



NYISO OPERATING STUDY

SUMMER 2013

Prepared by
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New York Independent System Operator, Inc.

**Approved by NYISO Operating Committee
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NYISO OPERATING STUDY - SUMMER 2013

I. INTRODUCTION

The following report, prepared by the Operating Studies Task Force (OSTF) at the direction and guidance of the System Operations Advisory Subcommittee (SOAS), highlights the significant results of the thermal analysis completed for the summer 2013 capability period. This analysis indicates that, for the summer 2013 capability period, the New York interconnected bulk power system can be operated reliably in accordance with the "NYSRC Reliability Rules for Planning and Operating the New York State Power System" and the NYISO System Operating Procedures.

Transfer limits cited in this report are based on the forecast peak load conditions and are intended as a guide to system operation. Changes in generation dispatch or load patterns that significantly change pre-contingency line loadings may change limiting contingencies or limiting facilities, resulting in higher or lower interface transfer capabilities.

System Operators should monitor the critical facilities noted in the included tables along with other limiting conditions while maintaining bulk power system transfers within secure operating limits.

II. PURPOSE

The purpose of the study is to determine:

- The total transfer capabilities (TTC) between NYISO and adjacent areas including IESO, PJM and ISO-NE for **normal conditions** in the summer/winter periods. The TTC is calculated based on NERC TPL-002-0b Category B contingencies and a set of selected NERC TPL-003-0a Category C contingencies.
- The TTC between NYISO and adjacent areas including IESO, PJM and ISO-NE for **emergency conditions** in the summer/winter periods. The TTC is calculated based on NERC TPL-002-0b Category B contingencies.

This study is being performed to fulfill NERC requirements, which include Requirement R2 of FAC-013 and Requirement R11 of TOP-002-2a as quoted below.

"FAC-013-1—Establish and Communicate Transfer Capabilities

Requirement R2: The Reliability Coordinator and Planning Authority shall each provide its inter-regional and intra-regional Transfer Capabilities to those entities that have a reliability-related need for such Transfer Capabilities and make a written request that includes a schedule for delivery of such Transfer Capabilities as follows:

R2.1. The Reliability Coordinator shall provide its Transfer Capabilities to its associated Regional Reliability Organization(s), to its adjacent Reliability Coordinators, and to the Transmission Operators, Transmission Service Providers and Planning Authorities that work in its Reliability Coordinator Area.

R2.2. The Planning Authority shall provide its Transfer Capabilities to its associated Reliability Coordinator(s) and Regional Reliability Organization(s), and to the Transmission Planners and Transmission Service Provider(s) that work in its Planning Authority Area."

"TOP-002-2a—Normal Operations Planning

Requirement R11: The Transmission Operator shall perform seasonal, next-day, and current-day Bulk Electric System studies to determine System Operating Limits (SOLs). Neighboring Transmission Operators shall utilize identical SOLs for common facilities. The Transmission Operator shall update these Bulk Electric System studies as necessary to reflect current system conditions; and shall make the results of Bulk Electric System studies available to the Transmission Operators, Balancing Authorities (subject to confidentiality requirements), and to its Reliability Coordinator."

III. STUDY PARTICIPANTS

First Name	Last Name	Company Name	First Name	Last Name	Company Name
Anie	Philip	LIPA	David	Mahlmann	NYISO
Michael	Del Casale	LIPA	Robert	Golen	NYISO
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Matthew	Antonio	National Grid	Henry	Wysocki	ConEd
Brian	Gordon	NYSEG	Zahid	Qayyum	ConEd
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Farzad	Farahmand	IESO	Yuri	Smolanitsky	PJM
Pedro	Rebillion	IESO	Jonathan	Mendoza	IESO
Ovidiu	Vasilachi	IESO			

IV. SYSTEM REPRESENTATION AND BASE STUDY ASSUMPTIONS

A. System Representation

The representation was developed from the NYISO Data Bank and assumes the forecast summer coincident peak load of 33,279 MW. The other NPCC Balancing Area and adjacent Regional representations were obtained from the RFC-NPCC summer 2013 Reliability Assessment power flow base case.

Generation Resource Changes

The generator output levels for major units are summarized in Appendix B, and are consistent with typical operation for the period. The inter-Area schedules represented in the study base case are summarized in Appendix A. The following table shows generation retirements and additions since the summer 2012 capability period:

Retirements

Niagara Biogen	-0 MW
Kensico Hydro Project	-3 MW
Montauk Diesels 2, 3 & 4	-6 MW
Dunkirk 1 (Mothballed)	-75 MW
Dunkirk 3 (Mothballed)	-185 MW
Dunkirk 4 (Mothballed)	-185 MW
Danskammer	- 495 MW
Total Retirements	-949 MW

Additions

Marble River Wind Farm (Nameplate)	215 MW
Total Additions	215 MW

Significant changes since the summer 2012 capability period include:

Transmission Facilities Changes

Hudson Transmission Partners
 Patnode 230 kV Substation
 Beck to Packard (BP76) 230 kV tie line returned to service
 Lockport to Sweden (111) 115 kV line
 Ramapo Phase Angle Regulator (PAR) 4500
 Moses to Massena (MMS2) 230 kV line remains out-of-service

The Hudson Transmission Partners line consists of a back to back DC converter constructed in PSE&G Bergen substation located in Ridgefield, NJ that will tie into Con Edison's West 49th St. 345 kV substation in Manhattan, NY via a 345 kV cable.

Patnode is a 230 kV Substation on the NYPA 230 kV system between Willis and Plattsburgh in northern New York.

The Beck to Packard (BP76) 230 kV tie line has returned to service for the summer 2013 operating period.

The Lockport to Sweden (111) 115 kV line has returned to service for the summer 2013 operating period.

The Ramapo PAR 4500 is expected to be out-of-service through the fall of 2013.

Moses to Massena (MMS2) 230 kV line will remain out-of-service for the summer 2013 operating period.

B. Base Study Assumptions

The Siemens PTI PSS™MUST and PSS™E software packages were used to calculate the thermal limits based on Normal and Emergency Transfer Criteria defined in the "NYSRC Reliability Rules for Planning and Operating the New York State Power System". The thermal transfer limits presented have been determined for all transmission facilities scheduled in service during the summer 2013 period.

The schedules used in the base case power flow for this analysis assumed a net flow of 1,000 MW from Public Service Electric & Gas (PSE&G) to Consolidated Edison via the PAR transformers controlling the Hudson – Farragut and Linden – Goethals interconnections, and 1,000 MW on the South Mahwah – Waldwick circuits from Consolidated Edison to PSE&G, controlled by the PARs at Waldwick. The Branchburg – Ramapo 500 kV (5018) circuit is scheduled in accordance with the "Ramapo Phase Angle Regulator Operating Procedure", December 11, 1987. For the summer 2013 base case, the schedule for the tie is 0 MW from PJM to New York. The four Ontario – Michigan PARs are modeled in-service and scheduled to a 0 MW transfer. These schedules are consistent with the scenarios developed in the RFC-NPCC Inter-Regional Reliability Assessment for summer 2013, and the MMWG summer 2013 power flow base cases. The series reactors on the Dunwoodie – Mott Haven (71 and 72), the Farragut – Gowanus (41 and 42) 345 kV and the Sprain Brook – W. 49th St. (M51 and M52) 345 kV cables, as well as the E. 179th St. – Hell Gate (15055) 138 kV feeder are in-service in the base case. The series reactors on the Sprain Brook – East Garden City (Y49) 345 kV cable are bypassed.

V. DISCUSSION

A. Resource Assessment

Load and Capacity Assessment

The forecast peak demand for the summer 2013 capability period is 33,279 MW. This forecast is approximately 16 MW (0.05%) lower than the forecast of 33,295 MW for the summer 2012 capability period, and 660 MW (1.94%) lower than the all-time New York Control Area (NYCA) seasonal peak of 33,939 MW, which occurred on August 2, 2006.

The Installed Capacity (ICAP) requirement for the summer period is 38,936 MW based on the NYSRC 17.0% Installed Reserve Margin (IRM) requirement for the 2013-2014 Capability Year. NYCA generation capacity for summer 2013 is 37,920 MW, and net external capacity purchases of 1,969 MW have been secured for the summer period. The combined capacity resources represent a 19.9% margin above the forecast peak demand of 33,279 MW. These values were taken from the 2013

Load & Capacity Data report produced by the NYISO, located at:

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2013_GoldBook.pdf

The equivalent forced outage rate is 5.0%, and includes forced outages and de-ratings based on historical performance of all generation in the NYCA. For summer 2012, the equivalent forced outage rate assumed was 4.5%.

B. Cross-State Interfaces

1. TRANSFER LIMIT ANALYSIS

This report summarizes the results of thermal transfer limit analyses performed on power system representation modeling the forecast peak load conditions for summer 2013. Normal and emergency thermal limits were calculated according to Normal and Emergency Transfer Criteria definitions in the "NYSRC Reliability Rules for Planning and Operating the New York State Power System". Facility ratings applied in the analysis were from the online MW ratings in the EMS, and are detailed in Appendix D. Generation shifts assumed for the thermal analysis are detailed in Appendix I.

Figure 1 presents a comparison of the summer 2013 thermal transfer limits to summer 2012 transfer limits. Changes in these limits from the previous years are due to changes in the base case load flow generation and load patterns that result in different pre-contingency line loadings, changes in limiting contingencies, or changes in circuit ratings, or line status. Appendix H presents a summary comparison of Cross-State thermal transfer limits between summer 2013 and 2012, with limiting element/contingency descriptions. Significant differences in these thermal transfer limits are discussed below.

Summer 2013/Summer 2012

- (1) Dysinger East
- (2) West Central
- (3) Total East
- (4) Central East
- (5) UPNY - ConEd
- (6) Spm / Dun - South
- (7) ConEd - LIPA
- (8) Moses South

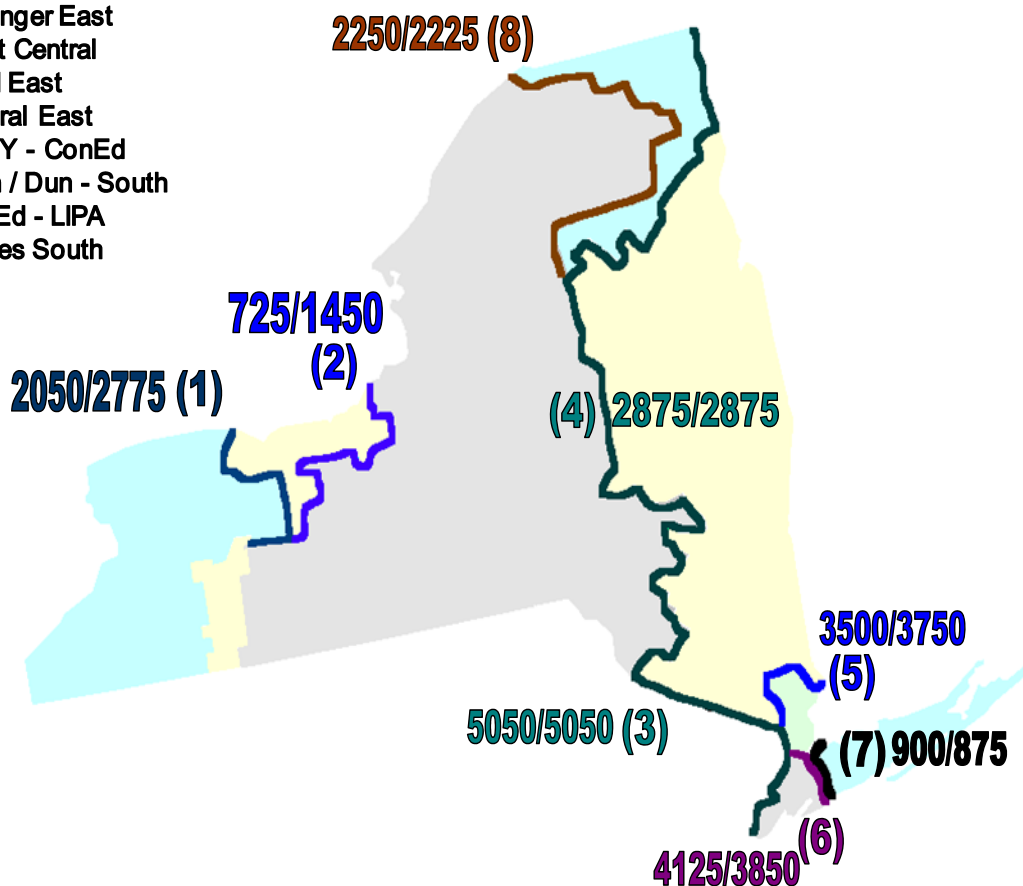


Figure 1 – Cross-State Thermal Transfer Limits

Dysinger East and West Central interface peak load thermal transfer limits decreased 725 MW. This peak load limitation is due to higher 230 kV transmission power flows between Niagara and the Dunkirk stations, for the conditions studied. These limits are sensitive to load in Zone A and flow toward PJM on Dunkirk-Erie 230 kV tie. Generation dispatch also affects the system constraints as it affects the flows on the 230 kV system. The limits would be further decreased by higher load levels and/or higher flows into PJM, and/or generation outages. The primary driver for these limit reductions is the mothballing of approximately 445 MW at Dunkirk.

Absent the load impacts, for instance at 70% peak load in Zone A, Dysinger East and West Central would increase by approximately 100 MW relative to 2012, due to the return of the Lockport-Sweden 115kV line. Depending on system conditions Dysinger East can be thermally limited between 2000 and 2800 MW. The potential variation in the West Central limits would be similar.

UPNY - ConEd interface thermal transfer limits decreased 250 MW. This is due to both the reduction in generation capability in the Hudson Valley and the reduction in Branchburg – Ramapo flows due to the Ramapo PAR outage.

Spain Brook/Dunwoodie South interface thermal transfer limits increased 275 MW. This is due to the increase in the limiting elements' normal and emergency ratings.

2. ATHENS SPS

In 2008 a Special Protection System (SPS) went in-service, impacting the thermal constraint on the Leeds to Pleasant Valley 345 kV transmission corridor. The SPS is designed to reject

generation at the Athens combined-cycle plant if either the Leeds to Pleasant Valley 345 kV (92) circuit or the Athens to Pleasant Valley 345 kV (91) circuit are out-of-service and the flow on the remaining circuit is above the LTE rating. Generation at Athens will be tripped until the flow is below the LTE rating, the out-of-service circuit recloses, or the remaining circuit trips. This SPS is expected to be active when there is generation on-line at the Athens station, and will allow the NYCA transmission system to be secured to the STE rating of the 91 line for the loss of the 92 line, and vice-versa, for normal operating conditions. The SPS increases the normal thermal limit to match the emergency thermal limit across the UPNY-ConEd operating interface when the 91 or 92 are the limiting circuit. The Table 1 “Emergency” limit for the UPNY-ConEd interface can be interpreted as the “Normal” limit, when the Athens SPS is active.

3. SENSITIVITY TESTING

The thermal limits presented in Section VI were determined using the base conditions and schedules. The effects of various intra- and inter-Area transfers or generation patterns in the system are presented in Appendix G. Certain graphs indicate that there may not be a measurable sensitivity to the specific variable condition (summer peak load), or the sensitivity may occur at transfer levels above other transfer constraints (e.g., voltage or transient stability limitations). This analysis demonstrates how the particular constraint (thermal transfer limits) may respond to different conditions.

Phase angle regulator schedules may vary from day-to-day. A sensitivity analysis for selected interfaces has been included for the Ramapo and St. Lawrence interconnections. Graphs showing the sensitivity of the interface limit to the PAR schedule are included in Appendix G.

4. WEST WOODBOURNE TRANSFORMER

The Total-East interface may be limited at significantly lower transfer levels for certain contingencies that result in overloading of the West Woodbourne 115/69 kV transformer. Should the West Woodbourne tie be the limiting facility, it may be removed from service to allow higher Total-East transfers. An over-current relay is installed at West Woodbourne to protect for contingency overloads.

5. CONED – LIPA TRANSFER ANALYSIS

Normal transfer capabilities were determined using the base case generation dispatch and PAR settings as described in Appendix B. Emergency limits are dispatch dependant, and can vary based on generation and load patterns in the LIPA system.

For emergency transfer capability analysis, the PARs controlling the LIPA import were adjusted to allow for maximum transfer capability into LIPA:

<u>ConEd – LIPA PAR Settings</u>		
	Normal	Emergency
Jamaica – Lake Success 138 kV	-165 MW	85 MW
Jamaica – Valley Stream 138 kV	-123 MW	90 MW
Sprain Brook – E. Garden City 345 kV	637 MW	637 MW
<u>ISO-NE – LIPA PAR Settings</u>		
Norwalk Harbor – Northport 138 kV	100 MW	286 MW

The PAR schedules referenced above and the ConEd – LIPA transfer assessment assume a 70% loss factor and rapid oil circulation in the determination of the facility ratings.

Emergency Transfer via the 138 kV PAR-controlled Jamaica ties between ConEdison and LIPA

Con Edison and LIPA have determined possible emergency transfer levels via the Jamaica - Valley Stream (901) 138 kV and Jamaica - Lake Success (903) 138 kV PAR-controlled ties that could be used to transfer emergency power between the two entities during peak conditions. The emergency transfer levels were calculated in both directions, for system peak load conditions with all transmission lines in service and all generation available for full capacity.

ConEd to LIPA emergency assistance

Based on analysis of historical conditions performed by LIPA and Con Edison, Con Edison anticipates being able to supply a total flow up to 175 MW of emergency transfer from Con Edison to Long Island, if requested, via the ties.

LIPA to ConEd emergency assistance

LIPA anticipates being able to supply a total flow up to 510 MW of emergency transfer from Long Island to Con Edison, if requested, via the ties.

6. TRANSFER LIMITS FOR OUTAGE CONDITIONS

Transfer limits for scheduled outage conditions are determined by the NYISO Scheduling and Market Operations groups. The NYISO Real-Time Dispatch system monitors the EHV transmission continuously to maintain the secure operation of the interconnected system.

7. TRANSIENT STABILITY AND VOLTAGE TRANSFER LIMITS

The interface transfer limits shown in Section VI are the results of a thermal transfer limit analysis only. Transient stability and voltage interface transfer limits for all lines in-service and line outage conditions are summarized and available through the NYISO website located at:

http://www.nyiso.com/public/markets_operations/market_data/reports_info/index.jsp

C. Thermal Transfer Capabilities with Adjacent Balancing Areas

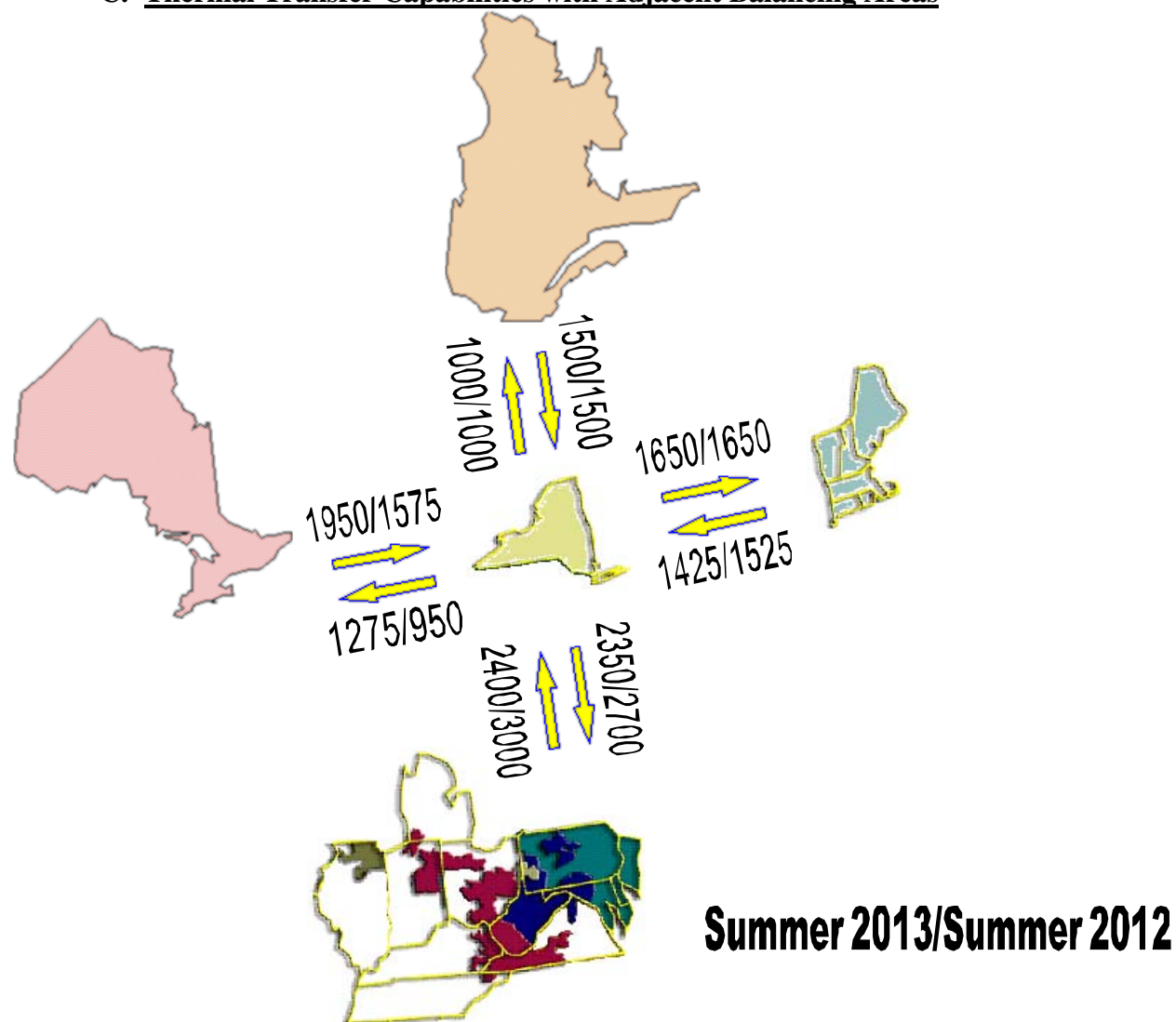


Figure 2 – Inter-Area Thermal Transfer Capabilities¹

Thermal transfer limits between New York and adjacent Balancing Areas are also determined in this analysis. These transfer limits supplement, but do not change, existing internal operating limits. There may be facilities internal to each system that may reduce the transfer limits between Balancing Areas. Reductions due to these situations are considered to be the responsibility of the respective reliability authority. Some of these potential limitations are indicated in the summary tables by “[Reliability Coordinating] Facility” limits, which supplement the “Direct Tie” limits between the Balancing Areas. Transfer conditions within and between neighboring Balancing Areas can have a significant effect on inter- and intra-Area transfer limits. Coordination between Balancing Areas is necessary to provide optimal transfer while maintaining the reliability and security of the interconnected systems.

New England – New York interface thermal transfer limit decreased 100 MW. This is due to the redistribution of base case flows on the 345 kV New York – New England ties to provide a consistent basis in determining the summer and winter transfer limits, along with the Plattsburgh – Sandbar (PV20) 115 kV PAR controlled line to 100 MW flow into New England.

¹ TE-NY transfer capabilities shown in Figure 2 are not thermal transfer limits; for more information see Section V.B.4.

Ontario – New York interface peak load thermal transfer limit increased by 375 MW. This is mainly due to the return of the Beck to Packard (BP76) 230 kV tie line.

New York – Ontario interface thermal transfer limit increased 325 MW. This is mainly due to the return of the Beck to Packard (BP76) 230 kV tie line.

PJM – New York interface thermal transfer limit decreased 600 MW. This is mainly due to the Branchburg to Ramapo 345 kV PAR 4500 being modeled out-of-service.

New York – PJM interface thermal transfer limit decreased 350 MW. This is mainly due to the Branchburg to Ramapo 345 kV PAR 4500 being modeled out-of-service.

1. NEW YORK – NEW ENGLAND ANALYSIS

a) New England Transmission/Capacity Additions

Transmission

New England had a number of new transmission facilities installed in western Massachusetts including 345 kV lines terminating at a new Agawam substation paralleling the existing 345 kV path from western Massachusetts to Connecticut. A modest number of 115 kV topology changes will follow the 345 kV upgrades. Concurrently, preparatory work is occurring in Maine for a set of 345 and 115 kV upgrades.

Capacity

No major generation additions or retirements are scheduled before the summer 2013 operating period.

b) Thermal Transfer Limit Analysis

The transfer limits between the NYISO and ISO New England for normal and emergency transfer criteria are summarized in Section VI, Table 2.

c) Cross-Sound Cable

The Cross-Sound Cable is an HVdc merchant transmission facility connecting the New Haven Harbor 345 kV (United Illuminating, ISO-NE) station and Shoreham 138 kV (LIPA, NYISO) station. It has a design capacity of 330 MW. This facility is not metered as part of NYISO – ISO-NE interface, and HVdc transfers are independent of transfers between the NYISO and ISO-NE.

d) Smithfield – Salisbury 69 kV

CHG&E and Northeast Utilities will operate the Smithfield - Salisbury 69 kV (FV/690) line normally closed. The maximum allowable flow on this line is 28 MVA based on limitations in the Northeast Utilities 69 kV system. When the ISO-NE to NYISO transfer is greater than approximately 400 MW, however, the line will be opened, due to post contingency limits within the Northeast Utilities system. The FV/690 line has directional over-current protection that will trip the FV/690 Line in the event of an overload when the flow is into Northeast Utilities, no protection exists that will trip the FV/690 Line in the event of an overload when the flow is into NYISO.

e) Northport – Norwalk Harbor Cable Flow

Flow on the NNC Norwalk Harbor to Northport, facility is controlled by a phase angle-regulating (PAR) transformer at Northport. As system conditions vary the following may

be used to optimize transfer capability between the Balancing Areas. The thermal transfer limits are presented in Table 2 for different PAR schedule assumptions on the Northport – Norwalk Harbor interconnection. Exhibits in Appendix G graphically demonstrate the optimization of transfer capability by regulating the flow on the Northport-Norwalk Harbor tie.

f) Whitehall – Blissville 115 kV

The phase angle regulator on this circuit will control pre-contingency flow between the respective stations. VELCO, National Grid, ISO-NE and NYISO developed a joint operating procedure. For the summer 2013 analyses, the pre-contingency schedule is 0 MW from Blissville (ISO-NE) to Whitehall (NYISO). The scheduled flow may be adjusted to protect the National Grid local 115 kV transmission south of Whitehall for 345 kV contingency events in southern Vermont.

g) Plattsburgh – Sand Bar 115 kV (i.e. PV20)

The phase angle regulating transformer at the VELCO Sand Bar substation was modeled holding a pre-contingency flow of approximately 0 MW on the PV20 tie. This modeling assumption was premised upon common operating understandings between ISO-NE and the NYISO given local operating practice on the Moses – Willis – Plattsburgh 230 kV transmission corridor. ISO-NE's analysis examined and considered New England system limitations given this modeling assumption and did not examine generation dispatch / system performance on the New York side of the PV20 tie for this analysis.

2. NEW YORK - PJM ANALYSIS

a) Thermal Transfer Limit Analysis

The transfer limits for the New York - PJM interface are summarized in Section VI, Table 3. The phase angle regulating transformers controlling the Branchburg – Ramapo 500 kV circuit are used to maintain flow at the normal rating of the Ramapo 500/345 kV transformer (1,000 MW) in the direction of the transfer. Ramapo #2 PAR is expected to be out-of-service through the fall of 2013, hence will have a potential to reduce transfer capability between NYISO-PJM.

b) Opening of PJM - New York 115 kV Ties as Required

The normal criteria thermal transfer limits presented in Section VI were determined for an all lines in-service condition. The 115 kV interconnections between First Energy and New York (Warren - Falconer, North Waverly - East Sayre, and Laurel Lake - Westover) may be opened in accordance with NYISO and PJM Operating Procedures provided this does not cause unacceptable impact on local reliability in either system. Over-current protection is installed on the Warren - Falconer and the North Waverly - East Sayre 115 kV circuits; either of these circuits would trip by relay action for an actual overload condition. There is no overload protection on the Laurel Lake - Westover circuit, but it may be opened by operator action if there is an actual or post-contingency overload condition. However, opening the Laurel Lake – Westover tie could potentially cause local thermal and pre- and post-contingency voltage violations for the 34.5 kV distribution system within New York. Sensitivity analysis performed indicated that the thermal and voltage conditions were exacerbated for conditions that modeled high simultaneous interface flows from New York to PJM and New York to Ontario.

c) DC Ties

Neptune DC tie is expected to be available at full capability, 660 MW, for summer 2013, pending New Bridge road 345/138 kV transformer replacement. HTP DC tie is expected to be in commercial operations, construction activities associated with the network upgrades are in progress.

d) Variable Frequency Transformer Tie

The Variable Frequency Transformer Tie is a transmission facility connecting the Linden 230 kV (PSEG, PJM) to Linden 345 kV (ConEd, NYISO). For the summer 2013 analysis, the pre-contingency schedule is 300 MW from PSEG to ConEd.

3. ONTARIO – NEW YORK ANALYSIS

a) Thermal Transfer Limit Analysis

The thermal transfer limits between the NYISO and Ontario's Independent Electricity System Operator (IESO) Balancing Areas for normal and emergency transfer criteria are presented in Section 4, Table 4. The thermal transfer limits between NY and Ontario were determined for two scheduled transfers in either direction on the phase angle regulating (PAR) transformers controlling the L33P and L34P interconnections at St. Lawrence: One transfer at 0 MW and one at 300 MW.

The 300 MW transfer on L33P and L34P is the interconnection flow limit across these ties, as presented in table 4.3 "Interconnection Total Transfer Capability (TTC) Limits" from the document "Ontario Transmission System" available at:

<http://www.ieso.ca/imoweb/monthsYears/monthsAhead.asp>

In addition, the Beck-Packard (BP76) 230 kV tie-line between Ontario and New York has returned in service since last winter after a long-term outage for several years.

Transient Stability Limitations

Transient stability limits for the NYISO - IESO interconnection are reported in "NYPP-OH TRANSIENT STABILITY TESTING REPORT on DIRECT TIE TRANSFER CAPABILITY - OCTOBER 1993" available at:

http://www.nyiso.com/public/webdocs/market_data/reports_info/operating_studies/NOH-1/NYPP-OH_1993.PDF

b) Ontario – Michigan PARs

All of the PARs on the four major transmission lines interconnecting Ontario and Michigan are in service and regulating. For this study, the PARs were scheduled to regulate at 0 MW, consistent with the ERAG Transmission System Assessment for summer 2013.

c) Impact of the Queenston Flow West (QFW) Interface on the New York to Ontario Transfer Limit

The QFW interface is defined as the sum of the power flows into Ontario on the 230 kV circuits out of Beck. The QFW is primarily equal to the algebraic sum of the following:

1. Total generation in the Niagara zone of Ontario including the units at the Beck #1, #2 & Pump Generating Stations, Thorold and Decew Falls GS

2. The total load in the zone
3. The import from New York.

For a given limit for QFW, the import capability from New York will depend on the generation dispatch and the load in the Niagara zone. The import capability from New York can be increased by decreasing the generation in the Niagara zone. An increase in the load in this zone would also increase the import capability.

4. TRANSÉNERGIE–NEW YORK INTERFACE

Thermal transfer limits between TransÉnergie (Hydro-Quebec) and New York are not analyzed as part of this study. Respecting the NYSRC and NYISO operating reserve requirements, the maximum allowable delivery into the NYCA from TransÉnergie on the Chateauguay – Massena (MSC-7040) 765 kV tie is limited to 1310 MW. However in real-time the total flow is limited to 1800 MW; the additional flow is a “wheel-through” transaction to another Balancing Authority Area. Maximum delivery from NYCA to Quebec on the 7040 line is 1000 MW.

The Dennison Scheduled Line represents a 115 kV dual-circuit transmission line that interconnects the New York Control Area to the Hydro-Quebec Control Area at the Dennison Substation, near Massena, NY. The Line has a nominal north to south capacity of 190 MW in summer, into New York, and a nominal south to north capacity of 100 MW into Quebec.

VI. SUMMARY OF RESULTS – THERMAL TRANSFER LIMIT ANALYSIS

Table 1 – NYISO CROSS STATE INTERFACE THERMAL LIMITS

- Table 1.a
 - Dysinger East
 - West Central
 - UPNY – ConEd
 - Sprain Brook – Dunwoodie So.
 - ConEd – LIPA Transfer Capability
- Table 1.b – MSC-7040 Flow Sensitivity
 - Central East
 - Total East
 - Moses South

Table 2.a – NYISO to ISO-NE INTERFACE THERMAL TRANSFER LIMITS

- Northport-Norwalk Flow Sensitivity

Table 2.b – ISO-NE to NYISO INTERFACE THERMAL TRANSFER LIMITS

- Northport-Norwalk Flow Sensitivity

Table 3.a – NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS

- 3-115 kV Ties I/S and O/S

Table 3.b – PJM to NYISO INTERFACE THERMAL TRANSFER LIMITS

- 3-115 kV Ties I/S and O/S

Table 4 – NYISO - IESO INTERFACE THERMAL TRANSFER LIMITS

- L33/34P Flow Sensitivity

TABLE 1.a

NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS-SUMMER 2013
ALL LINES I/S

	Dysinger East	West Central	UPNY - ConEd ₁	Sprain Brook Dunwoodie - So.	ConEd – LIPA Transfer Capability
NORMAL	2050 ⁽¹⁾	725 ⁽¹⁾	3500 ⁽³⁾	4125 ⁽⁵⁾	900 ⁽⁷⁾
EMERGENCY	2725 ⁽²⁾	1400 ⁽²⁾	4150 ⁽⁴⁾	4150 ⁽⁶⁾	1450 ⁽⁸⁾

LIMITING ELEMENT		Rating			LIMITING CONTINGENCY
(1)	Huntley – Sawyer (80) 230 kV	@LTE	654 MW	L/O	Huntley – Sawyer (79) 230 kV
(2)	Huntley – Sawyer (80) 230 kV	@STE	755 MW	L/O	Huntley – Sawyer (79) 230 kV
(3)	Leeds – Pleasant Valley (92) 345 kV	@LTE	1538 MW	L/O	Athens – Pleasant Valley (91) 345 kV
(4)	Leeds – Pleasant Valley (92) 345 kV	@STE	1724 MW	L/O	Athens – Pleasant Valley (91) 345 kV
(5)	Mott Haven – Rainey (Q11) 345 kV	@SCUC ₂	1066 MW	L/O	Mott Haven – Rainey (Q12) 345 kV Rainey 345/138 kV Transformer
(6)	Dunwoodie – Mott Haven (71) 345 kV	@NORM	707 MW		Pre-Contingency Loading
(7)	Dunwoodie – Shore Rd. (Y50) 345 kV	@LTE	914 MW ₃	L/O	(SB RNS2 @ Sprain Brook 345 kV) Sprain Brook – East Garden City (Y49) 345 kV Sprain Brook – Academy (M29) 345 kV
(8)	Dunwoodie – Shore Rd. (Y50) 345 kV	@NORM	653 MW ₃		Pre-Contingency Loading

1: See Section V.B.2 for discussion on Athens SPS

2: The rating used for cable circuits during SCUC reliability analysis is the average of the LTE and STE rating (SCUC Rating).

3: LIPA rating for Y50 circuit is based on 70 % loss factor and rapid oil circulation.

TABLE 1.b

NYISO CROSS-STATE INTERFACE THERMAL TRANSFER LIMITS-SUMMER 2013
ALL LINES I/S

	MSC-7040 FLOW 800 MW	MSC-7040 FLOW 1300 MW	MSC-7040 FLOW 1600 MW
CENTRAL EAST			
NORMAL	2850 ⁽¹⁾	2875 ⁽¹⁾	2900 ⁽¹⁾
EMERGENCY	3175 ⁽²⁾	3200 ⁽²⁾	3200 ⁽²⁾
TOTAL EAST			
NORMAL	4950 ⁽³⁾	5050 ⁽³⁾	5000 ⁽³⁾
EMERGENCY	5875 ⁽²⁾	5825 ⁽²⁾	5675 ⁽²⁾
MOSES SOUTH			
NORMAL	2050 ⁽⁴⁾	2250 ⁽⁶⁾	2175 ⁽⁶⁾
EMERGENCY	2350 ⁽⁵⁾	2750 ⁽⁷⁾	2675 ⁽⁷⁾

LIMITING ELEMENT		Rating		LIMITING CONTINGENCY	
(1)	New Scotland – Leeds (93) 345 kV	@LTE	1538 MW	L/O	New Scotland – Leeds (94) 345 kV
(2)	New Scotland – Leeds (93) 345 kV	@STE	1724 MW	L/O	New Scotland – Leeds (94) 345 kV
(3)	Fraser – Coopers Corners (33) 345 kV	@LTE	1404 MW	L/O	Double-circuit Tower 31&41 Marcy – Coopers Corners (UCC2-41) 345 kV Porter – Rotterdam (31) 230 kV
(4)	Moses – Adirondack (MA2) 230 kV	@LTE	386 MW	L/O	Chateauguay–Massena (MSC-7040) 765 kV Massena – Marcy (MSU1) 765 kV and TransÉnergie delivery
(5)	Moses – Massena (MMS1) 230 kV	@NORM	936 MW		Pre-Contingency Loading
(6)	Marcy 765/345 kV T2 Transformer	@LTE	1650 MW	L/O	Marcy 765/345 kV T1 Transformer
(7)	Marcy 765/345 kV T2 Transformer	@STE	1971 MW	L/O	Marcy 765/345 kV T1 Transformer

TABLE 2.a

NYISO to ISO-NE INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2013
ALL LINES I/S

New York to New England	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
Northport –Norwalk 100 MW			
NORMAL	1700 ⁽¹⁾	2825 ⁽³⁾	1625 ⁽⁵⁾
EMERGENCY	2300 ⁽²⁾	3050 ⁽⁴⁾	1625 ⁽⁵⁾
Northport –Norwalk 0 MW			
NORMAL	1650 ⁽¹⁾	2850 ⁽³⁾	1600 ⁽⁵⁾
EMERGENCY	2250 ⁽²⁾	3100 ⁽⁴⁾	1600 ⁽⁵⁾

LIMITING ELEMENT		Rating			LIMITING CONTINGENCY
(1)	Pleasant Valley – Long Mountain (398) 345 kV	@LTE	1313 MW	L/O	SB:MILLST 3:14T Beseck – Millstone (348) 345 kV Millstone G3 24 kV
(2)	Pleasant Valley – Long Mountain (398) 345 kV	@STE	1596 MW	L/O	Millstone G3 24.0 kV
(3)	New Scotland – Alps (2-AN) 345 kV	@LTE	1326 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV Pleasant Valley – East Fishkill (F37) 345 kV
(4)	Reynolds Rd – Greenbush (9-RG) 115 kV	@STE	398 MW	L/O	New Scotland – Alps (2-AN) 345 kV
(5)	Blandford – Granville Junction (1512) 115 kV	@STE	147 MW	L/O	Northfield – Ludlow (354) 345 kV

NOTE: Northport – Norwalk Harbor flow is positive in the direction of transfer
The Northport – Norwalk Harbor (NNC) line is no longer part of the New York – New England Interface Definition

TABLE 2.b

ISO-NE to NYISO INTERFACE THERMAL LIMITS – SUMMER 2013
ALL LINES I/S

New England to New York	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
Norwalk –Northport @ 0 MW			
NORMAL	1825 ⁽¹⁾	2600 ⁽⁵⁾	1350 ⁽⁷⁾
EMERGENCY	2200 ⁽²⁾	3350 ⁽⁶⁾	1400 ⁽⁸⁾
Norwalk –Northport @ 100 MW			
NORMAL	1825 ⁽¹⁾	2575 ⁽⁵⁾	1400 ⁽⁷⁾
EMERGENCY	2225 ⁽²⁾	3325 ⁽⁶⁾	1450 ⁽⁸⁾
Norwalk–Northport @ 200 MW			
NORMAL	1425 ⁽³⁾	2600 ⁽⁵⁾	1450 ⁽⁷⁾
EMERGENCY	2075 ⁽⁴⁾	3350 ⁽⁶⁾	1500 ⁽⁸⁾

LIMITING ELEMENT					LIMITING CONTINGENCY
(1)	Pleasant Valley – Long Mountain (398) 345 kV	@LTE	1313 MW	L/O	Alps – Berkshire (393) 345 kV Berkshire – Northfield Mount (312) 345 kV Berkshire 345/115 kV Transformer
(2)	Pleasant Valley – Long Mountain (398) 345 kV	@NORM	1135 MW		Pre-Contingency Loading
(3)	Northport – Norwalk Harbor (NNC) 138 kV	@LTE	513 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV Pleasant Valley – East Fishkill (F37) 345 kV
(4)	Northport – Norwalk Harbor (NNC) 138 kV	@STE	641 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(5)	New Scotland – Alps (2-AN) 345 kV	@LTE	1326 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(6)	New Scotland – Alps (2-AN) 345 kV	@STE	1685 MW	L/O	Pleasant Valley – Long Mountain (398) 345 kV
(7)	Norwalk Junction – Archers Lane (3403C) 345 kV	@LTE	850 MW	L/O	Southington 5T Stuck Breaker
(8)	Norwalk Junction – Archers Lane (3403C) 345 kV	@LTE	850 MW	L/O	Long Mountain – Frost Bridge (352) 345 kV

NOTE: Northport – Norwalk Harbor flow is positive in the direction of transfer.
The Northport – Norwalk Harbor (NNC) line is no longer part of the New York – New England Interface Definition

TABLE 3.a

NYISO to PJM INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2013
ALL LINES I/S

NYISO to PJM	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	1950 ⁽¹⁾	1950 ⁽³⁾	2300 ⁽⁶⁾
3-115-O/S	2350 ⁽²⁾	2275 ⁽⁴⁾	3175 ⁽⁷⁾
EMERGENCY	2025 ⁽⁸⁾	2100 ⁽⁵⁾	2300 ⁽⁶⁾
3-115-O/S	2475 ⁽⁹⁾	2425 ⁽¹⁰⁾	3175 ⁽⁷⁾

	LIMITING ELEMENT	Rating	LIMITING CONTINGENCY
(1)	North Waverly – East Sayre (956) 115 kV	@LTE 128 MW L/O	East Towanda – Hillside (70) 230 kV
(2)	Hillside – East Towanda (70) 230 kV	@LTE 531 MW L/O	Susquehanna G1
(3)	Oakdale – Goudey (939) 115 kV	@LTE 274 MW L/O	(Tower 72 & 69) Hillside – Watercure (69) 230 kV Stoney Ridge – Hillside (72) 230 kV
(4)	South Owego – Goudey (961) 115 kV	@LTE 131 MW L/O	(Tower 72 & 69) Hillside – Watercure (69) 230 kV Stoney Ridge – Hillside (72) 230 kV
(5)	Oakdale – Goudey (939) 115 kV	@NORM 238 MW	Pre-Contingency Loading
(6)	Towanda – East Sayre 115 kV	@EMER 131 MW L/O	Hillside – East Towanda (70) 230 kV
(7)	Homer City – Shelocta 230 kV	@EMER 917 MW L/O	Handsome Lake – Wayne 345 kV
(8)	North Waverly – East Sayre (956) 115 kV	@STE 143 MW L/O	East Towanda – Hillside (70) 230 kV
(9)	Hillside – East Towanda (70) 230 kV	@NORM 483 MW	Pre-Contingency Loading
(10)	South Owego – Goudey (961) 115 kV	@STE 143 MW L/O	Hillside – Watercure (69) 230 kV

NOTE: Emergency Transfer Capability Limits may have required line outages as described in Section V.C.2. PAR schedules have been adjusted in the direction of transfer.

TABLE 3.b

PJM to NYISO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2013
ALL LINES I/S

PJM to NYISO	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	1325 ⁽¹⁾	1850 ⁽⁶⁾	2025 ⁽³⁾
3-115-O/S	2400 ⁽²⁾	1975 ⁽⁷⁾	3075 ⁽¹¹⁾
EMERGENCY	1425 ⁽⁴⁾	2525 ⁽⁹⁾	2150 ⁽⁸⁾
3-115-O/S	2700 ⁽⁵⁾	2550 ⁽¹⁰⁾	3075 ⁽¹¹⁾

	LIMITING ELEMENT	Rating			LIMITING CONTINGENCY
(1)	Falconer – Warren (171) 115 kV	@LTE	116 MW	L/O	South Ripley – Dunkirk (68) 230 kV Gardenville – Dunkirk (73) 230 kV Gardenville – Dunkirk (74) 230 kV Dunkirk 230/115 kV Transformer Bank 31 Dunkirk 230/115 kV Transformer Bank 41
(2)	Dunkirk – South Ripley (68) 230 kV	@LTE	530 MW	L/O	Stolle Rd. – Homer City (37) 345 kV
(3)	Towanda – East Sayre 115 kV	@EMER	131 MW	L/O	(Stuck Breaker Hillside 230 kV) Hillside – Watercure (69) 230 kV Hillside – East Towanda (70) 230 kV Hillside 230/34.5 kV Transformer Hillside 115/34.5 kV Transformer
(4)	Falconer – Warren (171) 115 kV	@STE	119 MW	L/O	Erie East – Erie Southeast 230 kV
(5)	Dunkirk – South Ripley (68) 230 kV	@NORM	482 MW		Pre-Contingency Loading
(6)	North Waverly – Lounsberry 115 kV	@LTE	131 MW	L/O	Watercure – Oakdale (31) 345 kV Oakdale – Clarks Corners (36) 345 kV
(7)	Watercure 345/230 kV Transformer	@LTE	520 MW	L/O	Watercure – Oakdale (31) 345 kV Oakdale – Clarks Corners (36) 345 kV
(8)	Towanda – East Sayre 115 kV	@EMER	131 MW	L/O	Hillside – East Towanda (70) 230 kV
(9)	North Waverly – Lounsberry 115 kV	@STE	143 MW	L/O	Watercure – Oakdale (31) 345 kV
(10)	Watercure 345/230 kV Transformer	@STE	600 MW	L/O	Watercure – Oakdale (31) 345 kV
(11)	Towanda – North Meshoppen 115 kV	@EMER	172 MW	L/O	Canyon – North Meshoppen 230 kV

NOTE: Emergency Transfer Capability Limits may have required line outages as described in Section V.C.2. PAR schedules have been adjusted in the direction of transfer.

TABLE 4

NYISO - IESO INTERFACE THERMAL TRANSFER LIMITS - SUMMER 2013
ALL LINES I/S

	DIRECT TIE	NYISO FACILITY	IESO FACILITY		DIRECT TIE	NYISO FACILITY	IESO FACILITY
Ontario to New York		L33/34P 0 MW				L33/34P 300 MW	
NORMAL	1950 ⁽¹⁾	550 ⁽²⁾	2325 ⁽³⁾		2250 ⁽¹⁾	850 ⁽²⁾	2650 ⁽³⁾
EMERGENCY	2325 ⁽⁴⁾	1275 ⁽⁵⁾	2900 ⁽⁶⁾		2625 ⁽⁴⁾	1575 ⁽⁵⁾	3225 ⁽⁶⁾
New York to Ontario		L33/34P 0 MW				L33/34P 300 MW	
NORMAL	1275 ⁽⁷⁾		400 ^(3,10)		1550 ⁽⁷⁾		675 ^(3,10)
EMERGENCY	1700 ⁽⁸⁾		775 ^(9,10)		2000 ⁽⁸⁾		1050 ^(9,10)

	LIMITING ELEMENT		Rating		LIMITING CONTINGENCY
(1)	Beck – Niagara (PA27) 230 kV	@LTE	460 MW	L/O	Beck – Niagara (PA 301) 345 kV
(2)	Niagara – Packard (61) 230 kV	@LTE	717 MW	L/O	Niagara – Packard (62) 230 kV Beck – Packard (BP76) 230 kV
(3)	Q30M 230 kV	@LTE	393 MW	L/O	Q24HM + Q29HM 230 kV
(4)	Beck – Niagara (PA27) 230 kV	@STE	558 MW	L/O	Beck – Niagara (PA 301) 345 kV
(5)	Packard – Sawyer (77) 230 kV	@STE	704 MW	L/O	Packard – Sawyer (78) 230 kV
(6)	Q30M 230 kV	@NORM	370 MW		Pre-Contingency Loading
(7)	Beck – Niagara (PA27) 230 kV	@LTE	460 MW	L/O	Beck – Niagara (PA 301) 345 kV Q28A 230 kV Beck #2 units 19 & 20 + Thorold GS
(8)	Beck – Niagara (PA27) 230 kV	@NORM	400 MW		Pre-Contingency Loading
(9)	Q29HM 230 kV	@NORM	415 MW		Pre-Contingency Loading
(10)	This limit can be increased by reducing generation in the Niagara zone of Ontario. See Section V.C.3.c. for discussion.				