NYISO OPERATING STUDY

SUMMER 2008

Prepared by
Short Term Planning Staff
New York Independent System Operator, Inc.

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NYISO OPERATING STUDY - SUMMER 2008

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 2008 capability period. This analysis indicates that, for the Summer 2008 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, and result in higher, or lower, interface transfer capabilities.

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

II. 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 33,809 MW. The other NPCC Balancing Area and adjacent Regional representations were obtained from RFC-NPCC Summer 2008 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 2007:

Retirements	
Lovett 5	188.3 MW
Ogdensburgh	76.7 MW
Russell 1	47.2 MW
Russell 2	62.5 MW
Russell 3	48.5 MW
Russell 4	80.5 MW
Onondaga	78.3 MW
Total Retirements	**582 MW**
Additions	
Prattsburgh Wind Farm	55 MW
Munnsville Wind Farm	35 MW
Gilboa 2 Uprate	30 MW
Clinton Wind Farm	100 MW
Bliss Wind Farm	100 MW
Ellenburg Wind Farm	80 MW
Total Additions	**400 MW**

Significant changes since the Summer 2007 capability period include:

Transmission Facilities Changes

Re-conductor Northport – Norwalk Harbor 1385 Cable
Watercure 345/230 kV Transformer Bank Outage
Beck-Packard 230 kV (BP76) Tie-Line Outage
Millwood 240 MVAr Capacitor Bank Installation

The new three-circuit Northport-Norwalk Harbor 1385 Cable replaces the previous single-circuit and spare cable. The new cable will be operated respecting the same ratings as the previous cable.

The Watercure 345/230 kV transformer failed on January 30, 2008. NYSEG is considering options for replacing the transformer, but it is expected to be out of service for the duration of the Summer 2008 operating period. The transformer outage does not significantly impact thermal transfer limits analyzed in this study. However the outage will impact the voltage performance of the 230 kV transmission path from Stolle Rd to Watercure. During peak load conditions reactive power normally flows through the transformer from the 345 kV providing voltage support to the 230 kV. Without this connection to the 345 kV system, low voltage at Watercure 230 kV may be limiting under the same system conditions with the bank in-service. The NYISO and NYSEG are currently conducting voltage analyses for the Watercure 345/230 kV transformer bank outage.

The Millwood capacitor bank was modeled in-service for the summer peak conditions as it was expected to be in operation this summer. The capacitor bank has since been delayed until November 2008. It has no impact on the thermal limit analyses performed in this study.

B. Base Study Assumptions

The Siemens PTI PSS™MUST and PSS™E software packages are 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 2008 period.

The schedules used in the base case powerflow for this analysis assumed a net flow of 1,000 MW from Public Service Electric & Gas (PSE&G) to Consolidated Edison via the phase-angle-regulating (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 2008 base case, the schedule for the tie is 440 MW from PJM to New York. These schedules are consistent with the scenarios developed in the RFC-NPCC Inter-Regional Reliability Assessment for Summer 2008, and the MMWG Summer 2008 power flow base cases. The series reactors on the Dunwoodie – Mott Haven (71 and 72) and the Sprain Brook – W. 49th St. (M51 and M52) 345kV cables, as well as the E. 179th St. – Hell Gate (15055) 138kV feeder are in-service in the base case. The series reactors on the Sprain Brook – East Garden City (Y49) 345kV cable and the Farragut – Gowanus (41 and 42) 345kV cables are by-passed.

III. DISCUSSION

A. Resource Assessment

Load and Capacity Assessment

The forecast peak demand for the Summer 2008 capability period is 33,809 MW. This forecast is approximately 362 MW (1.08%) higher than the forecast of 33,447 MW for the Summer 2007 capability period, and 0.4% 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 38,880 MW based on the NYSRC 15% Installed Reserve Margin (IRM) requirement for 2008. NYCA generation capacity for Summer 2008 is 38,712 MW and net external capacity purchases of 2,802 MW have been secured for the summer period. The combined capacity resources represent a 22.8% margin above the forecast peak demand of 33,809 MW.

NYISO Peak Load and Capacity Assessment – Summer 2008

NYISO Installed Capacity	+	38,712
Net Capacity Purchases and Sales	+	2,802
Scheduled generation outages	-	0
Allowance for unplanned outages	-	3,195
Net capacity for load	=	**38,319**
NYISO Forecast Peak	-	33,809
Available Reserve	=	*4, 510*
Operating Reserve Requirement	-	1,800
Net Margin	=	**2,710**

The equivalent forced outage rate is 6.7% and includes forced outages and de-ratings based on historical performance of all generation in the NYCA. For Summer 2007 the equivalent forced outage rate assumed was also 6.7%.

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 2008. 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.

Figure 1 presents a comparison of the Summer 2008 thermal transfer limits to Summer 2007. 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 2008 and 2007, with limiting element/contingency descriptions. Significant differences in these thermal transfer limits are discussed below.

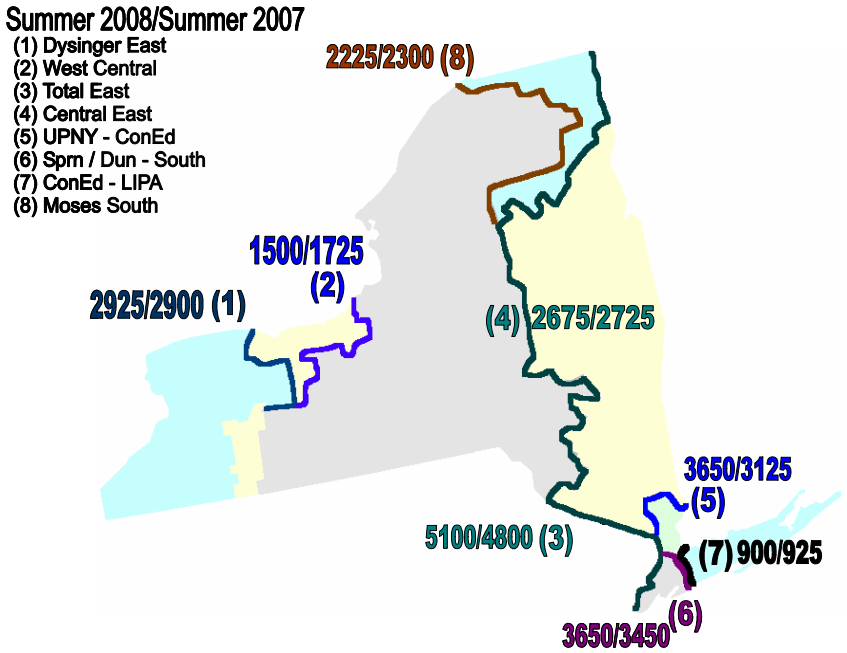

Figure 1 – Cross-State Thermal Transfer Limits

West Central interface limit decreased by 225 MW as a result of Russell Station retirement unloading the 115 kV circuits in the West Central interface.

UPNY – ConEd interface limit increased 525 MW and is the result of changes in generation commitment in the base case. Both Roseton units are online in this summer's base case compared to only one unit last summer. This increased loading on the Roseton – Fishkill 305 line and thus increases flow on the UPNY – ConEd interface.

Sprain Brook - Dunwoodie South interface limit increased 200 MW. This increase is due to load shifted to the Mott Haven station as compared to the previous summer, which results in lower flows on the limiting element and contingency for the same interface flow.

2. ATHENS SPS

By the Summer 2008 capability period a Special Protection System (SPS) is expected to be in-service, which will impact 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 345kV (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 IV 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 of graph 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. 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 115/69kV transformer. Should the West Woodbourne tie be the limiting facility, it may be removed from service to allow higher Total-East transfers. An overcurrent relay is installed at West Woodbourne to protect for contingency overloads.

5. CONED – LIPA TRANSFER ANALYSIS

Normal transfer limits 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 limit analysis the PARs controlling the LIPA import were adjusted to allow for maximum transfer capability into LIPA:

ConEd – LIPA PAR Settings	Normal	Emergency
Jamaica – Lake Success 138kV	-165 MW	85 MW
Jamaica – Valley Stream 138kV	-123 MW	90 MW
Sprain Brook – E. Garden City 345kV	630 MW	637 MW
ISO-NE – LIPA PAR Settings		
Norwalk Harbor – Northport 138kV	100 MW	286 MW

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

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

Con Edison and LIPA have determined possible emergency transfer levels via the Jamaica - Valley Stream (901) 138kV and Jamaica - Lake Success (903) 138kV 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 459 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 LIMITS

The thermal interface limits in Section IV do not include the results of transient stability testing. The current all lines in service and maintenance outage transient stability and voltage stability interface limits, are summarized and available through the NYISO website located at:

http://www.nyiso.com/public/webdocs/market_data/reports_info/oper_studies_sys_perf_reports/summary_nyiso_operating_limits.pdf

C. Thermal Transfer Capabilities with Adjacent Balancing Areas

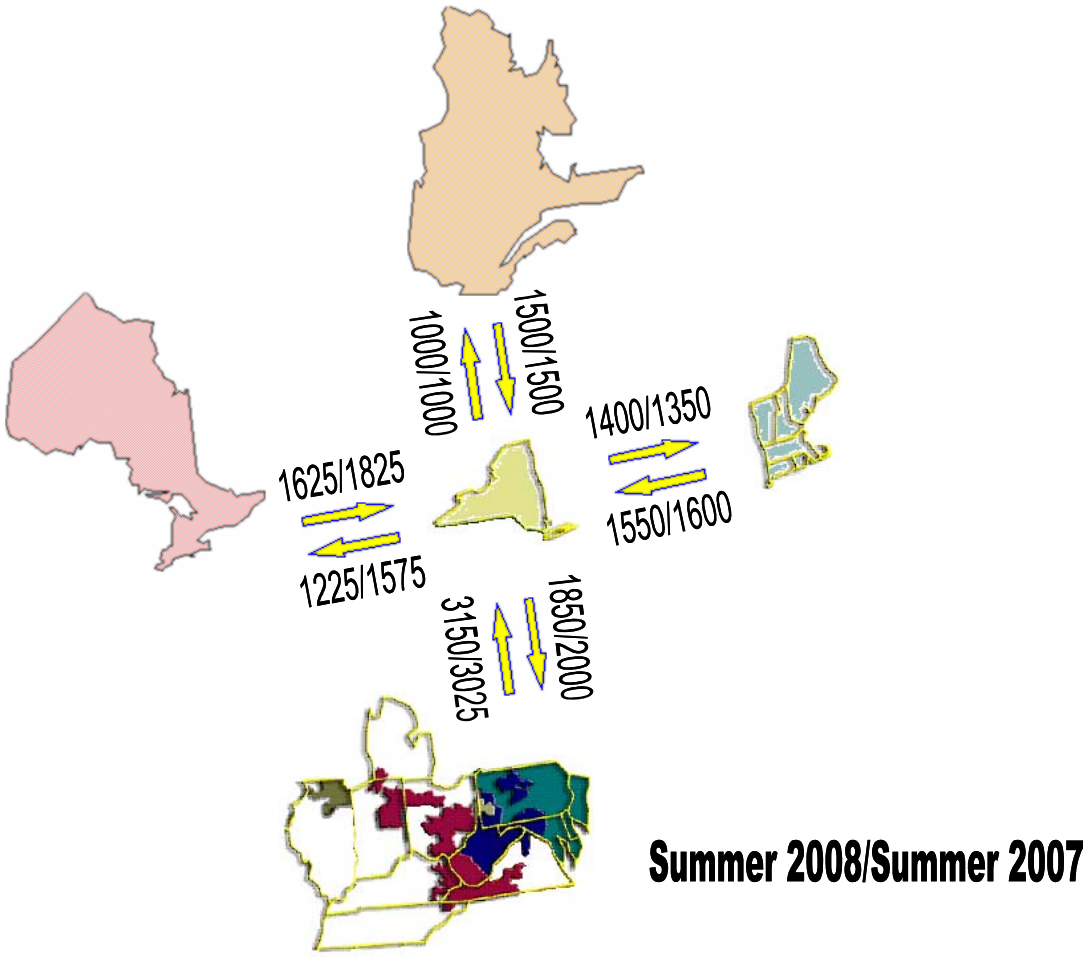

Figure 2 – Inter-Area Thermal Transfer Capabilities

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.

1. NEW YORK – ISO NEW ENGLAND ANALYSIS

a) New England Transmission/Capacity Additions

Transmission

A portion of the Southwest CT Phase II Middletown – Norwalk, project is expected to be energized in mid summer. This construction includes a new Beseck 345 kV substation, termination of the Millstone – Haddam – Southington 348 line into Beseck and the new 3754 line connecting from Beseck to Southington. Changes to the Devon area include new 345 kV and 115 kV substations at East Devon and the termination of Milford Power from Devon to East Devon substation. A new Barbour Hill 345 kV substation will tap the existing 395 line into a ring bus

leaving the southern section as 395 and the northern section named 3419. A new Trumbull substation has interconnected to the former 3-terminal 1730 line. The section from Trumbull to Weston has been renamed 1714. The undersea 1385 cable between Norwalk and Northport is expected to be available in June with TTC values in both directions to be 100 MW.

Capacity

In the New England Balancing Area, no significant capacity has been added since the previous summer 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 IV, Table 2.

c) Cross-Sound Cable

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

d) Smithfield – Salisbury 69kV

CHG&E and Northeast Utilities will operate the Smithfield - Salisbury 69 kV (FV/690) line normally open during the summer period due to post-contingency limits within the Northeast Utilities system. When the ISO-NE to NYISO transfer is less than approximately 400 MW, however, the line may be closed. When closed, the maximum allowable flow on this line is 28 MVA based on limitations in the Northeast Utilities 69 kV system. The FV/690 line has directional over-current protection that will trip the line in the event of an overload when the flow is into Northeast Utilities. This facility will not limit transfers between NYISO and ISO-NE.

e) Northport - Norwalk Harbor Cable Flow

The 1385 cable is expected to resume service in June. Flow on this 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 two 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.

New York to New England: With power flowing from New York to New England on the Northport to Norwalk Harbor (1385) cable, potential overloads of the Norwalk Harbor to Rowayton Junction (1867) and the Norwalk Harbor to Rowayton Junction (1880) circuits must be considered as follows:

- The flow from Norwalk Harbor to Rowayton Junction (1867) should not exceed 237 MVA (Normal rating of Norwalk Harbor to Rowayton Junction (1867).

- The flow from Norwalk Harbor to Rowayton Junction (1880) should not exceed 214 MVA (Normal rating of Norwalk Harbor to Rowayton Junction (1880)).

New England to New York: With power flowing from New England to New York on the Norwalk Harbor to Northport (1385) cable, potential overloads of the Trumbull to Weston (1714) and Trumbull Junction to Old Town (1710) circuits must be considered.

f) Whitehall – Blissville 115kV

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 2008 analyses, the pre-contingency schedule is 50 MW from Blissville (ISO-NE) to Whitehall (NYISO). The scheduled flow may be adjusted to protect the National Grid local 115kV transmission south of Whitehall for 345kV contingency events in southern Vermont.

g) Transient Stability Limitations

For certain system configurations, stability performance determines the transfer capability between the Balancing Areas. For those instances, the limits have been obtained from the report "1992-1996 NYPP-NEPOOL TRANSFER LIMIT STUDY - OCTOBER 1992." A new study of NYISO-ISO-NE transfer capability through 2009, including transient stability assessment, was approved in May 2007.

The stability limits are expressed in terms of the transfer on the "Northern Ties", i.e., excluding flow on the Norwalk Harbor – Northport circuit. Stability limits for transfers from New England to New York are a function of the New England MW load level, and include the effect of Northfield and Bear Swamp in the generating and pumping mode.

2. NEW YORK - PJM ANALYSIS

a) Thermal Transfer Limit Analysis

The transfer limits for the New York - PJM interface are summarized in Section IV, 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 (1000 MW) in the direction of the transfer.

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

The normal criteria thermal transfer limits presented in Section IV were determined for an all lines in-service condition. The 115kV interconnections between GPU Energy and New York (Warren - Falconer, North Waverly - East Sayre, and Laurel Lake - Goudey) 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 115kV circuits; either of these circuits would trip by relay action for an actual overload condition. There is no overload protection on the Laurel Lake - Goudey circuit, but it may be opened by operator action if there is an actual or post-contingency overload condition. However, opening the Laurel Lake – Goudey 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 NY to PJM and NY to Ontario.

3. ONTARIO – NEW YORK ANALYSIS

a) Thermal Transfer Limit Analysis

The thermal limits between the New York ISO and the Independent Electricity System Operator (IESO-Ontario) Balancing Areas for normal and emergency transfer criteria are presented in Section IV, Table 4. The transfer limits are determined for two assumed schedules on the phase angle regulating transformers controlling the L33P and L34P interconnections at St. Lawrence.

The Beck-Packard (BP76) 230kV tie between Ontario and New York will be out of service for the summer period, subsequently there is a decrease in the direct-tie transfer capability between the two Balancing Areas.

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."

b) Ontario – Michigan PARs

Phase Angle Regulating transformers are in service on the three of the four interconnections between Ontario and Michigan:

Lambton – St. Clair 345kV	L4D
Lambton – St. Clair 230kV	L51D
Keith – Waterman 230kV	J5D
Scott – Bunce Creek 230 kV	B3N

The PAR controlling the J5D circuit is controlling to 0 MW in the base case. The PARs controlling L4D and L51D circuits were placed in-service on April 14, 2008, and are represented in the powerflow base case holding fixed angle (free-flow MW). The fourth PAR on the B3N tie is being replaced, and is by-passed in the base case. These PARs will not be available to regulate power flow during normal operation on the Ontario – Michigan interface until an operating agreement among the parties has been finalized.

c) Generation Rejection for Loss of L33P/L34P-St. Lawrence Ties

The interface limits were determined for a particular load, transmission and generation pattern. When system conditions vary from those forecast in the study, normal interface limits may vary. Generation rejection special protection systems (SPSs) are available at Beauharnois, St. Lawrence/Saunders, and St. Lawrence/FDR to reject generation for the loss of the L33P and/or L34P interconnections. Ontario or NYPA operators consistent with system conditions can select these SPSs.

Of the two circuits, L33P is more limiting. At 0 degrees phase shift the limiting STE rating is 465 MVA (voltage regulator rating). The outage distribution factor for the loss of L34P is 0.601 and based on this, the maximum pre-contingency flow on each circuit should not exceed 290 MW. At 40 degrees phase shift the limiting STE rating is 334 MVA (PAR rating). The outage distribution factor for the loss of L34P is 0.462 and based on this, the maximum flow on each circuit should not exceed 228 MW.

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) 765kV tie is limited to 1200 MW. However in real-time the total flow is limited to 1800 MW; the additional flow is a “wheel-through” transaction to another Balancing Area. Maximum delivery from NYCA to Quebec on the 7040 line is 1000 MW.

IV. 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
- Table 1.b – MSC-7040 Flow Sensitivity
  - Central East
  - Total East
  - Moses South

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

- Northport-Norwalk Flow Sensitivity

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

- Northport-Norwalk Flow Sensitivity

Table 3.a – NYISO to PJM INTERFACE THERMAL LIMITS

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

Table 3.b – PJM to NYISO INTERFACE THERMAL LIMITS

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

Table 4 – NYISO - IESO INTERFACE THERMAL LIMITS

- L33/34P Flow Sensitivity

TABLE 1.a

NYISO CROSS-STATE INTERFACE THERMAL LIMITS - SUMMER 2008
ALL LINES I/S

	Dysinger East	West Central	UPNY-ConEd[1]	Sprain Brook-Dunwoodie So.	ConEd-LIPA
NORMAL	2925(1)	1500(1)	3650(3)	3650(5)	900(7)
EMERGENCY	3225(2)	1800(2)	4300(4)	3975(6)	1450(8)

	LIMITING ELEMENT		Rating		LIMITING CONTINGENCY
(1)	Niagara – Rochester (NR2) 345kV	@LTE	1501 MW	L/O	AES/Somerset – Rochester (SR-1) 345kV
(2)	Niagara – Rochester (NR2) 345kV	@STE	1685 MW	L/O	AES/Somerset – Rochester (SR-1) 345kV
(3)	Leeds – Pleasant Valley (92) 345kV	@LTE	1538 MW	L/O	Athens – Pleasant Valley (91) 345kV
(4)	Leeds – Pleasant Valley (92) 345kV	@STE	1724 MW	L/O	Athens – Pleasant Valley (91) 345kV
(5)	Mott Haven - Rainey (Q11) 345kV	@SCUC[2]	921 MW	L/O	Mott Haven - Rainey (Q12) 345 kV
(6)	Mott Haven - Rainey (Q11) 345kV	@STE	1077 MW	L/O	Mott Haven – Rainey (Q12) 345kV
(7)	Dunwoodie – Shore Rd. (Y50) 345kV	@LTE	914 MW[3]	L/O	(Breaker failure @ Sprain Brook 345kV) Sprain Brook – East Garden City (Y49) 345kV Sprain Brook – Dunwoodie North (S6) 345/138 kV transformer
(8)	Dunwoodie – Shore Rd. (Y50) 345kV	@NOR	653 MW[3]		Pre-Contingency Loading

1 See Section III.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.

NOTE: Some transfers may be voltage/stability limited. Thermal Transfers on the Dysinger East Interface may be limited by underlying 115 kV facilities.

TABLE 1.b

NYISO CROSS-STATE INTERFACE THERMAL LIMITS - SUMMER 2008
ALL LINES I/S

	MSC-7040 FLOW 800 MW	MSC-7040 FLOW 1200 MW	MSC-7040 FLOW 1600 MW
CENTRAL EAST			
NORMAL	2650(1)	2675(1)	2725(1)
EMERGENCY	3075(2)	3100(2)	3150(4)
TOTAL EAST			
NORMAL	5275(1)	5100(1)	5000(1)
EMERGENCY	6100(2)	5925(2)	5825(4)
MOSES SOUTH			
NORMAL	2000(3)	2225(5)	2175(5)
EMERGENCY	2350(7)	2650(7)	2650(6)

	LIMITING ELEMENT		Rating		LIMITING CONTINGENCY
(1)	Fraser – Coopers Corners (33) 345kV	@LTE	1404 MW	L/O	(Double-circuit Tower 31&41) Marcy – Coopers Corners (UCC2-41) 345kV Porter – Rotterdam (31) 230kV
(2)	Fraser – Coopers Corners (33) 345kV	@NOR	1207 MW		Pre-Contingency Loading
(3)	Moses - Adirondack 230kV	@LTE	359 MW	L/O	Chateauguay–Massena (MSC-7040) 765kV Massena – Marcy (MSU-1) 765kV and TransÉnergie delivery
(4)	New Scotland – Leeds (93) 345kV	@STE	1724 MW	L/O	New Scotland – Leeds (94) 345kV
(5)	Marcy 765/345 T2 transformer	@LTE	1650 MW	L/O	Marcy 765/345 T1 transformer
(6)	Marcy 765/345 T2 transformer	@STE	1971 MW	L/O	Marcy 765/345 T1 transformer
(7)	Moses - Adirondack 230kV	@STE	440 MW	L/O	Chateauguay–Massena (MSC-7040) 765kV Massena – Marcy (MSU-1) 765kV and TransÉnergie delivery

NOTE: Some transfers may be voltage/stability limited.

TABLE 2.a

NYISO to ISO-NE INTERFACE THERMAL LIMITS - SUMMER 2008
ALL LINES I/S

New York to New England	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
		Northport –Norwalk @ 100MW	
NORMAL	1050 (1)	1750(3)	750(5)
EMERGENCY	1625 (2)	1950(4)	1000(6)
		Northport –Norwalk @ 0 MW	
NORMAL	1400(1)	1725 (3)	775(5)
EMERGENCY	1975 (2)	1975 (4)	1025(6)

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Norwalk Harbor - Northport (1385) 138kV	@LTE	318 MW	L/O	Long Mountain – Pleasant Valley (398) 345kV
(2)	Norwalk Harbor - Northport (1385) 138kV	@STE	428 MW	L/O	Long Mountain – Pleasant Valley (398) 345kV
(3)	Greenbush – Reynolds Rd 115 kV	@LTE	293 MW	L/O	(Bus Fault @ New Scotland 77 345 kV) Edic – New Scotland (14) 345kV New Scotland – Leeds (93) 345 kV Alps – New Scotland (2) 345 kV New Scotland 345/115 (T2) kV transformer
(4)	Greenbush – Reynolds Rd 115 kV	@NOR	237 MW		Pre-Contingency Loading
(5)	Vermont Yankee – Vernon Road Tap	@STE	272 MW	L/O	Vermont Yankee – Amherst (379) 345kV Vermont Yankee – Coolidge (340) 345kV
(6)	Vermont Yankee - Vernon Road Tap	@STE	272 MW	L/O	Vermont Yankee – Coolidge (340) 345kV

NOTE: Northport – Norwalk Harbor flow is positive in the direction of transfer.

TABLE 2.b

ISO-NE to NYISO INTERFACE THERMAL LIMITS - SUMMER 2008
ALL LINES I/S

New England to New York	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
		Norwalk –Northport @ 100MW	
NORMAL	1550[1]	1725[3]	1350 [5]
EMERGENCY	2075[2]	2600[4]	1500 [6]
		Norwalk–Northport @ 200MW	
NORMAL	1250[1]	1750 [3]	1300 [5]
EMERGENCY	1775[2]	2650 [4]	1450 [6]

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Norwalk Harbor - Northport (1385) 138kV	@LTE	318 MW	L/O	(Breaker failure @ Pleasant Valley 345kV) Pleasant Valley - Fishkill (F36) 345kV Long Mountain – Pleasant Valley (398) 345kV
(2)	Norwalk Harbor - Northport (1385) 138kV	@STE	428 MW	L/O	Long Mountain – Pleasant Valley (398) 345kV
(3)	Alps – Reynolds Rd. 345kV	@LTE	562 MW	L/O	(Bus Fault @ New Scotland 77 345 kV) Edic – New Scotland (14) 345kV New Scotland – Leeds (93) 345 kV Alps – New Scotland (2) 345 kV New Scotland 345/115 (T2) kV transformer
(4)	Alps – Reynolds Rd. 345kV	@STE	755 MW	L/O	(Bus Fault @ New Scotland 77 345 kV) Edic – New Scotland (14) 345kV New Scotland – Leeds (93) 345 kV Alps – New Scotland (2) 345 kV New Scotland 345/115 (T2) kV transformer
(5)	North Bloomfield – Canton 115kV	@STE	306MW	L/O	(Breaker Failure @ Southington) Frost Bridge – Southington (329) 345kV Southington – Scovill Rock (3041) 345kV
(6)	North Bloomfield - Canton 115kV	@STE	306 MW	L/O	Frost Bridge – Southington (329) 345kV

NOTE: Norwalk Harbor – Northport schedule is positive in the direction of transfer.

TABLE 3.a

NYISO to PJM INTERFACE THERMAL LIMITS - SUMMER 2008
ALL LINES I/S

NYISO to PJM	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	1150[1]	1725[3]	1475[4]
3-115-O/S	1850[2]	1925[3]	1350[4]
EMERGENCY	1150[5]		1475[4]
3-115-O/S	1850[2]		1350[4]

	LIMITING ELEMENT		Rating		LIMITING CONTINGENCY
(1)	E. Sayre – N. Waverly 115kV	@LTE	124 MW	L/O	Grover – E. Towanda 230 kV E. Towanda – Hillside (70) 230 kV E. Towanda 230/115 kV transformer
(2)	Erie E.– S. Ripley (69) 230 kV	@NOR	499 MW		Pre – Contingency Loading
(3)	Oakdale 345/115 kV transformer	@LTE	556 MW	L/O	(Breaker Failure @ Oakdale 345kV) Watercure – Oakdale (31) 345kV Oakdale 345/115 kV transformer
(4)	Homer City 345/230kV transformer	@Emer	735 MW	L/O	Homer City 345/230kV transformer
(5)	E. Sayre – N. Waverly 115kV	@STE	124 MW	L/O	Grover – E. Towanda 230 kV E. Towanda – Hillside (70) 230 kV E. Towanda 230/115 kV transformer

NOTE: Emergency Transfer Capability Limits may have required line outages as described in Section III.C.2. PAR schedules have been adjusted in the direction of transfer. Some transfers may be stability limited.

TABLE 3.b

PJM to NYISO INTERFACE THERMAL LIMITS - SUMMER 2008
ALL LINES I/S

PJM to NYISO	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	2575[1]		2400[3]
3-115-O/S	3150[2]		2475[3]
EMERGENCY	2725[4]		2400[3]
3-115-O/S	3325[5]		2475[3]

	LIMITING ELEMENT	Rating			LIMITING CONTINGENCY
(1)	E. Sayre - N. Waverly (956) 115kV	@LTE	124 MW	L/O	(Breaker Failure @ Hillside 230kV) Meyer – Hillside(68) 230kV Hillside – Watercure (69) 230kV E. Towanda - Hillside (70) 230kV Hillside transformer
(2)	E. Towanda - Hillside (70) 230kV	@LTE	531 MW	L/O	(Breaker Failure @ Oakdale 345kV) Watercure – Oakdale (31) 345kV Lafayette - Oakdale (4-36) 345kV
(3)	N. Meshoppen series reactor 115kV	@Emer	127 MW	L/O	N. Meshoppen – E. Towanda 230 kV N. Meshoppen 230/115 kV transformer
(4)	E. Sayre - N. Waverly (956) 115kV	@STE	124 MW	L/O	E. Towanda - Hillside (70) 230kV
(5)	E. Towanda - Hillside (70) 230kV	@STE	554 MW	L/O	Homer City – Watercure (30) 345kV

NOTE: Emergency Transfer Capability Limits may have required line outages as described in Section III.C.2. PAR schedules have been adjusted in the direction of transfer. Some transfers may be stability limited.

TABLE 4

NYISO - IESO INTERFACE THERMAL LIMITS - SUMMER 2008
BP76 O/S

	DIRECT TIE	NYISO FACILITY	IESO FACILITY	DIRECT TIE	NYISO FACILITY	IESO FACILITY
Ontario to New York		**L33/34P @ 0 MW**			**L33/34P @ 400 MW**	
NORMAL	1725[1]	1150[2]	1125[3]	2125[1]	1625[2]	1550[3]
EMERGENCY	2050[4]	1525[5]	1125 [3]	2425[4]	1975[5]	1550 [3]
New York to Ontario		**L33/34P @ 0 MW**			**L33/34P @ 200 MW**	
NORMAL	1025[6]		1150[7]	1225[6]		1350 [7]
EMERGENCY	1325[8]		1150 [7]	1525[8]		1350 [7]

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Beck – Niagara (PA27) 230kV	@LTE	460 MW	L/O	Beck – Niagara (PA 302) 345kV
(2)	Niagara – Rochester (NR-2) 345kV	@LTE	1501 MW	L/O	AES/Somerset - Rochester (SR-1) 345kV
(3)	Middleport 500/220 kV (T3)	@NOR	750 MW		Pre-Contingency Loading
(4)	Beck – Niagara (PA27) 230kV	@STE	558 MW	L/O	Beck – Niagara (PA 302) 345kV
(5)	Niagara – Rochester (NR-2) 345kV	@STE	1685 MW	L/O	AES/Somerset - Rochester (SR-1) 345kV
(6)	Beck – Niagara (PA27) 230kV	@LTE	460 MW	L/O	(Breaker Failure @ Niagara 345kV) Beck – Niagara (PA 301) 345kV Niagara 345/230 kV transformer T3
(7)	Beck – Hanon J29 220 kV	@Emer	585 MW	L/O	Q24HM
(8)	Beck – Niagara (PA27) 230kV	@NOR	400 MW		Pre-Contingency Loading

NOTE: Some transfers may be stability limited.