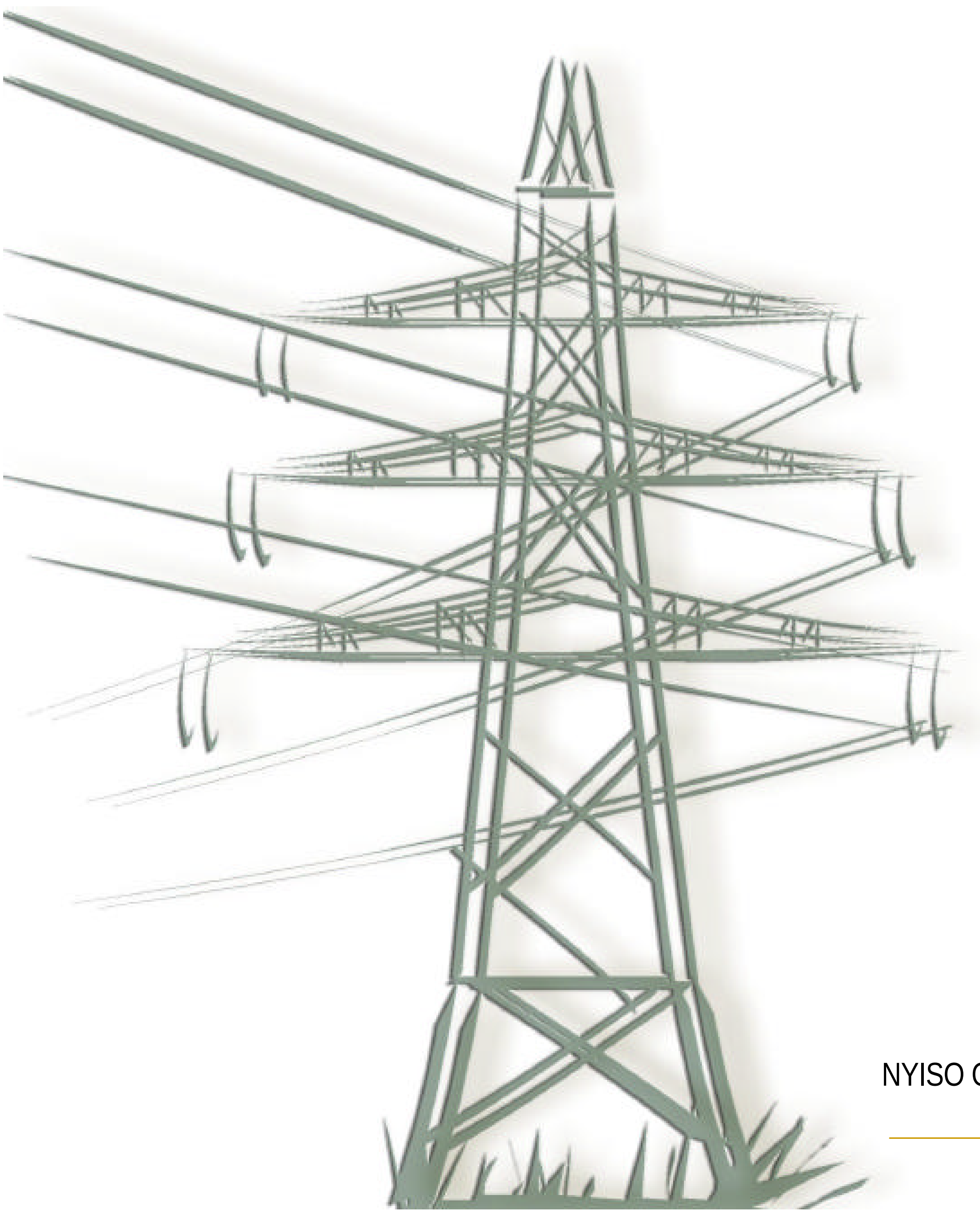
SUMMER 2002
OPERATING STUDY



April 2002
prepared by
NYISO Operations Engineering

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NYISO OPERATING STUDY
SUMMER 2002

Prepared by
Operations Engineering Staff
New York Independent System Operator, Inc.

And reviewed by
The NYISO Operating Studies Task Force

April 25, 2002

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NYISO OPERATING STUDY - SUMMER 2002

1. 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 2002 capability period. This analysis indicates that, for the Summer 2002 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" (September 10, 1999) 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.

2. RECOMMENDATIONS

The following recommendations are presented based on the analysis and results documented in this report.

1) 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.

2) Installed Capacity (ICAP) resources of 35,961 MW are anticipated to be adequate to meet the forecast peak demand of 30,475 MW. Based on the Load and Capacity assessment, the NYISO may not have adequate operating reserve during six to eight hours during the peak load period.

3. SYSTEM REPRESENTATION AND BASE STUDY ASSUMPTIONS

I. System Representation

The representation was developed from the NYISO Databank and assumes the forecast summer coincident peak load of 30,475 MW. The other NPCC members and adjacent regions representations were obtained from MEN/VEM Summer 2002 Reliability Assessment power flow.

For the Summer 2002 peak load period no significant generation is expected to be out of service. The generator output levels for major EHV-connected units are summarized in Appendix B, and are consistent with typical operation for the period. The inter-Area transactions represented in the study base case are summarized in Appendix A, and are consistent with those modeled in the MEN/VEM Summer 2002 Reliability Assessment.

Significant changes in the transmission system since the Summer 2001 capability period include:

Middletown 345/138kV transformer **Placed in service 11/2001**

Rock Tavern 345/115kV transformer #3 **Expected in service 6/2002**

Athens 345kV station **Expected in service 5/2002**
Loop existing Leeds – Pleasant Valley 345kV circuit #91, establishing a Leeds – Athens #95 and Athens – Pleasant Valley #91 circuits.

The Long Island Power Authority (LIPA) is working with several developers to facilitate the installation and operation of ten (10) new combustion turbine generators (approximately 400MW total capacity). These units are represented in the base case loadflow, and are detailed in the Load and Capacity Assessment.

Cross-Sound Cable is an HVdc facility between the New Haven Harbor 345kV (United Illuminating, ISO-NE) station and Shoreham 138kV (LIPA). It has a design capacity of 330MW. The facility is expected to be available for test, and possibly for test energy transfers during the Summer months, and for commercial operation in October, 2002.

II. Base Study Assumptions

The Normal and Emergency Criteria thermal limits have been determined by the PTI PSS/e thermal analysis activities (TLTG). The thermal limits presented have been determined for all transmission facilities scheduled in service during the Summer 2002 period.

The schedules used in the base case loadflows for this analysis assumed a net flow of 800 MW from PSE&G to Consolidated Edison via the phase-angle-regulating (PAR) transformers controlling the Hudson – Farragut and Linden – Goethals interconnections, and 1000 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. These schedules are consistent with the scenarios developed in the MAAC-ECAR-NPCC (MEN) Inter-regional Reliability Assessment for Summer 2002, and the NERC/MMWG Summer 2002 loadflow base case.

Thermal transfer capabilities between New York and adjacent 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 capability between Areas. Reductions due to these*

<u>situations are considered to be the responsibility of the respective operating authority</u>. Some of these potential limitations are indicated in the summary tables by "____ Facility" limits, which supplement the "Direct Tie" limits. Transfer conditions within and between neighboring Areas can have a significant effect on inter- and intra-Area transfer capabilities. Coordination of schedules and conditions between Areas is necessary to provide optimal transfer conditions while maintaining the reliability and security of the interconnected systems.

4. DISCUSSION

I. Resource Assessment

Load and Capacity Assessment

The forecast peak demand for the Summer 2002 capability period is 30,475MW. This forecast is approximately 1.0% below the forecast for Summer 2001 capability period, and 1.02% below the all-time New York control area seasonal peak of 30,982 MW, which occurred on August 9, 2001. The Installed Capacity (ICAP) requirement of 35,961 MW, based on the NYSRC 18% reserve requirement, is anticipated to be adequate to meet forecast demand.

NYISO Peak Load and Capacity Assessment – Summer 2002

NYISO ICAP Requirement	35961
Net of full-responsibility purchases/sales	0
Scheduled generation outages	0
Allowance for unplanned outages	3884
Net capacity for load	32077
NYISO Forecast Peak	30475
Operating Reserve Requirement	1800
Available Reserve	***1602***
Net Margin	-198

The assumed allowance for unplanned outages is an equivalent forced outage rate of 10.8% and includes forced outages and deratings based on historical performance of all generation in the New York control area. For Summer 2001 the equivalent forced outage rate assumed was 13.2%.

The NYISO load forecast for 2002 is lower than the forecast for 2001 primarily due to the transfer of the Rockland Electric Company (Orange & Rockland load in northern New Jersey) load to the PJM Control Area.

Based on historic load duration data, the NYISO would expect to be deficient in meeting the operating reserve between six and eight hours during the period.

New combustion turbine capacity represented in the LIPA service area includes the following sites:

Far Rockaway	44.0MW
Bethpage	44.0MW
Glenwood	79.9MW
Port Jefferson	79.9MW
Shoreham	79.9MW
Brentwood	79.9MW

These units are anticipated to be available for service prior to the Summer peak load exposure period (July 1 – September 1, 2002)

II. Cross-State Interfaces

A. Transfer Limit Analysis

Figure 1 presents a comparison of the Summer 2002 thermal transfer limits to Summer 2001. Changes in these limits from last year 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 2002 and 2001, with limiting element/contingency descriptions. Significant differences in these thermal transfer limits are discussed below.

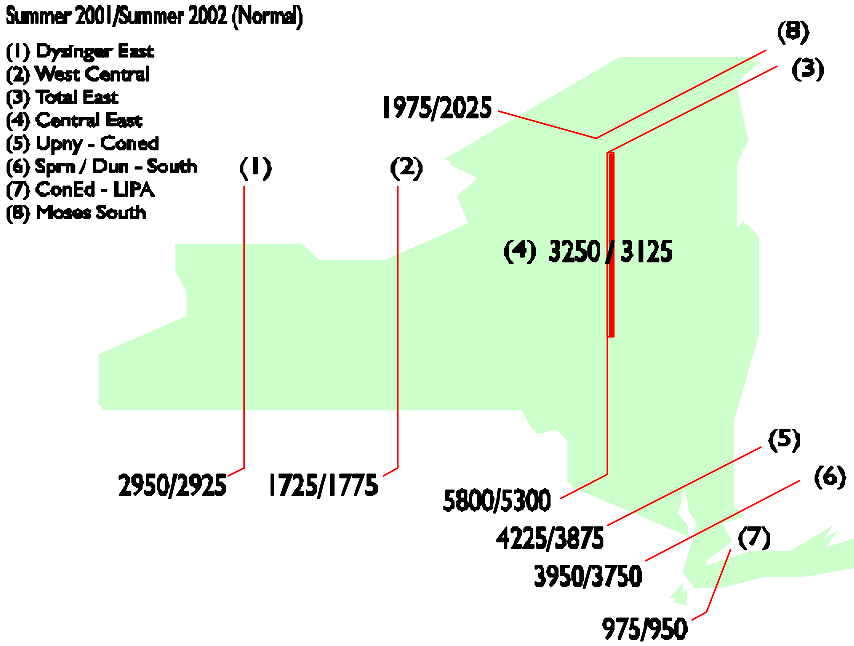

Figure 1 – Cross-State Thermal Transfer Limits

- ***Central East*** and ***Total East*** thermal transfer limits have decreased 100 MW and 500 MW respectively. The decrease in Total East limit is primarily due to the change in the Total East interface definition to account for the transfer of the Rockland Electric load to PJM. The decrease in Central East limit is due to slightly higher generation in eastern New York. This does not result in decreased overall transfer capability, as both of these interfaces will continue to be limited by voltage and stability performance.

- ***UPNY – ConEd*** interface limit has decreased 350 MW, due to changes in the base case dispatch, and lower base schedule on the Ramapo phase angle regulators. The slight increase in the impedance of the Leeds-Athens-Pleasant Valley #95/91 circuits resulting in slightly higher loading of the Leeds-Pleasant Valley circuit #92.

- ***Sprain Brook/Dunwoodie – South*** interface limit has decreased 200MW. The Summer 2002 limit is 3750MW Sprain Brook – West 49th Street 345kV circuit for loss of Sprain Brook – West 49th Street 345kV and Sprain Brook 345/138kV (breaker failure). The change is the result of the application of facility ratings consistent with ratings used in the NYISO Security Constrained Unit Commitment (SCUC) Day-Ahead Market process. The applicable "SCUC rating" is the average of the LTE and STE for limiting facility.

B. Sensitivity Testing

The thermal limits presented in Section 5 were determined using the base conditions and transactions. The effects of various intra- and inter-Area transfers or generation patterns in the system are presented in Appendix G.

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

C. 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.

D. ConEd - LIPA Transfer Analysis

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

For emergency transfer limit analysis the ConEd - LIPA PARs were adjusted to allow for maximum transfer capability into LIPA:

ConEd - LIPA PAR Settings for Emergency Conditions

Jamaica - Lake Success	0MW
Jamaica - Valley Stream	272MW
Sprain Brook - East Garden City	637MW

Dunwoodie – Shore Road 345kV circuit Y50 was out of service during the Winter 2001-2002 peak studies, recognizing the scheduled outage for cable repair. This work is scheduled to be completed in April 2002, and the circuit is represented in service in the study base case and for transfer limit analysis (ConEd – LIPA and New York – New England) into the Long Island load zone.

Norwalk Harbor – Northport 138kV circuit 1385 – Several times since being returned to service in July, 2000, the LIPA has not been able to maintain the scheduled power flow on the Norwalk Harbor – Northport 138kV circuit due to angle limitations on the phase angle regulator at Northport. This generally has occurred during periods with low generation on Long Island and high generation in southwest New England. System Operators should closely monitor this situation.

E. 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 Security Constrained Dispatch system monitors the EHV transmission continuously to maintain the secure operation of the interconnected system.

F. Transient Stability Limits

The thermal interface limits in Section 5 do not include the results of transient stability testing. The existing all lines in service and maintenance outage stability interface limits are summarized in Appendix I.

III. Thermal Transfer Capabilities with Adjacent Control Areas

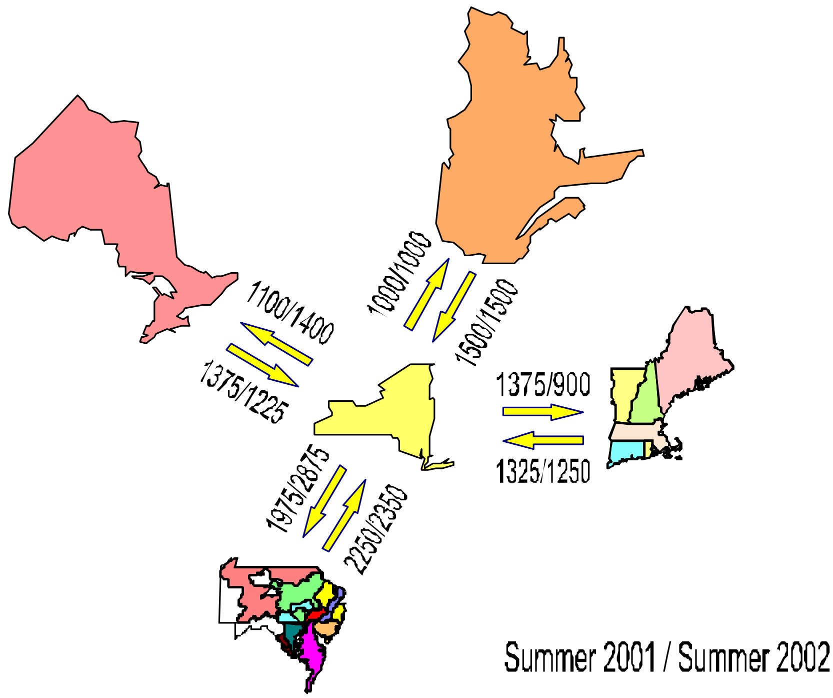

Figure 2 – Inter-Area Thermal Transfer Capabilities

A. New York – ISO New England Analysis

1. New England Capacity Additions

In the New England Control Area, from September 2001 through January 2002, no new capacity has been added. An additional 750 MW (summer capability) of new capacity is expected to be in service prior to the start of the Summer 2002 capability period. During the Summer 2002 period, an additional 3820 MW of capacity is expected to become available. Since the beginning of the previous summer (2001) capability period, the following new generation has become available or is expected to be available:

Blackstone 1-2	500 MW
Wallingford 1-5	250 MW
Lake Road 1-2	500 MW
Lake Road 3	250 MW
Milford 2	250 MW
W. Springfield 1-2	100 MW
Newington	520 MW
Bellingham 1	250 MW
Granite Ridge	750 MW
Kendall	180 MW

Bellingham 2	250 MW
Mystic 8	750 MW
Rise	520 MW

2. Thermal Transfer Limit Analysis

The transfer limits between the NYISO and ISO New England for normal and emergency transfer criteria are summarized in Section 5, Table 2. Referring to Figure 2 the transfer capability from NY to NE has decreased by 475 MW due to the lower rating of the Norwalk Harbor 138/115kV transformer limiting the Norwalk Harbor – Northport interconnection, and changes in the pre-transfer loading of the Pleasant Valley – Long Mountain 345kV circuit.

3. CHG&E and Northeast Utilities will operate the Smithfield-Falls Village 69kV line (FV/690) normally closed during the summer period. The maximum allowable transfer on this line is 28 MVA, based on limitations in the Northeast Utilities 69 kV system. The FV/690 has over-current protection that will trip the line in the event of an actual overload. This facility will not limit NYISO-ISO-NE transfers.

4. Northport - Norwalk Harbor Cable Flow

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 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 Junction to Weston (1730) circuit must be considered as follows:

- The algebraic sum of the flow from Trumbull Junction to Weston (1730) and 27% of the flow from Pequonnock to Trumbull Junction (1710) and 29% of the flow from Devon to Trumbull Junction (1710) should not exceed 239 MVA (STE rating of Trumbull Junction to Weston (1730)).

- The algebraic sum of the flow from Trumbull Junction to Weston (1730) and 25% of the flow from Pequonnock to Ash Creek (91001) and 21% of the flow from Bridgeport Resco should not exceed 239 MVA (STE rating of Trumbull Junction to Weston (1730)).

- In order to transfer 200 MVA from Norwalk Harbor to Northport, Norwalk Harbor generation should be on.

5. Plattsburgh – Sandbar (PV-20) Circuit

A new phase angle regulating transformer controlling the Plattsburgh, NY, to Sandbar, VT, 115kV circuit (PV-20) was placed in service in February 2001 and normal operating procedures have been restored.

6. Transient Stability Limitations

For certain system configurations, stability performance determines the transfer capability between the Areas. For those instances, the limits have been obtained from the report "1992-1996 NYPP-NEPOOL TRANSFER LIMIT STUDY - OCTOBER 1992." These stability transfer limits are presented in Appendix I.

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.

B. New York - PJM Analysis

1. Thermal Transfer Limit Analysis

The transfer limits for the New York - PJM interface are summarized in Section 5, Table 3. The phase angle regulating transformers controlling the Branchburg – Ramapo 500kV circuit are used to maintain flow at the normal rating of the Ramapo 500/345kV transformer (1000MW) in the direction of the transfer.

The comparison with Summer 2001 in Figure 2 shows an increase of 100

MW transfer capability toward NY, and the New York to PJM limit has increased by 900MW. These changes are the result of changes in base case PAR schedules and transfer of the RECO load to PJM, and network and rating changes within the PJM Area.

2. Opening of PJM to New York 115 kV Ties as Required

The normal criteria thermal transfer limits presented in Section 5 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, however it may be opened by operator action if it imposes an actual or post-contingency overload condition. The results presented in Table 3 include limits that assume one (or more) of these lines removed from service to achieve higher inter-Area transfer capability.

C. Ontario – New York Analysis

1. Thermal Transfer Limit Analysis

The thermal limits between the New York ISO and the Independent Market Operator (IMO-Ontario) Areas for normal and emergency transfer criteria are presented in Section 5, 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 New York to Ontario limit has increased 300 MW, and Ontario to New York limit has decreased 150 MW. Both are due to changes in the base case dispatch of the Ontario generation (net increase of 500MW) and lower generation western NY.

2. Transient Stability Limitations

Transient stability limits for the NYISO - IMO interconnection are reported in "NYPP-OH TRANSIENT STABILITY TESTING REPORT on DIRECT TIE TRANSFER CAPABILITY - OCTOBER 1993." This stability testing is summarized in Appendix I of this report.

3. Ontario – Michigan PARs

Phase Angle Regulating transformers have been installed on the interconnections between Ontario and Michigan:

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

The J5D phase angle regulator has been in service since 1975. The PAR on the B3N circuit was placed in service prior to Summer 2001, and the L51D PAR was placed in service during March 2002. The PAR for the L4D is not expected to be available until December 2002. The PARs are not expected to be operated to control scheduled power flow during the summer period except during emergency conditions.

4. 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. These SPSs can be selected by the Ontario or NYPA (as appropriate) operators consistent with system conditions.

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.

D. 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 is limited to 1200 MW via the Chateauguay – Massena 765kV circuit MSC-7040. Maximum delivery from NYCA to TE is 1000 MW.

5. SUMMARY OF RESULTS
TRANSFER LIMIT ANALYSIS

TABLE 1

NYISO CROSS STATE INTERFACE THERMAL LIMITS-SUMMER 2002
ALL LINES I/S

	Dysinger East	West Central	UPNY-ConEd	Sprain Brook Dunwoodie So.	ConEd-LIPA
NORMAL	2925(1)	1775(1)	3875(2)	3750(3)	950(5)
EMERGENCY	3250(1)	2100(1)	4525(2)	3950(4)	1500(6)

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Niagara – Rochester (NR2) 345kV	@LTE @STE	1501 MW 1685 MW	L/O	AES/Somerset – Rochester (SR-1) 345kV
(2)	Leeds – Pleasant Valley (92) 345kV	@LTE @STE	1538 MW 1724 MW	L/O	Athens – Pleasant Valley (91) 345kV
(3)	Sprain Brook – W. 49th St. 345kV	@SCUC-rating	1078MW	L/O	(Breaker failure @ Sprain Brook 345kV) Sprain Brook – W. 49th St. 345kV Sprain Brook 345/138kV
(4)	Sprain Brook – W. 49th St. 345kV	@NOR	774 MW		Pre-contingency Loading
(5)	Dunwoodie – Shore Rd. (Y50) 345kV	@LTE	693 MW	L/O	Sprain Brook – E.G.C. (Y49) 345kV
(6)	Dunwoodie – Shore Rd. (Y50) 345kV	@NOR	599 MW		Pre-contingency Loading

NOTE: Some transfers may be stability limited. See Appendix I for existing transient stability limits.

TABLE 1.a

NYISO CROSS STATE INTERFACE THERMAL LIMITS-SUMMER 2002
ALL LINES I/S

	MSC-7040 FLOW 800 MW	MSC-7040 FLOW 1200 MW	MSC-7040 FLOW 1600 MW
CENTRAL EAST			
NORMAL	3125 (1)	3125 (2)	3150 (1)
EMERGENCY	3450 (1)	3450 (1)	3475 (1)
TOTAL EAST			
NORMAL	5325 (1)	5300 (2)	5300 (1)
EMERGENCY	5950 (1)	5975 (1)	5925 (1)
MOSES SOUTH			
NORMAL	1875 (3)	2025 (3)	2225 (3)
EMERGENCY	2250 (4)	2575 (4)	2875 (4)

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	New Scotland – Leeds (93) 345kV	@LTE @STE	1538 MW 1724 MW	L/O	New Scotland – Leeds (94) 345kV
(2)	Fraser – Coopers Corners 345kV	@LTE	1404 MW	L/O	Marcy – Coopers Corners (UCC2-41) 345kV Porter – Rotterdam 230kV
(3)	Adirondack – Porter 230kV	@LTE	353 MW	L/O	(Breaker failure @ Porter 230kV) Adirondack - Porter 230kV Edic 345/230kV Edic 345/115kV
(4)	Brown Falls – Taylorville 115kV	@STE	134 MW	L/O	Chateauguay – Massena (MSC-7040) 765 kV Massena – Marcy (MSU-1) 765 kV and TransÉnergie delivery

NOTE: Some transfers may be stability limited. See Appendix I for existing transient stability limits.

TABLE 2.a

NYISO to ISO-NE INTERFACE LIMITS - SUMMER 2002
ALL LINES I/S

New York to New England		**Northport – Norwalk @ 100MW**	
	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
NORMAL	1100 (1)	1625 (3)	1825 (4)
EMERGENCY	1650 (2)	2150 (3)	1825 (4)
		Northport – Norwalk @ 0 MW	
NORMAL	1500 (1)	1550 (3)	1800 (4)
EMERGENCY	2025 (2)	2100 (3)	1800 (4)

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Norwalk Harbor - Northport (1385) 138kV	@LTE	318 MW	L/O	(Breaker failure @Long Mountain 345kV) Plumtree – Long Mountain 345kV Frost Bridge – Long Mountain 345kV Pleas. Valley – Long Mountain (398) 345kV
(2)	Norwalk Harbor 115/138kV	@STE	374 MW	L/O	Pleas. Valley – Long Mountain (398) 345kV
(3)	Greenbush – Reynolds Rd. (9) 115kV	@LTE @STE	197 MW 248 MW	L/O	New Scotland – Alps (2) 345kV
(4)	Bear Swamp – Pratts Jct. (E205E) 230kV	@STE	369 MW	L/O	Sandy Pond HVDC @ 1500 MW

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

TABLE 2.b

ISO-NE to NYISO INTERFACE LIMITS - SUMMER 2002
ALL LINES I/S

New England to New York	**Norwalk – Northport @ 100MW**		
	DIRECT TIE	NYISO FACILITY	ISO-NE FACILITY
NORMAL	1450(1)	1150(2)	900(3)
EMERGENCY	1575(4)	2150(5)	900(3)
	Norwalk – Northport @ 200MW		
NORMAL	1300(6)	1225(2)	950(3)
EMERGENCY	1625(4)	2200(5)	950(3)

.

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Bennington – Hoosick 115kV	@LTE	159 MW	L/O	(Alps Bus Fault) Alps – Berkshire (393) 345kV Reynolds Rd. – Alps 345kV New Scotland – Alps 345kV
(2)	New Scotland – Leeds 345kV	@LTE	1538 MW	L/O	New Scotland – Leeds 345kV
(3)	Southington – Todd (1910) 115kV	@STE	306 MW	L/O	Frost Bridge – Southington (329) 345kV
(4)	Bennington – Hoosick 115kV	@STE	159 MW	L/O	Alps – Berkshire (393) 345kV
(5)	Greenbush – Reynolds Road 115kV	@STE	248 MW	L/O	New Scotland – Alps 345kV
(6)	Norwalk Harbor – Northport 138kV	@LTE	318 MW	L/O	(Breaker failure @ Pleasant Valley 345kV) Pleasant Valley – Fishkill 345kV Pleasant Valley – Long Mountain(398) 345kV

Note: Norwalk Harbor – Northport cable schedule is positive in the direction of transfer

TABLE 3.a

PJM to NYISO INTERFACE LIMITS-SUMMER 2002
ALL LINES I/S

PJM to NYISO	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	1025(1)		2575(6)
3-115-O/S	2825(2)	3000(3)	3025(4)
EMERGENCY	1025(1)		2550(6)
3-115-O/S	2875(2)		3025(5)

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Warren-Falconer (171) 115 kV	@NOR	82 MW		Pre-Contingency Loading
(2)	E. Towanda-Hillside (70) 230kV	@LTE @STE	531 MW 554 MW	L/O	Homer City - Watercure (30) 345kV
(3)	Dunkirk – S. Ripley 230kV	@LTE	530 MW	L/O	Homer City - Stolle 345kV
(4)	Oxbow – Lackawanna 230kV	@Emer	504 MW	L/O	Grover – E. Towanda 230kV Grover – Moshannan 230kV Grover 230/34.5 kV
(5)	Erie E – Erie SE 230kV	@Emer	477 MW	L/O	Homer City - Stolle 345kV
(6)	Towanda – E.Sayre 115kV	@Emer	153 MW	L/O	E. Towanda – Hillside 230kV

NOTE: Emergency Transfer Limits may require line outages as described in Section 4.III. PAR schedules have been optimized for the emergency limits as described in Appendix B. Some transfers may be stability limited. See Appendix I for existing transient stability limits.

TABLE 3.b

NYISO to PJM INTERFACE LIMITS-SUMMER 2002
ALL LINES I/S

NYISO to PJM	DIRECT TIE	NYISO FACILITY	PJM FACILITY
NORMAL	2175 (1)		2300 (2)
3-115-O/S	2875 (3)		2275 (2)
EMERGENCY	2300 (4)		2700 (6)
3-115-O/S	2875 (5)		2875 (7)

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	E. Sayre - N. Waverly 115kV	@LTE	124 MW	L/O	Grover – E. Towanda 230 kV E. Towanda - Hillside 230 kV E. Towanda 230/115 kV
(2)	Homer City #2 345/230 kV	@LTE	699 MW	L/O	Homer City #1 345/230 kV
(3)	E. Towanda – Hillside 230kV	@NOR	483 MW		Pre-Contingency Loading
(4)	N. Waverly - E. Sayre 115kV	@STE	124 MW	L/O	E. Towanda – Hillside 230kV
(5)	E. Towanda – Hillside 230kV	@NOR	483 MW		Pre-Contingency Loading
(6)	Towanda – E. Sayre 115kV	@STE	153 MW	L/O	E. Towanda – Hillside 230kV
(7)	Homer City #1 345/230 kV	@STE	913 MW	L/O	Homer City #2 345/230 kV

NOTE: Emergency Transfer Capability Limits may have required line outages as described in Section 4.III. PAR schedules have been optimized for the emergency limits as described in Appendix B. Some transfers may be stability limited. See Appendix I for existing transient stability limits.

TABLE 4

NYISO- IMO INTERFACE LIMITS - SUMMER 2002
ALL LINES I/S

Ontario to New York	**L33/34P @ 0 MW**			**L33/34P @ 400 MW**		
	DIRECT TIE	NYISO FACILITY	IMO FACILITY	DIRECT TIE	NYISO FACILITY	IMO FACILITY
NORMAL	2000[1]	800[2]	1850[3]	2375[1]	1225[2]	2250[3]
EMERGENCY	2375[1]	1150[2]			1575[2]	2300[4]

New York to Ontario	**L33/L34P @ 0 MW**			**L33/34P @ 200 MW**		
NORMAL	1400[5]		1275[3]	1600[5]		1475[3]
EMERGENCY	1650[6]		1800[7]	1825[6]		2000[7]

	LIMITING ELEMENT				LIMITING CONTINGENCY
(1)	Beck – Niagara (PA27) 230kV	@LTE @STE	460 MW 558 MW	L/O	Beck - Niagara (PA302) 345kV
(2)	Niagara – Rochester (NR-2) 345kV	@LTE @STE	1501 MW 1685 MW	L/O	AES/Somerset - Rochester (SR-1) 345kV
(3)	Beck – Middleport (Q30M) 220kV	@LTE	459 MW	L/O	Beck-Hannon-Nebo-Middleport (Q24HM) 220kV Beck-Hannon-Nebo-Middleport (Q29HM) 220kV
(4)	Beck – Middleport (Q30M) 220kV	@STE	459 MW	L/O	Beck – Hamilton – Middleport (Q29HM) 220kV
(5)	Beck – Niagara (PA27) 230kV	@LTE	460 MW	L/O	(Breaker failure @ Niagara 345kV) Beck – Niagara (PA301) 345 kV Niagara 345/230 kV
(6)	Beck – Niagara (PA27) 230kV	@NOR	400 MW		Pre-Contingency Loading
(7)	Beck – Hamilton – Middleport (Q29HM) 220kV	@NOR	518 MW		Pre-Contingency Loading

NOTE: Some transfers may be stability limited. See Appendix I for existing transient stability limits.