to identify the largest source contingency that can be sustained without violating the NYISO Central East Voltage Collapse limit under all possible NYISO and ISONE system conditions. Since it is not possible to anticipate or evaluate all possible simultaneous system conditions in both regions, conservative assumptions are employed in the analysis.

These limits do not affect dispatch or market conditions for New York and only affect New England operationally. The effect is to limit the impact of a loss of New England source capacity on the Central East interface. Since Central East is limited by voltage collapse, care must be taken that the post-contingency flow on Central East from a loss of New England source does not induce voltage collapse. Therefore, the post-contingency flow from a loss of New England source must be limited, within reason, so as not to restrict flows on Central East pre-contingency.

Observations and Recommendations

From the latest Central-East Voltage Limit study it was found that a loss of source capacity in New England has a distribution factor of approximately 0.32 on Central-East. The existing loss-of-source limits are based on a distribution factor of 0.3. The increase in distribution factor is mainly due to the addition of the Edic-Princetown 345 kV 351 & 352 lines as part of the Segment A project. In the latest study, it was also found that Central-East Voltage Collapse is not significantly limited by the loss of the Phase II HVDC loaded at 1,500 MW due to these system upgrades. Thus, the largest loss-of-ISONE-source was selected at 1,500 MW. The post-contingency distribution factor was set, conservatively, at 0.33. Based on the analysis, it is recommended that the ISO New England Source Contingency limits be adjusted as summarized in Figure 1.

Figure 1 - Recommended Limit Updates

	Current Limit (MW)	Recommended Limit (MW)
ISONE Source Limit	1,320	1,500
CEVC Post-Contingency Offset	400 (30%)	495 (33%)

Potentially higher levels of New England source operation are permissible, provided that Central East is operating below the pre-contingency voltage collapse limit defined by NYISO contingencies. The pre-contingency voltage collapse limit supports 495 MW of transfer across Central-East in the event of the largest source contingency in ISO-NE. The 1,500 MW limit defines the maximum operational level of a New England resource whenever Central-East is binding or at its limit.

Study Assumptions and Methodology

Central-East Base Case Development and Analysis

All details regarding base case development, analysis, results, conclusions, and recommendations are available in the report *2024 Central-East Voltage Limit Study*, approved by the Operating Committee, September 2023[1].

Study Criteria

This analysis was conducted in accordance with the "NYSRC Reliability Rules, Standards for Planning and Operating the New York ISO Bulk Power System"[2] and "NPCC Regional Reliability Reference Directory # 1 Design and Operation of the Bulk Power System"[3].

The NYISO Transmission Expansion and Interconnection Manual[4], Attachment G: NYISO Transmission Planning Guideline #2-1 "Guideline for Voltage Analysis and Determination of Voltage-Based Transfer Limits" describes the methodology employed to determine voltage transfer limits.

A pre-contingency kV limit is determined when the post-contingency voltages fall below the post-

[1] 2024 Central-East Voltage Limit Study

[2] https://www.nysrc.org/wp-content/uploads/2023/07/RRC-Manual-V46-final.pdf

[3] NPCC Directory 1

[4] NYISO Transmission Expansion and Interconnection Manual

contingency low voltage limit. In this analysis the pre-contingency low voltages were recorded at the highest transfer at which the post-contingency low solved voltage reached the defined post-contingency low limit. The NYISO post-contingency low voltages employed in the analysis are found in the NYSO Emergency Operations Manual, Attachment A, Table A-2 "NYISO Voltage Limits".

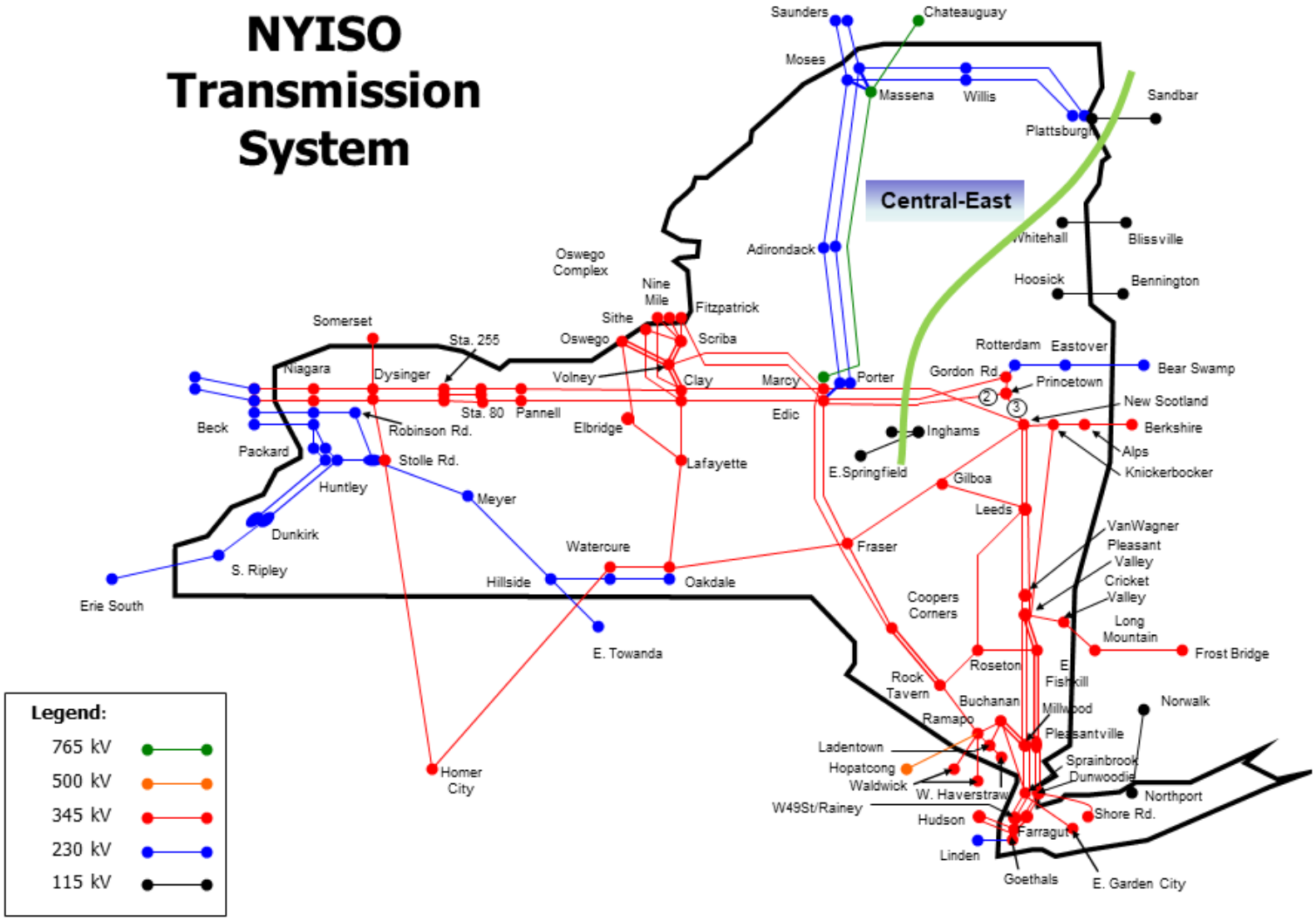
Central-East Definition

The Central-East interface definition is given below in Figure 2 and illustrated in Figure 3. The Edic-Princetown 345kV 351 and 352 circuits are a new addition to the interface definition.

Figure 2 - Central-East Interface Definition

CENTRAL EAST		
Mohawk Valley (Zone E) – Capital (Zone F)		
Name	**Line ID**	**Voltage (kV)**
Edic-Gordon Road*	14	345
Marcy-New Scotland*	18	345
East Springfield-Inghams*	7-942	115
Inghams PAR	PAR	115
Inghams Bus Tie	R81	115
Edic*-Princetown	351	345
Edic*-Princetown	352	345
North (Zone D) – ISONE (Zone N)		
*Plattsburgh-Sand Bar	PV20	115

Figure 3 - NYISO Transmission System (Central-East inset)



Determination of Distribution Factors

The Central-East Voltage Collapse limits were developed with derates for generating units that significantly impacted the limits. Derates were developed to address the outages of Oswego Complex units (Nine Mile1, Nine Mile 2, Fitzpatrick, Oswego 5 & Oswego 6), Independence units 1-6 and Athens units 1-3.

New England source losses do not contribute directly to CEVC Transfer Limits, rather, they impact Central East flows post-contingency. The largest source contingency was evaluated as a flat value, under peak load conditions, with the conservative assumption that the Athens plant was off-line. This is a reasonable assumption, as the plant dispatches at a roughly 33% capacity factor. The tested largest source contingency was 1,500 MW, a standard test level for the Phase II HVDC line in New England.

The observed post-contingency impacts on Central East for the loss of a New England source are shown in Figure 4. Based on this data a post-contingency Central East distribution factor is determined conservatively to be 0.33 of the New England source.

Figure 4 - L/O NE Source Distribution Factors

# of Oswego AVRs IS	Pre-Contingency CE Flow	Post-Contingency CE Flow	Post – Pre	DFAX (Based on 1,500 MW Source)
0	3308	3785	477	0.318
1	3398	3873	475	0.317
2	3485	3961	476	0.317
3	3507	3985	478	0.318
4	3568	4041	473	0.315
5	3686	4151	465	0.31

Conclusions

The data supports a minimum limit for the loss of ISO-NE source of 1,500 MW with a post-contingency distribution factor of 0.33, which results in post-contingency offset of 495 MW.