NYISO OPERATING STUDY

SUMMER 2009

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Approved by NYISO Operating Committee
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APPENDICES

NYISO OPERATING STUDY - SUMMER 2009

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 2009 capability period. This analysis indicates that, for the Summer 2009 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 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 33,452 MW. The other NPCC Balancing Area and adjacent Regional representations were obtained from RFC-NPCC Summer 2009 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 2008:

Retirements	
N/A	0 MW
Total Retirements	**0 MW**
Additions	
Gilboa 3 Uprate	30 MW
Altona Wind Farm	98 MW
Chateaugay Wind Farm	107 MW
Canandaigua Wind Farm	125 MW
High Sheldon Wind Farm	113 MW
Wethersfield Wind Farm	126 MW
Caithness Combined Cycle Plant	310 MW
Total Additions	**909 MW**

Significant changes since the Summer 2008 capability period include:

Transmission Facilities Changes

Re-conductor Northport – Norwalk Harbor 1385 Cable (completed)
230 kV stations for connecting wind farms: (completed)
- Ryan, Duley, High Sheldon, Wethersfield, and Canandaigua

Linden VFT single channel 100 MW (June 2009)
Millwood two 120 MVAr Capacitor Banks Installation (June 2009)
Watercure 345/230 kV Transformer Bank to return in-service (June 2009)

The new three-circuit Northport-Norwalk Harbor 601/602/603 Cable replaced the previous single-circuit (1385) and spare cable. The new cable has higher emergency ratings than the previous cable but is operated respecting the same continuous rating

In the North Country, Duley and Ryan 230 kV stations have been added to the Willis – Plattsburgh WP1 and WP2 lines, respectively. Ryan and Duley 230 kV stations serve to connect the following wind farms: Clinton, Ellenburg, Altona, and Chateaugay. High Sheldon, Wethersfield, and Canandaigua 230 kV stations have been added to the Stolle – Meyer – Hillside 230 kV path on the Southern Tier to connect the following wind farms: High Sheldon, Wethersfield, and Canandaigua. The addition of High Sheldon causes a change in the Dysinger East and West Central interface definitions; Stolle Road – High Sheldon (67) replaces Stolle Road – Meyer (67) in both interface definitions.

The Linden VFT Project consists of three 100 MW channels connected to New York via the G23L/M to Goethals South. The first channel is scheduled to be in-service June 1, 2009 with the second and third channels scheduled in-service in July and August 2009, respectively. The base case has a single Linden VFT channel modeled in-service.

The Millwood capacitor bank is modeled in-service for the summer peak conditions expected to be in operation this summer. It has no impact on the thermal limit analyses performed in this study.

The Watercure 345/230 kV transformer bank is scheduled to return in-service this summer operating period.

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 2009 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 2009 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 2009, and the MMWG Summer 2009 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 2009 capability period is 33,452 MW. This forecast is approximately 357 MW (1.1%) lower than the forecast of 33,809 MW for the Summer 2008 capability period, and 487 MW (1.4%) 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 39,528[1] MW based on the NYSRC 16.5% Installed Reserve Margin (IRM) requirement for 2009. NYCA generation capacity for Summer 2009 is 38,547 MW and net external capacity purchases of 2,412 MW have been secured for the summer period. The combined capacity resources represent a 22.4% margin above the forecast peak demand of 33,452 MW.

NYISO Peak Load and Capacity Assessment – Summer 2009

NYISO Installed Capacity	+	38,547
Net Capacity Purchases and Sales	+	2,412
Scheduled generation outages	-	0
Allowance for unplanned outages	-	2,908
Net capacity for load	=	**38,051**
NYISO Forecast Peak	-	33,452
Available Reserve	=	*4,599*
Operating Reserve Requirement	-	1,800
Net Margin	=	**2,799**

The equivalent forced outage rate is 7.6% and includes forced outages and de-ratings based on historical performance of all generation in the NYCA. For Summer 2008 the equivalent forced outage rate assumed was 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 2009. 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 2009 thermal transfer limits to Summer 2008. 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 2009 and 2008, with limiting element/contingency descriptions. Significant differences in these thermal transfer limits are discussed below.

Central East and UPNY – ConEd interface thermal transfer limits increased by 275 MW and 325 MW, respectively. The main factor was the construction of the 345 kV transmission in the Southwest Connecticut SWCT Project. The transmission additions unloaded the counter clock-wise base flow loop around the Alps – Berkshire (393) and Pleasant Valley – Long Mountain (398) lines resulting in unloading Athens – Pleasant Valley (91) and Leeds – Pleasant Valley (92) base flows allowing for a higher transfer limit.

[1] Based on the ICAP forecast of 33,930 MW; The 2009 Gold Book forecast was revised to 33,452 MW in April 2009.

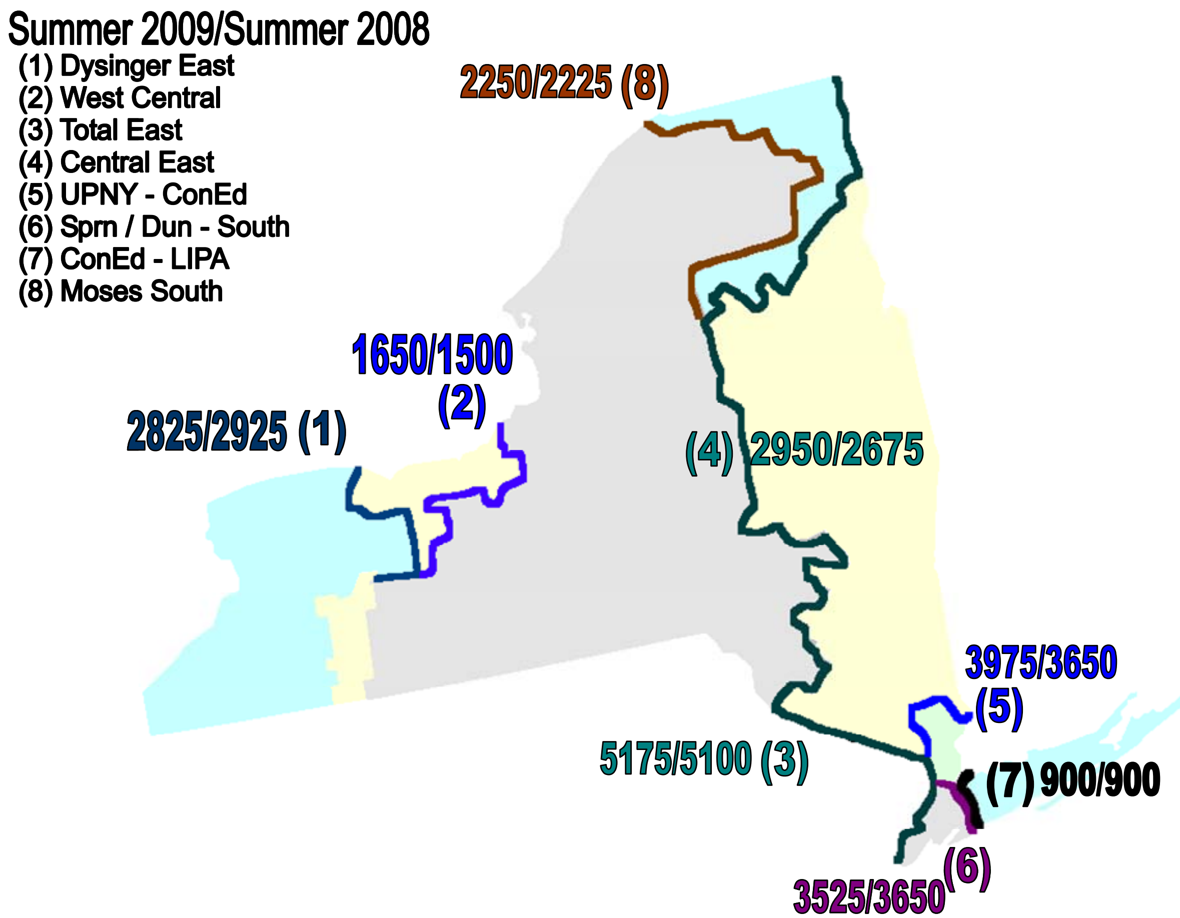

Figure 1 – Cross-State Thermal Transfer Limits

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 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 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. 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 over-current 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 AND VOLTAGE LIMITS

The thermal interface limits in Section IV do not include the results of transient stability testing or voltage transfer limit analyses. 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/market_data/reports/operational_studies_reports.jsp

C. Thermal Transfer Capabilities with Adjacent Balancing Areas

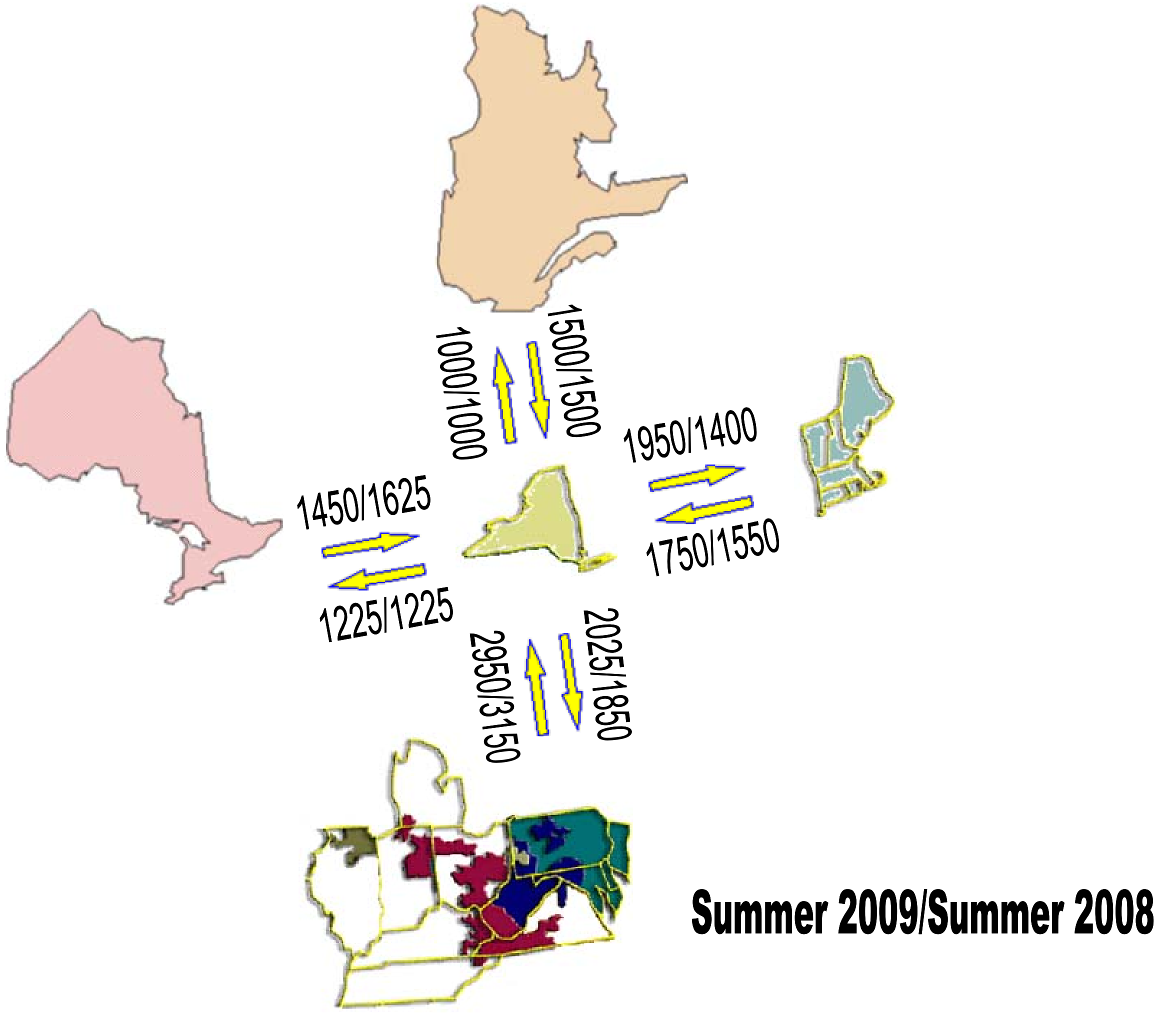

Figure 2 – Inter-Area Thermal Transfer Capabilities[2]

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.

Significant differences in these thermal transfer limits are discussed below.

New York – New England interface thermal transfer limit increased by 550 MW as a result of increased emergency ratings on the re-conductored 601/602/603 NNC between Norwalk Harbor and Northport. The LTE and STE ratings of the NNC increased from 318 MW and 428 MW to 513 MW and 641 MW, respectively. The continuous rating of the NNC remained unchanged. The ratings increase changed the limiting element from the former 1385 cable to the Long Mountain – Pleasant Valley (398) line.

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

1. NEW YORK – ISO NEW ENGLAND ANALYSIS

a) New England Transmission/Capacity Additions

Transmission

The Southwest CT Phase II Middletown – Norwalk, project was energized in winter. A 2% series reactor will be installed on the 115kV North Bloomfield to Canton 1784 circuit. A new Fitzwilliam substation tapping the Vermont Yankee to Amherst section of the 379 line will be in service. Changes in Southeast MA include a second autotransformer at the Carver substation and looping the 355 line into that substation. A third 345kV cable will serve Boston import from the south. The undersea 1385 cable between Norwalk and Northport is expected to be available 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

Flow on the 1385 (NNC) 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.

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 2009 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 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	L4D	345 kV
Lambton – St. Clair	L51D	230 kV
Keith – Waterman	J5D	230 kV
Scott – Bunce Creek	B3N	230 kV

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 day-ahead delivery into the NYCA from TransÉnergie on the Chateauguay – Massena (MSC-7040) 765kV tie is limited to 1200 MW plus an additional 300 MW wheel-through transaction to another Balancing Area for a total of 1500 MW. However, in real-time the total flow is limited to 1800 MW based on system conditions; the additional flow is an hourly 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 2009
ALL LINES I/S

	Dysinger East	West Central	UPNY - ConEd[1]	Sprain Brook Dunwoodie - So.	ConEd - LIPA
NORMAL	2825(1)	1650(1)	3975(3)	3525(5)	900(7)
EMERGENCY	3125(2)	1950(2)	4625(4)	3825(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)	Athens – Pleasant Valley (91) 345kV	LTE	1538 MW	L/O	Leeds – Pleasant Valley (92) 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

TABLE 1.b

NYISO CROSS-STATE INTERFACE THERMAL LIMITS-SUMMER 2009
ALL LINES I/S

	MSC-7040 FLOW 800 MW	MSC-7040 FLOW 1200 MW	MSC-7040 FLOW 1600 MW
CENTRAL EAST			
NORMAL	2925[8]	2950[8]	2975[8]
EMERGENCY	3225[4]	3250[4]	3275[4]
TOTAL EAST			
NORMAL	5350[1]	5175[1]	5075[1]
EMERGENCY	6200[2]	6025[2]	5975[2]
MOSES SOUTH			
NORMAL	2075[3]	2250[5]	2200[5]
EMERGENCY	2450[7]	2725[6]	2675[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
(8)	New Scotland – Leeds (93) 345kV	LTE	1538 MW	L/O	New Scotland – Leeds (94) 345kV

TABLE 2.a

NYISO to ISO-NE INTERFACE THERMAL LIMITS - SUMMER 2009
ALL LINES I/S

New York to New England	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
		Northport –Norwalk 100MW	
NORMAL	2100 (1)	825(3)	700(5)
EMERGENCY	2525 (2)	1350(4)	1300(6)
		Northport –Norwalk 0 MW	
NORMAL	1950(1)	775 (3)	900(5)
EMERGENCY	2375 (2)	1300 (4)	1350(7)

	LIMITING ELEMENT	Rating			LIMITING CONTINGENCY
(1)	Long Mountain – Pleasant Valley (398) 345kV	LTE	1317 MW	L/O	Seabrook Generator
(2)	Long Mountain – Pleasant Valley (398) 345kV	NOR	1135 MW		Pre-Contingency Loading
(3)	Reynolds Rd – Greenbush (9) 115 kV	LTE	255 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)	Reynolds Rd – Greenbush (9) 115 kV	STE	315 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)	Vermont Yankee – Vernon Road Tap	STE	272 MW	L/O	Vermont Yankee – Amherst (379) 345kV Vermont Yankee – Coolidge (340) 345kV
(6)	Norwalk Harbor – Northport (1385) 138kV	STE	382 MW	L/O	Long Mountain – Pleasant Valley 345kV
(7)	Norwalk Harbor – Northport (1385) 138kV	STE	382 MW	L/O	NE Largest Source Contingency

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

TABLE 2.b

ISO-NE to NYISO INTERFACE THERMAL LIMITS - SUMMER 2009
ALL LINES I/S

New England to New York	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
		Norwalk –Northport 100MW	
NORMAL	1750 (1)	2425 (3)	1300 (5)
EMERGENCY	2225 (7)	3375 (4)	1575 (6)
		Norwalk–Northport 200MW	
NORMAL	1525 (1)	2450 (3)	1200 (6)
EMERGENCY	2125 (2)	3400 (4)	1200 (6)

	LIMITING ELEMENT	Rating			LIMITING CONTINGENCY
(1)	Norwalk Harbor - Northport (1385) 138kV	LTE	513 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	641 MW	L/O	Long Mountain – Pleasant Valley (398) 345kV
(3)	Reynolds Rd 345/115 kV T2 transformer	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)	Reynolds Rd 345/115 kV T2 transformer	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)	Norwalk Junction – Archers Lane (3403C) 345kV	LTE	850MW	L/O	(Breaker Failure Southington) Frost Bridge – Southington (329) 345kV Southington – Scovill Rock (3041) 345kV 345kV/115kV (3x) Transformer
(6)	Norwalk Harbor – Northport (1385) 138kV	STE	382MW	L/O	Long Mountain – Pleasant Valley (398) 345kV
(7)	Long Mountain – Pleasant Valley (398) 345kV	NOR	1135 MW		Pre-Contingency Loading

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

TABLE 3.a

NYISO to PJM INTERFACE THERMAL LIMITS - SUMMER 2009
ALL LINES I/S

NYISO to PJM	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	1625 (1)	2275 (3)	1825 (4)
3-115-O/S	2025 (2)	2400 (3)	1750 (4)
EMERGENCY	1725 (5)		1825 (4)
3-115-O/S	2150 (2)		1750 (4)

	LIMITING ELEMENT	Rating			LIMITING CONTINGENCY
(1)	E. Sayre - N. Waverly (956) 115kV	LTE	128 MW	L/O	Grover – E. Towanda 230 kV E. Towanda – Hillside (70) 230 kV E. Towanda 230/115 kV transformer
(2)	Hillside – E.Towanda 230 kV	LTE	531 MW	L/O	Double-circuit Tower 41 & 33 Marcy – Coopers Corner (41) 345 kV Fraser – Coopers Corner (33) 345 kV
(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 – Shelocta 230 kV	Emer	841 MW	L/O	Wayne – Handsome Lake
(5)	E. Sayre - N. Waverly (956) 115kV	STE	143 MW	L/O	Grover – E. Towanda 230 kV E. Towanda – Hillside (70) 230 kV E. Towanda 230/115 kV transformer
(6)	Hillside – E.Towanda 230 kV	NOR	483 MW		Pre-Contingency Loading

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.

TABLE 3.b

PJM to NYISO INTERFACE THERMAL LIMITS - SUMMER 2009
ALL LINES I/S

PJM to NYISO	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	1800(1)	2950(6)	2900(3)
3-115-O/S	2950(2)	2875(6)	3250(9)
EMERGENCY	2075(4)	3475(8)	3175(7)
3-115-O/S	3000(5)	3225(10)	3250(9)

	LIMITING ELEMENT	Rating			LIMITING CONTINGENCY
(1)	Warren – Falconer (171) 115kV	LTE	116 MW	L/O	Forest – Glade TP 230kV Glade TP – Glade 230 kV
(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	LTE	157 MW	L/O	N. Meshoppen – E. Towanda 230 kV N. Meshoppen 230/115 kV transformer
(4)	Warren – Falconer (171) 115kV	STE	116 MW	L/O	Forest – Glade TP 230kV Glade TP – Glade 230 kV
(5)	E. Towanda - Hillside (70) 230kV	STE	554 MW	L/O	Homer City – Watercure (30) 345kV
(6)	Watercure 345/230 kV transformer	LTE	520 MW	L/O	Oakdale – Watercure (31) 345 kV
(7)	N. Meshoppen series reactor 115kV	STE	188 MW	L/O	N. Meshoppen – E. Towanda 230 kV N. Meshoppen 230/115 kV transformer
(8)	Watercure 345/230 kV transformer	STE	600 MW	L/O	Oakdale – Watercure (31) 345 kV
(9)	Moshannon – Grover 230 kV	Emer	522 MW	L/O	Oxbow – Lackawanna 230 kV
(10)	Oakdale 230/115 kV transformer	STE	440 MW	L/O	Oakdale – Watercure (31) 345 kV

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.

TABLE 4

NYISO - IESO INTERFACE THERMAL LIMITS - SUMMER 2009
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)	925 (2)	1225 (3)	2100 (1)	1450 (2)	1625 (3)
EMERGENCY	2025 (4)	1325 (5)	1225 (3)	2400 (4)	1850 (5)	1625 (3)
New York to Ontario		**L33/34P 0 MW**			**L33/34P 200 MW**	
NORMAL	1050 (6)		1175 (7)	1225 (6)		1375 (7)
EMERGENCY	1325 (8)		1650 (9)	1525 (8)		1850 (9)

	LIMITING ELEMENT	Rating			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)	Q25BM 220 kV	STE	720 MW	L/O	Q24HM+Q23BM
(8)	Beck – Niagara (PA27) 230kV	NOR	400 MW		Pre-Contingency Loading
(9)	Q29HM 220 kV	Emer	624 MW	L/O	Q24HM