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May 11, 2012

By Electronic Filing

Hon. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Subject: **Midwest Independent Transmission System Operator, Inc. and International Transmission Company d/b/a ITC*Transmission*, Docket No. ER11-1844-000, PUBLIC Version of Testimony of New York Independent System Operator, Inc. Witness Wesley J. Yeomans**

Dear Ms. Bose:

The New York Independent System Operator, Inc. submits by electronic filing the **PUBLIC** version of the attached Prepared Direct and Answering Testimony of Wesley J. Yeomans (Exhibit NYI-1 for identification), with verification.

The testimony has been served on all parties as required by Rule 2010 of the Commission's Rules of Practice and Procedure. In addition, two three-hole punched chambers copies are being provided to Presiding Administrative Law Judge Steven Sterner, along with a summary of the testimony.

Very truly yours,

/s/ Howard H. Shafferman

Howard H. Shafferman

Cc: Parties of Record
Vintricia Alexander. (Law Clerk to Judge Sterner)

HHS/

DMEAST #15031566 v1

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-1

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Midwest Independent Transmission System Operator, Inc. and International Transmission Company d/b/a ITC*Transmission*	**Docket No. ER11-1844-000**

SUMMARY OF TESTIMONY OF WESLEY J. YEOMANS (EXHIBIT NYI-1)

Mr. Yeomans is Vice President of Operations for the New York Independent System Operator, Inc. ("NYISO").

By submitting testimony addressing the merits of the MISO/ITC filing, the NYISO is not conceding that the Commission has legal authority under the Federal Power Act to accept the MISO/ITC filing, that the Commission has made the findings necessary to permit the NYISO to recover PAR-related charges it receives from MISO from the NYISO's customers, or that the collection of any or all the proposed charges – under any circumstance – is just and reasonable and not unduly discriminatory or preferential.

In Section III of his testimony, Mr. Yeomans provides an introduction to phase angle regulators ("PARs") and transmission loading relief procedures ("TLRs") (page 3, line 21 through page 9, line 2). Each is a key concept in this proceeding, and in the testimony of NYISO witnesses. Mr. Yeomans explains the function of PARs (page 3, line 22 through page 4, line 20), and provides an overview of the history of the PARs at issue in this proceeding (the "Replacement PARs") and the failed PAR (the "Original PAR") that they replaced, as well as the PARs (the "Hydro One PARs") on the Ontario side of the Michigan-Ontario interface (the

"MI/ON Interface")[1] (page 4, line 22 through page 5, line 14). He then explains TLRs, and how they are implemented (page 5, line 16 through page 7, line 23), and the importance of accurate modeling of the MI/ON PARs in the NERC Interchange Distribution Calculator (page 8, line 2 through page 9, line 2).

In Section IV of his testimony, Mr. Yeomans responds to the claims of the Midwest Independent Transmission System Operator, Inc. ("MISO") and the International Transmission Company ("ITC") regarding the expected effectiveness of the MI/ON PARs in fully mitigating Lake Erie unscheduled power flow (or "loop flow") (page 9, line 4 through page 10, line 17). Mr. Yeomans notes that neither MISO nor ITC submitted studies or workpapers supporting the claimed effectiveness of the MI/ON PARs (page 10, lines 1 through 7), and that the PARs on all four transmission lines connecting Michigan and Ontario have never been in service at the same time (page 10, lines 9 through 17).

In Section V of his testimony, Mr. Yeomans addresses the operating rules for the MI/ON PARs agreed to by MISO and the Independent Electricity System Operator (Ontario) ("IESO") in 2011 (page 10, line 19 through page 13, line 3). The MISO-IESO "Operating Instruction" provides a operational target that actual power flows over the MI/ON Interface are to be maintained within a +/-200 MW "Control Band" of the power flows that have been scheduled over the MI/ON Interface to the maximum extent practical (page 11, line 15 through page 12, line 10). Mr. Yeomans provides data showing that without *any* control by the MI/ON PARs, the flows were within that Control Band about one-half of the time over the past year (page 12, line 12 through page 13, line 3).

[1] The Replacement PARs and the Hydro One PARs are referred to collectively in NYISO testimony as the "MI/ON PARs."

Section VI of Mr. Yeomans' testimony explains that, despite the proposal of MISO/ITC to collect more than half of the cost of the Replacement PARs from NYISO and PJM customers, MISO and ITC do not propose to assume an obligation to serve those customers (page 13, line 5 through page 16, line 16). MISO asserts that NYISO and PJM customers will be required to pay the proposed PAR charges even when the Replacement PARs or Hydro One PARs are out of service (page 13, line 9 through page 15, line 17). ITC disclaims any service obligation whatsoever (page 15, lines 19 through 27). Mr. Yeomans indicates that in order to be permitted to charge NYISO and PJM customers for the costs of the Replacement PARs, MISO and ITC should be required to meet the performance expectations created in the their direct testimony; namely, that the MI/ON PARs will fully mitigate unscheduled Lake Erie power flows in at least 74% of all hours, and reduce unscheduled power flows by at least 600 MW at times when the MI/ON PARs are not able to fully mitigate those flows (page 16, lines 2 through 16).

In Section VII, Mr. Yeomans explains that the MISO-IESO Operating Instruction does not require MISO and IESO to operate the MI/ON PARs to mitigate 600 MW of unscheduled power flows at time when those flows exceed the +/-200 MW Control Band (page 16, line 18 through page 19, line 23).

Section VIII reviews provisions of the MISO-IESO Operating Instruction that permit MISO and IESO to favor their own customers and interests, versus those of NYISO and PJM (page 20, line 1 through page 23, line 22). The operating instruction provides protections to MISO and IESO that are not available, or not available on an equivalent basis, to NYISO and PJM (page 20, lines 3 through 17). This disparity applies in cases of control area emergencies (page 20, line 19 through page 22, line 8), and in cases of unforeseen operational or market outcomes (page 22, line 10 through page 23, line 8). Further, proposed Attachment SS-1 to the

MISO tariff allows MISO to temporarily suspend normal operations of the MI/ON PARs in the event of anomalous MISO market results related to the MI/ON PARs, without according similar rights to NYISO or PJM for anomalous market results in their respective markets (page 23, lines 10 through 22).

Section IX reviews the outage history of the PARs at the MI/ON Interface from 2001 to the present (page 23, line 24 through page 31, line 3). The Original PAR and the Hydro One PARs have experienced significant operational difficulties during that period (page 23, line 25 through page 27, line 17). Indeed, when the Replacement PARs were placed into service on April 5, 2012, not all of the Hydro One PARs were in service, and the history of the MI/ON PARs indicates that they are prone to failure (page 27, line 19 through page 29, line 12). Mr. Yeomans explains that this calls into serious question the MISO/ITC claim that the MI/ON PARs can control Lake Erie unscheduled power flows by 600 MW and for 74 percent of the time (page 29, line 14 through page 30, line 10). Notably, ITC chose a different manufacturer for the Replacement PARs from the one utilized for the Original PAR and the Hydro One PARs that have experienced significant failures (page 30, line 8 through page 31, line 3).

Mr. Yeomans evaluates, in Section X of his testimony, the ability of the MI/ON PARs to mitigate Lake Erie unscheduled power flows when one or more of the Hydro One PARs is out of service (page 31, line 5 through page 39, line 16). He reviews a series of examples and diagrams illustrating why the ability to mitigate unscheduled power flows is limited, and reviews admissions by MISO that the ability to mitigate will be reduced (page 31, line 8 through page 37, line 2). Based his review of data for prior recent periods when the MI/ON PARs were not in operation, and for the first month of operations of the MI/ON PARs with one of the Hydro One PARs out of service, it appears that the performance of the available PARs has not improved upon the performance that the NYISO recorded for periods when the MI/ON PARs were not available (page 37, line 4 through page 38, line 15). The Replacement PARs are not capable of mitigating Lake Erie unscheduled power flows if they are operated without any of the Hydro PARs in operation (page 39, lines 1 through 16).

In Section XI, Mr. Yeomans explains that all interconnected facilities benefit neighbors (page 39, line 18 through page 40, line 18). PARs are not a "special class" of transmission facilities of extraordinary value; they are no different from other transmission facilities that provide mutual transmission security benefits for neighboring ISOs/RTOs (page 39, line 18 through page 40, line 6). Finally, the Replacement PARs do not provide unique benefits that no other PARs can provide (page 40, lines 10 through 18).

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Midwest Independent Transmission System Operator, Inc. and International Transmission Company d/b/a ITC*Transmission*	**Docket No. ER11-1844-000**

TESTIMONY OF WESLEY J. YEOMANS

I. SUMMARY OF TESTIMONY

A summary precedes my testimony.

II. WITNESS IDENTITY AND QUALIFICATIONS

Q. Please state your name, title and business address.

A. My name is Wesley J. Yeomans. I am the Vice President of Operations for the New York Independent System Operator, Inc. ("NYISO"). My business address is 10 Krey Boulevard, Rensselaer, NY 12144.

Q. Please describe your educational background and work experience.

A. I received my Bachelor of Science degree in Electrical Engineering from Clarkson University in 1984, and a Masters in Business Administration from Syracuse University in 1990. I joined the NYISO in 2009 as its Director of Operations. I was promoted to Vice President of Operations in September of 2011. Prior to joining the NYISO, I worked for Niagara Mohawk Power Corporation and National Grid for twenty-five years. My areas of responsibility at Niagara Mohawk and National Grid included transmission planning analysis, management of bulk power operations, wholesale energy commitment and procurement of supply, and meeting the transmission owner and Load Serving Entity responsibilities of the NYISO OATT.

Q. Have you previously testified in regulatory proceedings?

A. Yes. I testified in New York State Public Service Commission proceedings and in the Niagara Mohawk Open Access Transmission Tariff losses proceeding in Docket No. OA96-194.

Q. What topics do you address in your testimony?

A. My direct testimony:

(i) provides an introduction to phase angle regulators ("PARs") and transmission loading relief ("TLR") (see page 3);

(ii) addresses claims of the Midwest Independent Transmission System Operator, Inc. ("MISO") and the International Transmission Company ("ITC") regarding expected effectiveness of the PARs on the Michigan-Ontario interface (the "MI/ON PARs") (see page 9);

(iii) discusses the operating agreement between MISO and the Independent Electricity System Operator (Ontario) ("IESO") (see page 10);

(iv) describes MISO and ITC's refusal to assume an obligation to serve NYISO or PJM customers are asked to pay for more than half of the cost of the PARs at issue in this proceeding (the "Replacement PARs") (see page 13);

(v) discusses the absence of an operating agreement requirement that MISO and IESO operate the MI/ON PARs to mitigate 600MW of unscheduled power flows at times when those flows exceed the Control Band in their operating agreement (see page 16);

(vi) explains the manner in which the operating agreement permits MISO and IESO to favor their own customers and interests (see page 20);

(vii) reviews the outage history of the PARs at the Michigan-Ontario interface (the "MI/ON Interface") (see page 23);

(viii) assesses the ability of the MI/ON PARs to mitigate Lake Erie unscheduled power flows when one or more of the PARs on the Ontario side of the MI/ON Interface (the "Hydro One PARs") is out of service (see page 31); and

(ix) explains that all interconnected facilities benefit neighbors (see page 39).

Q. In what context are you addressing these topics?

A. By submitting testimony addressing the merits of the MISO/ITC filing, the NYISO is not conceding that the Commission has legal authority under the Federal Power Act to accept the MISO/ITC filing, that the Commission has made the findings necessary to permit the NYISO to recover PAR-related charges it receives from MISO from the NYISO's customers, or that the collection of any or all the proposed charges – under any circumstance – is just and reasonable and not unduly discriminatory or preferential.

III. INTRODUCTION TO PARs AND TRANSMISSION LOADING RELIEF

Q. Could you please explain generically what phase angle regulators are, and what they do?

A. Real power flows are transmitted across transmission lines by creating a phase angle difference. It is possible to introduce a phase angle difference on a specific path with a phase angle regulating transformer ("PAR"). A PAR creates a phase angle shift along one path through adjustments to the windings of the transformer. By introducing a phase angle shift on a particular path, the distribution of total power on the PAR and across parallel paths can be adjusted. By taking taps on a PAR, the phase angle can be modified on this controlled path; hence, the flow can be increased or decreased, shifting the displaced MW flow to/from other parallel paths. The amount of taps can be limited by transmission constraints created when increased flow is forced upon other circuits.

Q. Which PARs are most relevant to this proceeding?

A. The PARs located on the four major transmission lines (the J5D, L4D, L51D and B3N lines) that interconnect the State of Michigan and Ontario, Canada.

Q. In plain English, what happens when a "tap" is taken on a PAR?

A. When a tap is taken on one of the PARs identified above, a relatively large (50MW+) quantity of power is diverted from the path over which it would, otherwise, have flowed. Because PARs affect power flows in a "chunky" manner, it is not possible to "tune" the PARs to achieve the precisely desired quantity of power flow over a transmission line.

Q. Please provide a brief history of the ITC and Hydro One PARs.

A. In 2002, the International Transmission Company ("ITC") installed a PAR at its

Bunce Creek substation on the B3N line in Michigan (the "Original PAR"). The Original PAR failed in March of 2003. In this proceeding, ITC is asking the Commission to require New York and PJM customers to pay for more than half of the cost of a pair of "Replacement PARs" that ITC installed at its Bunce Creek substation on the B3N circuit to replace the Original PAR. The Replacement PARs entered service on April 5, 2012.

In order to significantly affect unscheduled Lake Erie power flows, ITC's Replacement PARs must operate in coordination with three PARs that are owned by Hydro One Networks, Inc. ("Hydro One") that are located in Ontario, Canada on the J5D, L4D and L51D circuits. The three PARs that Hydro One owns are referred to collectively in my testimony as the "Hydro One PARs." The Replacement PARs and the Hydro One PARs are all referred to collectively in this testimony as the "MI/ON PARs."

Q. What are Transmission Loading Relief procedures?

A. Transmission Loading Relief or "TLR" is a procedure that Balancing Authorities such as the NYISO, Midwest ISO ("MISO"), the Independent Electricity System Operator (Ontario) ("IESO"), and PJM Interconnection, L.L.C. ("PJM") use to address power flows that are causing reliability impacts on their transmission systems. It permits Balancing Authorities to request the curtailment or removal of inter-Control Area transactions that have a substantial impact on a particular transmission constraint that presents a reliability risk.

Q. How is TLR implemented?

A. TLR is implemented via the North American Electric Reliability Corporation's ("NERC's") Interchange Distribution Calculator ("IDC"). The IDC is a database that identifies inter-Control Area transactions that have a 5% or greater impact (distribution factor) on the transmission constraint that TLR is being requested to address. The IDC identifies all scheduled inter-Control Area transactions that have the requisite 5% or greater impact. The Balancing Authority that requires relief specifies the amount of relief it requires, and may request that the transactions the IDC identifies be curtailed (intra-hour) or removed (at the top of the next hour). The IDC then identifies proposed pro rata reductions to all of the transactions that have a 5% or greater impact on the transmission constraint that are necessary to achieve the requested level of relief. The IDC then transmits the pro rata transaction reductions to each of the Balancing Authorities that are participants in the transactions that need to be curtailed or removed to provide the requested relief. The pro rata reductions identified by the IDC are then implemented by the Balancing Authorities that receive the TLR.[1]

Q. Please provide a simplified example of how a TLR is implemented.

A. Assume a NYISO transmission line is being significantly affected by Lake Erie unscheduled power flows. NYISO determines that it requires 100 MW of relief to

[1] Balancing Authorities that receive TLR requests to apply pro rata reductions to inter-Control Area transactions are not required to implement the requested reductions, but they ordinarily do so and expect reciprocal treatment from other Balancing Authorities when they are the issuer of a TLR request.

protect its transmission facility from overheating (to address a thermal constraint). NYISO's transmission system operators query the NERC IDC and the IDC identifies a total of five non-firm transactions that have impacts of 5% or greater on the particular New York transmission line that requires relief. They are:

1. 200 MW IESO export to MISO that has a 40% distribution factor on the transmission constraint 200 MW * 40% = 80 MW max relief
2. 100 MW IESO export to MISO that has a 40% distribution factor on the transmission constraint 100 MW * 40% = 40 MW max relief
3. 100 MW MISO export to PJM that has a 30% distribution factor on the transmission constraint 100 MW * 30% = 30 MW max relief
4. 100 MW MISO export to PJM that has a 30% distribution factor on the transmission constraint 100 MW * 30% = 30 MW max relief
5. 200 MW PJM export to NYISO that has a 10% distribution factor on the transmission constraint 200 MW * 10% = 20 MW max relief

The total available relief = 200 MW, requested relief = 100 MW. To achieve the requested relief, the IDC would apply a 50% pro rata reduction to each of the five identified transactions and issue notices to IESO, MISO, NYISO and PJM informing the Balancing Authorities of the TLR request and of the reductions.

Depending on the urgency of the needed relief, NYISO could use the IDC to request curtailment (in hour) or removal (at the top of the next hour).[2] The requests would be sent to the relevant Balancing Authorities, which would be responsible for implementing them.

[2] The transactions that the IDC identifies for potential in-hour curtailment could be different from the transactions that would be available for removal at the top of the next hour. For simplicity, the example assumes that the set of transactions identified in the IDC remains the same for several hours, so they are available for curtailment and would still be available for removal at the top of the next hour.

Q. In what way is the NERC IDC modeling of transactions scheduled over the MI/ON PARs at the MI/ON Interface different from the IDC's modeling of transactions scheduled at the IESO/NYISO, NYISO/PJM and PJM/MISO interfaces?

A. When IESO sets the MI/ON PARs to "Regulated Mode" in the NERC IDC model, the MI/ON Interface will be modeled in the IDC as perfectly controlling loop flow. In other words, power flows in the model will exactly equal the MISO/IESO scheduled interchange. This will be the case even when the MI/ON PARs are not, in fact, perfectly conforming actual power flows to scheduled power flows.

Q. How is the modeling of the MI/ON PARs in the NERC IDC relevant to the practical implementation of TLR?

A. When the MI/ON PARs are set to Regulated Mode in the NERC IDC, the NERC IDC model will not identify transactions scheduled over the MI/ON PARs as contributing to unscheduled power flows that are impacting transmission constraints in the Balancing Authorities around Lake Erie. The modeling of other Lake Erie transactions will be similarly affected. In other words, the IDC model will represent power flows as conforming to schedules, without regard to what is actually happening in the real world.

For this reason, it is very important for MISO and IESO to timely and accurately reflect the correct scheduling mode for the MI/ON PARs in the NERC IDC. Otherwise, NYISO, PJM and other Balancing Authorities' ability to use TLR to remove transactions that are adversely impacting reliability in their Balancing Authority Areas could be artificially limited and cause adverse reliability impacts.

IV. MISO AND ITC CLAIMS REGARDING EXPECTED EFFECTIVENESS OF THE MI/ON PARs

Q. What impact do the witnesses of the MISO and ITC claim the operation of ITC's Replacement PARs, in coordination with the Hydro One PARs, will have on unscheduled Lake Erie power flows?

A. MISO witnesses state in their testimony (*see* Webb/Chatterjee testimony at 23, 26 and 31, and Mallinger testimony at 19-20) that the Replacement PARs, operating in coordination with the Hydro One PARs, are "expected to fully mitigate Lake Erie loop flows approximately 74% of the time," (Mallinger at 19) and "during the period of time when the Michigan-Ontario PARs are not able to maintain actual flows equal to scheduled flows, the Michigan-Ontario PARs will still provide a 600 MW offset of potential circulation flows." (Mallinger at 20).

MISO witness Mallinger provided greater detail regarding the assertions in his testimony in his response to data request NYISO/MISO 2-3(c) (Exhibit NYI-2):

> Loop flow is defined as the difference between scheduled flow and actual flow across an interface. By measuring Lake Erie loop flow at the Michigan-Ontario interface, actual flow will be compared with MISO-IESO scheduled flow. Where a deviation exists, this represents Lake Erie loop flow. It is expected that operation of the New PARs and the Hydro One PARs will maintain actual flow equal to scheduled flow within a bandwidth for approximately 74% of the time. For the remaining 26% of the time, the New PARs and the Hydro One PARs will still provide 600 MW of loop flow control.

Q. Has MISO or ITC provided any studies or analysis supporting the claims in their Direct Testimony that the MI/ON PARs will control up to 600 MW of unscheduled Lake Erie unscheduled power flow?

A. No. Neither MISO nor ITC submitted studies supporting the claimed effectiveness of the MI/ON PARs with their Direct Testimony. No MISO or ITC witness identified such a study as one of the workpapers or documents supporting their Direct Testimony.

Q. Can MISO, ITC, the IESO or Hydro One rely on its real-world experience operating the MI/ON PARs to conclude that their 74%/600 MW expectation is reasonable?

A. No. Although some of the MI/ON PARs have been in place for over a decade, MISO, ITC, IESO and Hydro One have *never* managed to have the PARs on all four transmission lines in service at the same time. If Hydro One's L4D PAR returns to service on May 18, 2012 (IESO's sixth proposed return-to-service date), it will be the first opportunity for MISO, ITC, IESO and Hydro One to gather actual data on the MI/ON PARs' real-world effectiveness.

V. <u>THE MISO/IESO OPERATING AGREEMENT AND THE ±200 MW CONTROL BAND</u>

Q. Has an operating agreement for the MI/ON PARs been executed between MISO and the IESO?

A. Yes. MISO and the IESO have mutually agreed upon a set of operating instructions for the MI/ON PARs entitled "Operation of the Michigan-Ontario Tie Lines and Associated Facilities," with an effective date of August 8, 2011 (the "MISO/IESO Operating Instruction"). The MISO/IESO Operating Instruction was submitted to the United States Department of Energy ("DOE") for informational purposes as Tab 3 (at page 50 of Exhibit NYI-3) of ITC's August 9, 2011 filing of "Supplemental Reply Comments" in DOE Docket No. PP-230-4. The Supplemental Reply Comments, including all attachments, are Exhibit NYI-3 to my testimony.

As Tab 2 of the Supplemental Reply Comments, ITC "submitted for filing" with DOE an Amended and Restated Interconnection Facilities Agreement ("2011 Facilities Agreement") between Hydro One and ITC (at page 18 of Exhibit NYI-3). ITC's supplemental reply comments states (at 3) that Schedule I to the 2011 Facilities Agreement (at page 45 of Exhibit NYI-3) "sets forth the agreed upon standard to which actual flows will match scheduled flows on the Michigan-Ontario facilities after the new PARs go into operation…. That standard is consistent with the standard set forth in Section 3.0 of the [MISO/IESO Operating Instruction]."

Q. Does the MISO/IESO Operating Instruction describe how the MI/ON PARs will be operated?

A. Yes.

Q. Does the MISO/IESO Operating Instruction provide a target to which IESO and MISO seek to operate the MI/ON PARs?

A. Yes. Section 3.0 of the MISO/IESO Operating Instruction (at page 52 of Exhibit NYI-3) states IESO and MISO will operate the MI/ON PARs so actual power flows over the MI/ON Interface are maintained within a +/-200 MW "Control Band" of the power flows that have been scheduled over the MI/ON Interface to the maximum extent practical considering operational feasibility, safety, equipment limitations and regulatory and statutory requirement." The "Control Band" is defined in Section 2.0 of the Operating Instruction as a "maximum targeted Interface Deviation of ±200 MW, maintained within practical considerations."

According to Section 2.0 of the Operating Instruction (at page 51 of Exhibit NYI-3), to the extent that the MI/ON Interface "is within operational limitations and retains the ability to maintain the Interface Deviation within the Control Band," the Interface will be considered to be in "Regulated Mode." I discuss the significance of "Regulated Mode" later in my testimony.

Q. Were the MI/ON PARs operated to better conform actual power flows to schedule power flows from January 1, 2011 to March 31, 2012?

A. No.

Q. For the 2011 calendar year, and from April 1, 2011 to March 31, 2012, what percentage of the time does the NYISO estimate flows over the MI/ON Interface were within ±200 MW of the interface schedule?

A. As indicated in Exhibit NYI-4, for the twelve months ending March 31, 2012, NYISO estimates[3] that MI/ON Interface Flow was within ±200 MW of MI/ON Interface schedule in 49.41% of hours. For the twelve months ending December 31, 2011, the corresponding figure was 48.50% of hours. So, even when the MI/ON

[3] NYISO's estimate was prepared using the difference between scheduled and actual power flows, measured at the NYISO's border with IESO. The difference between scheduled and actual power flows at the MI/ON Interface should be very similar to the difference between scheduled and actual power flows at the Ontario/New York border.

PARs are not operating to conform actual power flows to scheduled power flows, it is reasonable to expect that the ±200 MW Control Band specified in the MISO/IESO Operating Instruction will be achieved nearly 50% of the time.

VI. <u>MISO AND ITC DO NOT PROPOSE TO ASSUME AN OBLIGATION TO SERVE THE NYISO OR PJM CUSTOMERS THAT THEY ARE ASKING THE COMMISSION TO REQUIRE TO PAY FOR MORE THAN HALF OF THE COST OF THE REPLACEMENT PARs</u>

Q. Do the MISO's proposed tariff revisions require MISO and IESO to actually achieve the 74%/600 MW control as a prerequisite to collecting the costs of the Replacement PARs from NYISO and PJM customers?

A. No.

Q. Are MISO and ITC proposing to assume *any* service obligation to the NYISO and PJM customers that they propose to charge for the Replacement PARS in connection with their repeated claims that the MI/ON PARs "will fully mitigate Lake Erie loop flow approximately 74% of the time and will mitigate it by approximately 600 MW the remainder?"

A. No. Despite the fact that the testimony of MISO witnesses Mallinger (at 19), Chatterjee (at 26, 31) and Zwergel (at 8) repeatedly state "[t]he MI/ON PARs "will fully mitigate Lake Erie loop flow approximately 74% of the time and will mitigate it by approximately 600 MW the remainder" (Chatterjee at 26), in response to discovery requests, MISO and ITC have indicated that they are not proposing to actually be held to meeting this operating standard, or to meeting *any* operating standard, in order to collect the charges proposed in this proceeding. MISO and ITC state that their proposed tariff revisions will require customers in New York and PJM to pay for the Replacement PARs even when the Replacement PARs are not in service, or when one or more of the Hydro One PARs are not available.

Q. What did MISO say about the obligation it will have to serve the NYISO and PJM customers that MISO proposes to charge for the cost of the Replacement PARs?

A. In data request NYTO/MISO 1-9 (Exhibit NYI-5), the NYTOs asked:

> If the current rate filing is approved please explain any and all service obligations that either MISO or ITC will have to NYISO and any circumstances under which MISO or ITC could have financial liability to the NYISO related to the operation of the Replacement PARs or lack thereof.

MISO responded:

> …MISO responds that approval of the current rate filing will not affect or alter MISO's existing service obligations as defined under Section 38 of the MISO Tariff and related agreements identified therein. MISO's current limitation of liability provisions under its Tariff (Section 10) and related agreements are unaffected by the current rate filing. At present, NYISO is not a MISO Transmission Owner, Transmission Customer, or Market Participant, and MISO does not have service obligations to NYISO related to these categories.

In NYISO/MISO 3-3 (Exhibit NYI-6), the NYISO asked:

> Should the Commission ultimately accept MISO's proposed tariff revisions and require NYISO customers and PJM customers to pay for a portion of the cost of ITC's Replacement PARs:
>
> a. Will the MISO and/or ITC be subject to an obligation to provide reliable service to NYISO customers and PJM customers that are not otherwise MISO customers?
>
> i. If so, please identify any/all laws, regulations, FERC precedent and/or court precedent relied on to prepare Recipient's response to NYISO/MISO 3-3a.
>
> b. Identify and explain the nature of any and all service obligations MISO and/or ITC will become subject to with regard to the NYISO customers and PJM customers that are not otherwise MISO customers.
>
> i. For each service obligation MISO and/or ITC will assume, identify any/all laws, regulations, FERC precedent and/or court precedent relied on to prepare Recipient's response to NYISO/MISO 3-3b.

MISO responded:

> No. See response to NYISO TO/MISO 1-9 which has already been provided to NYISO on February 14, 2012.

In addition to the above data requests, NYISO asked MISO a series of data requests about whether NYISO and PJM customers would still be required to pay for the Replacement PARs when the Replacement PARs are not in-service (NYISO/MISO 3-4, 3-5), or when the Hydro One PARs are out of service (NYISO/MISO 3-6, 3-7)[4] (these data requests are collected as Exhibit NYI-7), MISO responded to all of the referenced data requests on a consolidated basis in its response to NYISO/MISO 3-4 (Exhibit NYI-8) as follows:

> Yes. MISO is obligated to charge the rates set forth in its Tariff. *See* MISO Tariff https://www.midwestiso.org/Library/Tariff/Pages/Tariff.aspx. *See also*, Sections 205 and 206 of the Federal Power Act. *See also, Midwest Independent Transmission System Operator, Inc.,* 133 FERC ¶61,275 (2010), *reh'g pending; Midwest Independent Transmission System Operator,Inc.,* 134 FERC ¶61,185 (2011).

Q. What did ITC say about the obligation it will have to serve the NYISO and PJM customers that MISO proposes to charge for the cost of the Replacement PARs?

A. The NYTOs asked ITC in data request NYTO/ITC 1-14:

> Q: Please describe what service obligation ITC would have to the NYISO or any NYTO to the extent the NYISO or any NYTO is required to pay for any portion of the Replacement PARs.

ITC responded (see Exhibit NYI-9):

> A: As far as ITC knows, none. This question should be addressed to MISO.

[4] I address the importance of the Hydro One PARs on pages 31 through 39 of my Direct Testimony.

Q. Do you think it would be appropriate for the Commission to require MISO and ITC to meet the 74%/600MW performance expectation they propose in their testimony in order to be permitted to charge NYISO and PJM customers for the Replacement PARs?

A. Yes, MISO and ITC should be required to meet the performance expectations they create in their Direct Testimony. In particular, MISO and ITC should be required to prove that the operation of the MI/ON PARs "fully mitigates" unscheduled Lake Erie power flows in at least 74% of all hours, and reduces Lake Erie unscheduled power flows by at least 600 MW at times when the MI/ON PARs are not able to fully mitigate unscheduled Lake Erie power flows.

Q. Do you think MISO and ITC should be required to file tariff revisions that define their obligation to serve NYISO and PJM customers?

A. Yes, if the Commission permits the collection of the proposed charges, which the NYISO believes would be contrary to the Federal Power Act.

VII. <u>MISO AND IESO ARE NOT REQUIRED TO OPERATE THE MI/ON PARs TO MITIGATE 600MW OF UNSCHEDULED POWER FLOWS AT TIMES WHEN UNSCHEDULED POWER FLOWS EXCEED THE CONTROL BAND</u>

Q. Does the MISO/IESO Operating Instruction specify how MISO and IESO will operate the MI/ON PARs when flow is outside the ±200 MW Control Band?

A. Yes. Section 3.4.4 of the Operating Instruction (at page 53 of Exhibit NYI-3) says, "In Non-Regulated Mode, the interface will be controlled to its applicable interface limits. Actions (*e.g.* TLR's, generation re-dispatch, reconfiguration, etc.) will not be taken solely to return the Interface Deviation to within the regulating capability of the PARs." I interpret this language as indicating that the MI/ON Interface will be operated to ensure it remains within applicable reliability limits. The language does not clearly require MISO and IESO to operate the MI/ON PARs to mitigate 600 MW of loop flow at times when the PARs are in Non-Regulated Mode. The NYISO is not aware of any regulatory obligation that requires MISO, ITC, IESO or Hydro One to operate the MI/ON PARs to mitigate 600 MW of loop flow at times when the PARs are in Non-Regulated Mode.

Q. What is "Non-Regulated Mode?"

A. Section 2.0 of the Operating Instruction (at page 51 of Exhibit NYI-3) states that "Non-Regulated Mode" means that: "[t]he [MI/ON] Interface has reached Max Tap [*i.e.,* the MI/ON PARs have reached the maximum ability to control flow, in either direction] and the Interface Deviation [*i.e.*, the difference between the Interface Flow and the Interface Schedule] is exceeding or expected to exceed the Control Band [*i.e.,* the maximum targeted Interface Deviation of ±200 MW]."

Q. Under Section 2.0 of the MISO/IESO Operating Instruction, when will MISO and IESO set the MI/ON PARs to Non-Regulated Mode in the North American Electric Reliability Company's Interchange Distribution Calculator?

A. MISO and IESO have indicated that they are required to place the MI/ON PARs in Non-Regulated Mode in the NERC's IDC whenever the MI/ON PARs have reached Max Tap and cannot hold, or are not expected to be able to maintain, the Interface Deviation within the +/-200MW Control Band.

On October 13, 2011, MISO and IESO jointly filed comments at the United States

Department of Energy (DOE) explaining how the MI/ON PARs would be operated and when the MI/ON PARs would be placed in Non-Regulated Mode (see Exhibit NYI-10). In their comments (at 4-7), MISO and IESO explained:

> Specifically, the [MISO/IESO Operating Instruction] now provides that the PARs are to be operated such that the difference between the Interface Flow and the Interface Schedule is maintained within ±200 MW to the maximum extent practical, while staying within all applicable operational limitations. More simply, this change requires MISO and IESO to implement all practical actions necessary to keep loop flow within the ±200 MW bandwidth, as long as operational limitations of the PARs (or surrounding transmission system) allow. The [operating instruction] now reduces the prospect of periods where loop flow is not actively being controlled and resolves the challenges related to the NERC TLR process.
>
> *   *   *
>
> The [operating instruction] seeks to implement the existing IDC requirements.... The two primary regulation statuses are fairly straightforward (regulate or non-regulate). What becomes more difficult and complicated is the determination of the transition between regulation statuses, or exactly when the PARs are no longer able to fully control flows across the interface.
>
> The [operating instruction] uses the terminology that has historically been used in the industry to describe this situation, or "Max Tap". Conceptually, it is relatively easy to understand that this would apply when a PAR, or all PARs in a set, has reached the physical limitation of the PAR(s). In actuality, however the situation is more complex, particularly when addressing a coordinated set of PARs – as in this case. In situations where a set of PARs are being coordinated not only to control overall flow, but to distribute flows across the various local transmission elements interconnecting the PARs, a local transmission system limitation may become the factor limiting the ability of the PARs to continue regulating flows. In other words, there may [sic] situations where tap range on any given PAR (or PARs) are "available" (have not been used up), but cannot be utilized because doing so would result in an overload on the local or underlying transmission system. Given the various configuration changes (transmission outages, PAR outages, transmission reconfigurations, etc.) that will occur, it is simply not possible to exactly define all of the operational situations which may end up limiting the PARs ability to control flow over the Ontario/Michigan interface. The [operating instruction] recognizes this reality by generally defining the "Max Tap" state as those operating situations where the "Interface," defined as all 4 transmission circuits (and all 5 PARS), can no longer be controlled.... In fact,

> a Max Tap condition will occur any time MISO and IESO are unable to control power flows to closely (within the Control Band) match schedules at the Ontario/Michigan interface.
>
> Taken together, the provisions of the [operating instruction] require that MISO and IESO take actions to regulate loop flow for as long as possible. When that ability is exhausted, and loop flow exceeds (or is expected to exceed) ±200MW, the IDC status flag will be set to "Non-Regulate".

I have omitted the footnotes from these comments.

Q. If the PARS are in Non-Regulated Mode, are MISO and IESO required to move the PARs in order to return the flow to within the ±200 MW bandwidth?

A. No, that does not appear to be the case. Section 3.4.4 of the Operating Instruction does not require MISO and IESO to take affirmative actions to return the flow to within the ±200 MW bandwidth when the PARs have been placed in Non-Regulated Mode.

Q. Does the MISO-IESO Operating Instruction require MISO and IESO to operate the MI/ON PARs to control 600 MW of Lake Erie unscheduled power flows when the PARs are in Non-Regulated Mode?

A. No. In Non-Regulated Mode, MISO and IESO need only control the MI/ON PARs to "applicable interface limits." I interpret this language as indicating that the MI/ON Interface will be operated to ensure it remains within applicable reliability limits.

VIII. <u>THE MI/ON PAR OPERATING INSTRUCTION PERMITS MISO AND IESO TO FAVOR THEIR OWN CUSTOMERS AND INTERESTS</u>

Q. Under the MISO-IESO Operating Instruction, which entities are responsible for operating the MI/ON PARs?

A. Section 1.0 of the Operating Instruction (page 50 of Exhibit NYI-3) states that MISO "will direct actions regarding the Michigan-Ontario interconnection facilities in Michigan." Section 1.0 also states that IESO "directs the operation of the Interconnection Facilities in Ontario." That section also states that "MISO and IESO will jointly coordinate operation of the Interconnection Facilities in accordance with this document regardless of the location or the status at any time of any of the Interconnection Facilities."

Q. Do NYISO or PJM get a "vote" in any operating decisions regarding the MI/ON PARs?

A. No. The MISO-IESO Operating Instruction, in a limited number of circumstances, requires MISO and IESO to consult with NYISO and PJM, but the ultimate decision-making authority rests with MISO and IESO in every case.

Q. Does the MISO-IESO Operating Instruction require or permit MISO and IESO to operate the MI/ON PARs in a manner that favors MISO, IESO, and their customers?

A. Yes. Several subsections of Section 3.0 of the Operating Instruction (pages 52-54 of Exhibit NYI-3) provide protections to the MISO and IESO that are not available to NYISO and PJM, or that are not available on an equivalent basis to NYISO and PJM.

Section 3.4.2 of the Operating Instruction provides "[i]n order to prevent an emergency in MISO or Ontario, PARs may be adjusted such that the Interface Deviation exceeds the Control Band providing other actions are utilized first, time permitting." There is no reciprocal provision that permits NYISO or PJM to request MISO and IESO to operate the PARs to prevent emergencies in New York or PJM.

Section 3.5.1 of the Operating Instruction provides "[i]f the emergency is within MISO or Ontario, the PARs may be adjusted up to Max Tap utilizing emergency thermal limits as appropriate….. If emergencies are declared in both MISO and Ontario, tap positions for the PARs shall be set in the position(s) that best mitigates, or assists with the mitigation of, the overall scope of the emergencies in both areas and that achieves, to the extent practical, a fair sharing of relief requirements between the areas."

A different set of rules apply to emergencies that occur in PJM or New York. Those rules are in Section 3.5.2 of the Operating Instruction. Section 3.5.2.1 of the Operating Instruction provides that if the emergency is outside of MISO and Ontario, the PARs may be operated to assist with the emergency only after, among other things, the non-MISO or Ontario parties (such as NYISO or PJM) have "taken all mitigating steps except voltage reduction and shedding of firm load" to address the problem." For emergencies within MISO or Ontario, Section 3.5.1 does not impose the same mitigation obligation on MISO or IESO.

Section 3.5.2 of the Operating Instruction provides that, for emergencies outside of MISO or Ontario, "[t]he type of assistance shall be agreed upon and directed by MISO and the IESO." Accordingly, MISO and IESO retain full discretion to decide (a) if they will operate the MI/ON PARs to provide relief in response to a NYISO or PJM request, and (b) the degree or extent of relief they will provide.

The operating instruction does not put NYISO and PJM on an equal footing with MISO and IESO.

Q. Does the MISO-IESO Operating Instruction provide for suspension of normal operation of the MI/ON PARs to protect MISO and/or IESO customers?

A. Yes. Section 4.0 of the MISO-IESO Operating Instruction (pages 54-55 of Exhibit NYI-3) recognizes that "normal operation of the PARs may result in unforeseen operational or market outcomes within MISO or the IESO." It also states that: "Depending on the nature of the event, the most appropriate or only mitigating action may be to suspend normal operation of the PARs, i.e. change the Interface Control Mode from Regulated Mode to Bypass Mode." "Bypass Mode" is defined in Section 3.0 as the state in which the PARs are physically bypassed or where in-service PARs are at or near neutral tap and MISO and IESO are not attempting to control flows to the Interface Schedule. Section 4.0 provides that if MISO and IESO agree to suspend normal operations, "[n]ormal operations of the PARs will remain suspended until mutual agreement is reached to restore them to Regulated Mode or regulatory action occurs and a subsequent resolution plan developed and implemented." While suspension of normal PAR operation "[i]n the case of anomalous market outcomes in either jurisdiction, will only occur after consultation with other affected markets," MISO and IESO retain ultimate decision making authority, as explained above.

Q. Does the MISO-IESO Operating Instruction provide for potential suspension of the normal operation of the MI/ON PARs in circumstances in which operation of the PARs causes anomalous market results in NYISO or PJM?

A. No.

Q. Do the MISO's proposed tariff revisions include a proposal to permit MISO to suspend the operation of the MI/ON PARs when its markets are being adversely impacted?

A. Yes. MISO's proposed Attachment SS-1 to the MISO's tariff would permit MISO to temporarily suspend normal operation of the MI/ON PARs "in the event there are anomalous Midwest ISO market results related to the PARs controlling the Michigan-Ontario Interface."

Q. Do the MISO's proposed tariff revisions permit MISO to suspend the operation of the MI/ON PARs when the NYISO or PJM markets are being adversely impacted by the MI/ON PARs operation?

A. Proposed Attachment SS-1 only addresses anomalous market results in the MISO's markets. It does not provide similar rights to NYISO or PJM.

IX. <u>THE OUTAGE HISTORY OF THE PARS AT THE MI/ON INTERFACE</u>

Q. Have you reviewed the outage history of the PARs at the MI/ON Interface?

A. Yes. I have reviewed a number of NERC, NPCC and other similar third-party reports that discuss outages of the MI/ON PARs occurring from 2001 to the present. I have attached a summary of these reports as Exhibit NYI-11. My reliance on these reports was necessary because: (i) IESO's response to NYISO/IESO 3-1 (see Exhibit NYI-12) indicated IESO has no PAR outage records for periods before January 1, 2006, (ii) ITC's response to NYISO/ITC 5-1 (see Exhibit NYI-13) provided no details about the availability of the Hydro One PARs during the pertinent period; (iii) Detroit Edison's response to NYISO/DTE 3-1 (see Exhibit NYI-14) indicated that it had no knowledge with respect to whether one or more Hydro One PARs were out-of-service during the time period when the Original PAR was in service.

Q. Has the Hydro One PAR on the L4D circuit experienced any operational difficulties since it was constructed in 2001?

A. Yes.

Q. What difficulties were experienced?

A. As described in the MAAC-ECAR-NPCC Study Committee 2001 Summer MEN Interregional Transmission System Reliability Assessment, May 2001 ("MEN 2001 Assessment") (at page 40 of Exhibit NYI-15)[5], the L4D PAR failed a factory test in March 2001, before it was placed in service. The subsequent MAAC-ECAR-NPCC Study Committee 2002 Summer MEN Interregional Transmission System Reliability

[5] The cited language occurs at page 36 in the numbering of the original document.

Assessment, May 2002 ("MEN 2002 Assessment") (at page 34 of Exhibit NYI-16),[6] indicated that "Transformer testing failures have impacted the Lambton PARs, L51D and L4D…."

Q. Was the L4D PAR placed in service in 2002?

A. No. As explained in the Northeast Power Coordinating Council ("NPCC") Reliability Assessment For Summer 2003, issued in May 2003 ("NPCC 2003 Summer Assessment") (at page 21 of Exhibit NYI-17), the installation of the L4D PAR was not expected to be completed until the end of August 2003.

Q. Did the L4D PAR enter service in August 2003?

A. No. As reflected in the NPCC Reliability Assessment For Summer 2004, issued in May 2004 (the "NPCC 2004 Summer Assessment") (at page 24 of Exhibit NYI-18), as of May 2004, the L4D PAR, despite earlier predictions, had still not been installed, but was expected to be installed by the end of September 2004.

Q. Did the L4D PAR enter service in September 2004?

A. No. As reflected in the NPCC Reliability Assessment For Summer 2005, issued in April 2005, (at page 25 of Exhibit NYI-19), the L4D PAR was finally placed in service in February 2005.

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[6] The cited language occurs at page 30 in the numbering of the original document.

Q. Has the L4D PAR remained in service from February 2005 to the present?

A. No. IESO's response to NYISO/IESO 1-5 (Exhibit NYI-20) indicates that the L4D PAR went out of service on December 17, 2011. As described in the "Michigan-Ontario Interface Notice" issued by MISO on March 23, 2012, attached as Exhibit NYI-21 hereto, in "late 2011, Hydro One removed the L4D [PAR] from service due to early indications of an electrical issue with the PAR. Testing on the L4D PAR will continue through mid-May...." The response to NYISO/IESO 4-1, attached as Exhibit NYI-22 hereto, states that the "current scheduled return date for the L4D PAR is May 18, 2012." However, this is the sixth in a series of projected return dates, each of which has turned out to be incorrect. See Exhibit NYI-23.

Q. Did the Hydro One PAR on the L51D circuit (the "L51D PAR") experience any operational difficulties from 2001 to the present?

A. Yes. As described in the MEN 2001 Assessment, in April 2001, the in-service L51D PAR was automatically removed from service for an internal fault (see Exhibit NYI-15 at page 40).[7] According to the MEN 2002 Assessment, because of failure of some of the PARs and delays in restoring them to service, only the Keith-Waterman 230 kV J5D interconnection PAR [(the "J5D PAR")] was represented in the 2002 analysis (see Exhibit NYI-16 at page 35).[8]

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7 The cited language occurs at page 36 in the numbering of the original document.

8 The cited language occurs at page 9 in the numbering of the original document.

Q. When did the L51D PAR return to service?

A. The records the NYISO reviewed do not clearly address when the problems with the L51D PAR were addressed and the PAR returned to service. A 2004 NYISO summer operating report indicated that the L51D was "available" for the summer of 2004.

Q. Did the PAR originally installed by ITC on the B3N circuit (i.e., the Original PAR) experience any operational difficulties during this period?

A. Yes. As explained in the NPCC 2003 Summer Assessment, the Original PAR was forced from service in March 2003, with an unknown return date (see Exhibit NYI-17 at page 21). According to the NPCC 2004 Summer Assessment, a tower on the B3N circuit was also damaged in April 2003 (see Exhibit NYI-18 at page 24). The NPCC Reliability Assessment For Winter 2006-2007, issued in November 2006 ("NPCC Winter 2006-2007 Assessment") (see Exhibit NYI-24 at page 22) stated that the B3N circuit was returned to service in November 2006 without a phase shifter. We now know that it took ITC nine years to get replacements for the Original PAR into service.

Q. When the Replacement PARs were placed into service on April 5, 2012, were all of the other MI/ON PARs in service?

A. No. As indicated above, when the Replacement PARs went into service, the L4D PAR remained out of service. As of the date of this testimony, the L4D PAR still has not returned to service.

Q. Over the past nine years, have the Hydro One PARs been subjected to the operational stresses that would result from their being employed to conform actual power flows to scheduled power flows on the MI/ON Interface?

A. No. As stated in the IESO's response to NYISO/IESO 2-2(a) and (b) (Exhibit NYI-25), the Hydro One PARs have not been operated in "Regulated Mode" (*i.e.*, to attempt to control loop flow across the MI/ON Interface) during the period from April 1, 2003 through February 15, 2012. In fact, MISO and IESO did not begin attempting to use the available MI/ON PARs better conform actual power flows to scheduled power flows at the MI/ON Interface until April 5, 2012, as the MISO announcement in Exhibit NYI-26 indicates.

Q. How would you sum up the outage history of the PARs at the MI/ON Interface?

A. The history of the MI/ON PARs indicates that they are prone to failure. Since 2001 there has continuously been at least one PAR out-of-service at the MI/ON Interface. According to IESO's response to NYISO/IESO 2-2 (Exhibit NYI-25), prior to April 5, 2012, IESO never attempted to operate the three Hydro One PARs (when operable) to conform actual power flows to scheduled power flows at the MI/ON Interface, due to lack of an operating agreement with MISO. In over a decade of operating history, MISO and ITC have never managed to achieve simultaneous PAR control of all four lines at the MI/ON Interface. Prior to April 5, 2012, it does not appear that the MI/ON PARs had ever been operated to conform actual power flows to scheduled power flows.

Q. Is there any indication in the testimony submitted by MISO or ITC in this proceeding that the MI/ON PARs can control Lake Erie unscheduled power

flows by 600 MW and for 74 percent of the time, if the Commission takes into account reasonably anticipated outages of the PARs?

A. No. Mr. Mallinger's testimony (at 19-20) appears to assume that all of the MI/ON PARs will be available 24 hours/day, 7 days/week, 365 days/year. Mr. Mallinger's estimate of the MI/ON PARs expected effectiveness in controlling Lake Erie unscheduled power flows did not appear to take MI/ON PAR outages into account.

Q. How would you assess the likelihood of keeping all of the MI/ON PARs in service simultaneously for extended periods of time?

A. Given the PAR operating history I recount above, and the fact that the IESO PARs have not been actively operated to control power flows for years, there is no reason to expect the pattern of forced MI/ON PAR outages will not continue.

Q. So what impact does that have on MISO's and ITC's claims that the PARs will control unscheduled power flows 74% of the time, and will reduce unscheduled power flows by 600MW at times when they are not able to fully control Lake Erie unscheduled power flows?

A. This calls into serious question the validity of the claim that the MI/ON PARs can control Lake Erie unscheduled power flows by 600 MW and for 74 percent of the time, because the claim is based on all five MI/ON PARs being in service to control all four circuits in the MI/ON Interface. Below I explain why the ability to control power flows at the MI/ON Interface is extremely limited when only three of the four transmission lines at the interface are PAR controlled.

Q. Is there any other information NYISO has uncovered that supports NYISO's concern that some or all of the PARs at the MI/ON Interface are likely to prove unreliable?

A. Yes. ITC's decision to change the PAR manufacturer when it constructed the ITC PARs to replace the failed Original PAR appears to be consistent with the concerns I have raised regarding the expected long-term availability of the MI/ON PARs.

Q. By what entity was the failed Original PAR manufactured?

A. As indicated in Exhibit NYI-27, ITC's response to NYISO/ITC 5-4, the Original PAR was manufactured by ABB.

Q. Did ITC choose a different manufacturer for the Replacement PARs?

A. Yes. REDACTED REDACTED

Q. In the aftermath of the failure of the Original PAR, did ITC's chief executive officer offer an assessment of the MI/ON PARs' operation?

A. Yes, REDACTED REDACTED

Q. REDACTED

A. REDACTED REDACTED REDACTED

Q.

REDACTED

A.

X. ABILITY OF THE MI/ON PARS TO MITIGATE LAKE ERIE UNSCHEDULED POWER FLOWS WHEN ONE OR MORE OF THE HYDRO ONE PARS IS OUT OF SERVICE

Q. Please explain the ability of the MI/ON PARs to mitigate Lake Erie unscheduled power flows when one or more of the Hydro One PARs is out of service.

A. I have prepared a series of examples and diagrams to provide the requested explanation. By way of background, Lake Erie loop flow is measured by taking the difference between scheduled transactions and actual power flow across an interface. All four of my examples build upon the assumption that there would be 450MW of actual unscheduled power flows across the MI/ON Interface if all four of the transmission lines that comprise the MI/ON Interface are permitted to free flow. In my examples, "positive" Lake Erie loop flows denote a clockwise direction of power flow and "negative" flows denote counter-clockwise power flows.

In the examples, Lake Erie loop flow is measured across the Ontario/New York (ON/NY) interface. The examples assume that no External Transactions are scheduled across the MI/ON or ON/NY interfaces. Assuming that zero transactions are scheduled across the MI/ON and ON/NY interfaces, Lake Erie loop flow should be approximately equal to the actual power flow across the MI/ON Interface.

Q. **Please explain your first example and the corresponding diagram.**

A. Exhibit NYI-30 illustrates the power flow with none of the four MI/ON PARs being operated to affect power flows. In this example, power flows freely across all four Ontario-Michigan ties following the laws of physics as generation serves load and transactions are scheduled between control areas (other than MI/ON and ON/NY). The actual, unscheduled power flow across the MI/ON Interface is equal to 450MW in a positive direction, which reflects 450MW of clockwise Lake Erie loop flow.

Q. **What circumstance is described in your second example and illustrated in the corresponding diagram?**

A. Exhibit NYI-31 assumes that all four of the MI/ON PARs are in service and that the PARs are able to "perfectly" match flows to schedules. In this example, the PARs prevent the 450MW of Lake Erie loop flow that would otherwise flow across the MI/ON Interface (the MI/ON PARs conform the actual power flows to the zero MW schedule between the two regions). As I explained in the introductory section of my Direct Testimony, and explain in greater detail below, PARs impact power flows in a "chunky" manner, so the assumption of "perfect" control is not realistic, even under optimal conditions.

Q. **What circumstance is described in your third example and illustrated in the corresponding diagram?**

A. Exhibit NYI-32 illustrates the limited ability to control loop flow with all MI/ON PARs available and being operated to conform actual power flows to scheduled power flows, with the exception of Hydro One's L4D PAR, which is unavailable or bypassed in this example. If MISO and IESO operate the PARs on the other three transmission lines at the MI/ON Interface to hold zero flow across those three ties, then approximately 400MW of actual, unscheduled power flow will occur on the free flowing L4D tie. The net result is 400MW of clockwise Lake Erie loop flow.

In other words, in the third example, if three out of the four ties at the MI/ON Interface are perfectly matching flow (0MW) to schedule (0MW), but the fourth tie is free flowing, only 50MW of Lake Erie loop flow would be prevented. In order to more closely conform actual power flows to scheduled power flows at the MI/ON Interface, it would be necessary for the available PARs on the other three circuits to move away from zero flow and actively generate counter flow.

Q. What circumstance is described in your fourth example and illustrated in the corresponding diagram?

Exhibit NYI-33 further illustrates the limited ability to control loop flow with PARs available on only three out of the four ties at the MI/ON Interface. The fourth example again assumes that the L4D PAR is unavailable, but assumes more aggressive operation of the three available PARs. If MISO and IESO operate the PARs on the other three transmission lines at the MI/ON Interface to induce counter flow across those three ties to reduce Lake Erie Loop Flow it is theoretically possible to reduce the Lake Erie Loop Flow by 200MW. The 200MW reduction would be accomplished by operating the three available PARs to introduce 950MW of counter-clockwise counter flow. However, operating the three available PARs to introduce counter flow will result in increased clockwise power flow across the free-flowing L4D tie. As the three PARs are operated to introduce counter flow across the three PAR-controlled ties, the L4D tie will see ever-increasing clockwise power flows. Eventually, the actual flow across the free-flowing L4D tie will increase to the point it will exceed the line's normal thermal rating, which is 1200MW.

Q. Is there reason to believe that the actual ability to mitigate unscheduled Lake Erie power flow would be less than the 200MW estimated in the fourth example?

A. Yes. Practically speaking, I expect the actual limit to which MISO and IESO would operate would be well below the 1200 MW limit used in the fourth example. Before the counter flow became large enough to cause an overload on the L4D tie, there would likely be an overload for the loss of a circuit onto an adjacent circuit that would limit the PAR movements. The applicable criteria to which MISO and IESO (and NYISO and PJM) operate require that no circuit is overloaded as the result of the loss of any other transmission line. This is commonly referred to as operating to an "n-1" standard. It is reasonable to assume that limits on controlling loop flow with one PAR out of service will be a result of network contingency constraints rather than PAR equipment ratings or PAR tap range restrictions. If the limit to which MISO and IESO must operate is lower than the 1200 MW thermal limit for the L4D tie used in my fourth example, the available counter-flow would be reduced, and the ability to prevent Lake Erie loop flow would be lower than the 200MW estimated in the example.

Q. Has MISO provided information in response to data requests, or otherwise, regarding the feasibility of mitigating Lake Erie unscheduled power flows when one or more of the Hydro One PARs is out of service?

A. Yes. MISO responded to that issue, as pursued in NYISO/MISO 1-18 through 1-21 (Exhibit NYI-34), on a consolidated basis in its response to NYISO/MISO 1-19 (Exhibit NYI-34), stating:

> Unavailability of one or more of the MI/ON PARs is one of many operational factors that may affect the overall ability of the MI/ON PARs to conform actual power flows to scheduled power flows.
>
> a. There have been no equipment and/or system conditions identified that would make conforming actual power flows to scheduled power flows impractical (e.g.. overall control ability reduced to near zero), and operating agreements do not specifically address this condition.
>
> b. While MISO expects the effectiveness of the MI/ON PARs will vary as equipment status and/or system conditions change, there have been no studies performed that quantify the effectiveness of the MI/ON PARs for any sub-optimal condition (e.g., all PARs and Transmission elements in service).

Q. Has MISO performed any studies to test the expected operational effectiveness of the MI/ON PARs when one or more of the lines that comprise the interface are free flowing?

A. In NYISO/MISO 3-1, the NYISO posed questions regarding the impact on loop flow control achievable by the MI/ON PARs under a number of scenarios reflecting various combinations of PAR outages. Initially, MISO objected on the basis that "it requires MISO witnesses to create studies that do not already exist." In its subsequent response reserving objections (Exhibit NYI-35), MISO stated:

> MISO agrees that the effectiveness of the MI/ON PARs will vary as equipment status and/or system conditions change but MISO is unable to respond to the various hypothetical scenarios posed in NYISO/MISO 3-1 as MISO has already stated in response to NYISO/MISO 1-19 (i.e., there have been no studies performed that quantify the effectiveness of the MI/ON PARs for any sub-optimal condition).

Q. Did MISO issue a "Michigan-Ontario Interface Notice" on March 23, 2012 that indicated MISO's expectation of the effectiveness of the MI/ON PARs while the L4D PAR is out of service?

A. Yes. The Notice (Exhibit NYI-21) states:

> Coordinated interface operations without the L4D PAR in service will reduce the overall capability to control loop flow by an estimated 40-50%, which significantly reduces the time that the interface will be fully regulated (loop flow exceeds collective ability of remaining PARs to control flow).

Q. Did MISO also supplement its response to data request NYISO/MISO 3-1?

A. Yes. MISO supplemented its response to NYISO/MISO 3-1 on April 6, 2012 (Exhibit NYI-35). MISO's supplement added the following information:

> Kevin Frankeny further explains that, based upon his professional judgment and experience, MISO believes that with the Hydro One L4D PAR out of service, overall capacity to reduce loop flows will decline so MISO would expect the MI/ON PARs to fully mitigate loop flows 40-50% of the time. However, the MI/ON PARs will still be able to mitigate Lake Erie loop flow by approximately 300-350 MW.

For the reasons explained above, Mr. Frankeny's estimate of the ability of the MI/ON PARs to control flow when one of the four transmission lines that comprise the MI/ON Interface is free flowing appears optimistic.

Q. Did the supplemental response to NYISO/MISO 3-1 offer any studies or analysis to support Mr. Frankeny's estimate?

A. No. Accordingly, I must assume that the earlier MISO responses to NYISO/MISO 1-19 and NYISO/MISO 3-1 still stand: that "there have been no studies performed that quantify the effectiveness of the MI/ON PARs for any sub-optimal condition." To the extent that MISO or ITC produce a study or refined estimate of the effectiveness in sub-optimal conditions, I reserve the right to supplement my testimony to respond to that study or refined estimate.

Q. What does actual data since April 5, 2012 indicate about the degree to which the available MI/ON PARs are controlling unscheduled Lake Erie power flows?

A. Because MISO and IESO propose to operate the PARs to a ±200 MW Control Band, the NYISO compared how often the MI/ON PARs were within the Control Band over the period from April 5, 2012 to May 5, 2012 (a very small sample, but it is all the NYISO has to work with), to the frequency with which the MI/ON Interface was within the +/-200MW Control Band over the period April 1, 2011 to March 31, 2012. From April 5, 2012 to May 5, 2012, NYISO estimates that MI/ON Interface Flow was within ±200 MW of MI/ON Interface schedule in 56.6% of hours (see Exhibit NYI-36).[9]

As indicated in Exhibit NYI-4, for the twelve months ending March 31, 2012, NYISO estimates that MI/ON Interface Flow was within ±200 MW of MI/ON Interface schedule in 49.41% of hours. While the performance for the April 5, 2012 to May 5, 2012 period exceeds the average performance for the year starting April 1, 2011, it is not outside the expected range of results. As shown in Exhibit NYI-4: (i) for the seven months commencing July 1, 2011 and ending January 31, 2012, MI/ON Interface flow was within ±200 MW of MI/ON Interface schedule in 57.5% of hours;

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[9] NYISO's estimate was prepared using the difference between scheduled and actual power flows, measured at the NYISO's border with IESO. The difference between scheduled and actual power flows at the MI/ON Interface should be very similar to the difference between scheduled and actual power flows at the Ontario/New York border.

(ii) in October 2011, MI/ON Interface flow was within ±200 MW of MI/ON Interface schedule in 75.7% of hours.

In the MISO's supplemental response to NYISO/MISO 3-1, MISO asserted (on the basis of Mr. Frankeny's professional judgment) that it expects the MI/ON PARs, operating without the L4D PAR, to "fully mitigate loop flows 40-50% of the time." I am not certain how Mr. Frankeny would define "fully mitigate," but assuming that this phrase means that MI/ON Interface flow is controlled to within ±10 MW of MI/ON Interface schedule, this control was achieved in only 3% of hours during the April 5 – May 5, 2012 time period (see Exhibit NYI-36).

Based on the NYISO's review of one months' operating data with the L4D PAR out of service, it appears the performance of three available MI/ON PARs has not improved upon the performance that the NYISO recorded for periods when the MI/ON PARs were not available.

Q. Are the Replacement PARs capable of mitigating Lake Erie unscheduled power flows if they are operated in isolation – *i.e.*, without any of the Hydro One PARs in Operation?

A. No. MISO witness Chatterjee admits as much (on page 7 of his testimony) when he indicates that MISO and ITC's proposed cost allocation is based on using all of the MI/ON PARs—both ITC's Replacement PARs and the Hydro One PARs—to better conform actual power flows to scheduled power flows at the MI/ON Interface.

Q. What has ITC said about the capability of its PARs, operated in isolation?

A. While ITC asserts in its response to NYTO/ITC 1-86 (Exhibit NYI-37) that "[s]ome loop flow mitigation could occur by operating the [Replacement] … PARs in isolation of the operation of the Ontario PARs on the interface," ITC admits that "the results would be sub-optimal," and more fundamentally, that this type of scenario would "be contrary to NERC compliance requirements." ITC's Replacement PARs cannot be effectively operated to mitigate unscheduled power flows without the assistance of the Hydro One PARs.

XI. ALL INTERCONNECTED FACILITIES BENEFIT NEIGHBORS

Q. Do PARs constitute some sort of "special class" of transmission facilities of extraordinary value?

A. No. PARs do not constitute a "special class" of transmission facilities of extraordinary value. There are many types of transmission facilities that provide mutual transmission security benefits to neighboring ISOs/RTOs. Interconnected transmission facilities, including free flowing transmission lines, provide mutual transmission security benefits to neighboring ISOs/RTOs. These mutual transmission security benefits can include: (1) reduced post contingency power flows; (2) improved pre and post contingency transmission voltage performance; (3) improved dynamic and steady state transmission stability performance; (4) improved post disturbance frequency response; (5) opportunities for reserve sharing protocols; and (6) opportunities for emergency power purchases. None of these mutual transmission security benefits require a PAR.

Q. Do ITC's Replacement PARs provide unique benefits that no other PARs provide?

A. No. As I explain above, the Replacement PARs, operated in isolation, would be of little value to anyone. When (if) ITC's Replacement PARs are operated in conjunction with all three of the Hydro One PARs, they may better conform actual power flows to scheduled power flows at the MI/ON Interface.[10] The fact that the stated purpose of the MI/ON PARs is to conform actual power flows to scheduled power flows is not unique. The ABC and JK PARs at the New York/PJM border are operated to perform a similar function. PARs that are operated to conform flows to schedules, will tend to reduce loop flows, that characteristic is not unique to the Replacement PARs or the MI/ON PARs.[11]

[10] NYISO witness Robert Pike addresses if, whether, and under what circumstances the NYISO would benefit if the MI/ON PARs are successfully operated to better conform flows to schedules at the MI/ON Interface.

[11] NYISO witness Zachary Smith also addresses this claim in his direct testimony.

XII. <u>CONCLUSION</u>

Q. Does this conclude your testimony?

A. Yes.

AFFIDAVIT OF WESLEY J. YEOMANS

State of New York §
§
County of Rensselaer §

I, Wesley J. Yeomans, being duly sworn, depose and state that I prepared the Testimony of Wesley J. Yeomans and the statements contained therein are true and correct, to the best of my knowledge, information and belief.

Wesley J. Yeomans
Vice President, Operations
New York Independent System Operator, Inc.

SUBSCRIBED AND SWORN BEFORE ME, this 10 day of May, 2012.

Diane Egan
Notary Public for the State of New York

My Commission Expires on: March 21, 2013

DIANE L. EGAN
Notary Public, State of New York
Qualified in Schenectady County
No. 4924890
Commission Expires March 21, 20 13

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-2

<u>NYISO/MISO 2-3.</u> Does the scheduling of external transactions (imports, exports, wheels through) between and among the balancing areas that surround Lake Erie affect Lake Erie loop flow?

a. If so, how does the scheduling of external transactions between and among the balancing areas that surround Lake Erie affect Lake Erie loop flow?

b. Will the operation of the PARs at the interface between Michigan and Ontario (MISO and IESO), including both the Replacement PARs and the Hydro One PARs affect the Lake Erie loop flow impacts, if any, of external transactions?

c. If the answer to NYISO/MISO 2-3, sub-part b is "yes," how will the operation of the PARs at the interface between Michigan and Ontario (MISO and IESO), including both the Replacement PARs and the Hydro One PARs affect the Lake Erie loo flow impacts of external transactions?

Response:

a. MISO's response to NYISO/MISO 1-16 data request describes the Regional Power Control Device Study that was issued in June 2011. One section evaluated correlations between operation of existing PARs and Lake Erie Circulation (LEC) flow as well as other factors that affect LEC. These other factors included correlations between scheduled interchange and LEC.

The study evaluated the correlations of PJM-NYISO, IESO-MISO, IESO-NYISO and PJM-MISO scheduled interchange versus LEC. While none of these four scenarios show significant or strong correlations by themselves, these scheduled interchanges on the four interfaces do not occur in isolation from each other. By summing all of the average hourly interchanges on the four interfaces while taking into account the sign convention of scheduled interchange, a correlation analysis found a significant negative correlation of -.6562.

The study group concluded that there are two explanations for this high correlation. First, there are instances where scheduled interchange on an interface is not that great but summing all interfaces produces high scheduled interchanges that coincides with high LEC. Second, LEC is measuring the combined impact of all scheduled interchange on all interfaces, not just one at a time. Because of the direction selected to measure LEC (clockwise flow around Lake Erie is positive), a negative correlation exists and has a larger magnitude than the correlation of each scenario.

b. Yes. The operation of the PARs at the interface between Michigan and Ontario (MISO and IESO), including both the New PARs and the Hydro One PARs does affect the Lake Erie loop flow impacts of external transactions between and among the balancing areas that surround Lake Erie.

c. Loop flow is defined as the difference between scheduled flow and actual flow across an interface. By measuring Lake Erie loop flow at the Michigan-Ontario interface, actual flow will be compared with MISO-IESO scheduled flow. Where a deviation exists, this represents Lake Erie loop flow. It is expected that operation of the New PARs and the Hydro One PARs will maintain actual flow equal to scheduled flow within a bandwidth for approximately 74% of the time. For the remaining 26% of the time, the New PARs and the Hydro One PARs will still provide 600 MW of loop flow control.

Sponsored by: Tom Mallinger

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-3

STUNTZ, DAVIS & STAFFIER, P.C.

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August 9, 2011

Anthony J. Como
Director, Permitting and Siting
Office of Electric Delivery and Energy Reliability
U.S. Department of Energy
1000 Independence Avenue, SW
Room 6H-050, OE-20
Washington, DC 20585

Re: Presidential Permit PP-230-4

Dear Mr. Como:

Enclosed herewith for filing in the above-referenced proceeding are an original and two copies of the Supplemental Reply Comments of International Transmission Company d/b/a ITC*Transmission.* ("ITC"). The supplemental comments complete ITC's response to the comments filed in this proceeding in March, 2009 by the Midwest Independent Transmission System Operator, Inc., and the Independent Electricity System Operator of Ontario. The operational agreements required to complete ITC's application in this case are attached to the supplemental comments, and ITC respectfully requests that the application be approved as promptly as possible.

Certain of the material included in this filing constitutes critical energy infrastructure information ("CEII") and is so marked. It should not be released to the public. For your convenience, CD-ROMs containing electronic copies of the Public and Non-Public versions of this filing are enclosed.

Please contact the undersigned if you have questions regarding this filing. Thank you for your consideration.

Very truly yours,

John R. Staffier
Counsel for International Transmission Company d/b/a ITC*Transmission*

cc: All parties on the attached service list.

UNITED STATES OF AMERICA
DEPARMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

	)	
International Transmission Company	)	**Docket No. PP-230-4**
d/b/a ITC*Transmission*	)	
	)	

Supplemental Reply Comments of International Transmission Company d/b/a ITC*Transmission*

On January 5, 2009, International Transmission Company d/b/a ITC*Transmission* ("ITC") applied to the Department of Energy ("DOE") in this proceeding to amend its Presidential Permit PP-230-3 to authorize the installation and operation of two 700-MVA phase shifting transformers connected in series at its Bunce Creek Station in Marysville, Michigan. The new transformers, also known as phase angle regulators ("PARs"), will replace a single 675-MVA phase shifting transformer that failed at that location in 2003.

ITC's application was noticed by DOE on February 4, 2009 (74 Fed. Reg. 6607 (February 10, 2009)), with comments, protests and requests for intervention being due on March 12, 2009. No protests or requests for intervention were filed regarding the application, but comments were submitted by the New York Independent System Operator, Inc. ("NYISO") which submitted a letter of support on March 9, 2009, the Independent Electricity System Operator of Ontario ("IESO") which filed comments on March 11, 2009, and the Midwest Independent Transmission System Operator, Inc. ("MISO") which submitted comments on March 12, 2009. While supporting the installation of the new PARs, both IESO and the MISO requested that DOE condition its approval of ITC's application in certain respects relating to the future operation of the proposed facilities.

ITC filed its initial reply to the comments of these parties on March 31, 2009. ITC stated, among other things, that negotiations regarding future operations were ongoing among the parties and that there was no need for DOE to intercede in the discussion at that time. ITC further stated that before the new PARs were energized, it would file with DOE all agreements concerning future operations.

I. Supplemental Reply Comments

Since the filing of ITC's initial reply comments, installation of the PARs has been completed and this proceeding has effectively been on hold while, among other things, issues regarding the allocation of the costs of the new PARs were being pursued at the Federal Energy Regulatory Commission ("FERC").[1] Although the cost allocation issues have not yet been resolved, ITC, MISO, IESO and Hydro One Networks, Inc. ("Hydro One"), the owner of the Canadian facilities that interconnect with ITC's Presidential Permit facilities, have now completed their negotiations on operational issues and ITC is hereby submitting the following documents for filing in this docket:

- A letter agreement between ITC and MISO dated August 8, 2011 (Tab 1) assigning to MISO functional control over the facilities covered by ITC's Presidential Permit, including the new PARs. In the letter, MISO has confirmed that it is a FERC-approved Regional Transmission Organization and has agreed, among other things, that the facilities "will at all times be operated in accordance with the then current terms of, and the operating principles and for the purposes set forth in," ITC's Presidential Permit (Letter at Paragraph (2)).
- An Amended and Restated Interconnection Facilities Agreement ("IFA") between ITC and Hydro One dated August 8, 2011 (Tab 2)[2] which replaces the interconnection agreement between those parties (or their predecessors in interest) which is currently on

[1] Following the filing by ITC and MISO of a cost allocation proposal at FERC in Docket No. ER11-1844, and FERC's acceptance thereof subject to refund, PJM Interconnection, Inc. ("PJM") and several of its transmission owners and other supporters filed late interventions and comments in this case raising concerns about the impacts upon the PJM market of operating the PARs on a flow to schedule basis. ITC, MISO and IESO have submitted responses to those pleadings showing that the concerns of those parties are misplaced and without merit.
[2] Public and non-public versions of the IFA are being submitted herewith. In the public version, which is marked "Public", facility drawings and certain technical and communications information, which constitute critical energy infrastructure information ("CEII") and should not be made public, have been redacted. The non-public version includes all of this material and is marked "Non Public", "Contains CEII", "Do Not Release".

file with DOE. The Amended and Restated IFA includes a revised Schedule I which sets forth the operating principles for the PARs facilities in place on ITC's and Hydro One's interconnected facilities, including the new PARs which are the subject of ITC's pending application in this docket.[3] Schedule I also sets forth the agreed upon standard to which actual flows will match scheduled flows on the Michigan-Ontario facilities after the new PARs go into operation. (Schedule I at paragraph 1). That standard is consistent with the standard set forth in Section 3.0 of the CO2 Agreement between MISO and IESO (See footnote 2, below). Schedule I as set forth in the Amended and Restated IFA, and the CO2 Agreement, therefore, resolve all of the concerns regarding future operations raised by IESO and the MISO in their initial comments.

In addition to the above-described agreements which are being submitted for filing (and the CO2 Agreement that is being submitted for informational purposes), ITC is also submitting for DOE's consideration proposed revisions to Articles 3, 9 and 10 of ITC's Presidential Permit. (Tab 4). The proposed revision to Article 3 updates the operating principles for ITC's PARs to incorporate the principles set forth in the above-referenced revised Schedule I included in the Amended and Restated IFA, and the agreed upon standard to which actual flows will match scheduled flows on the Michigan-Ontario facilities after the new PARs go into operation. It should be emphasized that the basic operational goal set forth in the proposed Article 3 is the same as that approved by DOE when the original Bunce Creek PAR was approved in 2001, namely, controlling loop flow so that actual flows across the interface match scheduled flows to the maximum extent. (See Article 3 at page 6 of DOE's April 19, 2001 Order in Docket No. PP-230-2).

The proposed revision to Article 9 of the Permit updates and revises ITC's reporting requirements, among other things, to eliminate pricing information, which neither ITC nor MISO have access to under the current unbundled regulatory regime.

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[3] The operating principles set forth in the revised Schedule I included in the Amended and Restated IFA are consistent with those agreed to by MISO and IESO in an Operating Instruction entitled "Operation of the Michigan-Ontario Tie Lines and Associated Facilities" (the "CO2 Agreement") (Tab 3). The CO2 Agreement is being submitted herewith for informational purposes and is so marked. As with the IFA, Public and Non-Public versions are being submitted and are so marked.

The proposed revision to Article 10 of the Permit clarifies ITC's right to assign functional control of the facilities covered by the Permit to an entity such as MISO, which is an FERC-approved Regional Transmission Organization and which has agreed to comply with the provisions of the Permit.

Taken together, the documents being submitted herewith for filing, and the proposed revisions to Articles 3, 9 and 10 of ITC's Presidential Permit, complete ITC's response to the comments previously submitted herein by the NYISO, IESO and the Midwest ISO. In addition, they eliminate the need for any of the operations-related conditions initially requested by IESO and MISO to be incorporated into DOE's approval of ITC's pending application in this proceeding.

II. Suggested Procedures and Request for Expedited Consideration

ITC respectfully requests that DOE accept these supplemental reply comments and the attached documents for filing and approve ITC's pending application to amend its Presidential Permit in this proceeding on an expedited basis. Since these comments and the attached documents merely supplement ITC's original response to the timely initial comments of MISO and IESO, and since the operating principles embodied in the attached operational documents – basically providing for the regulation of flows to schedule on the Michigan-Ontario interface – are substantially identical to those that have been included in ITC's Presidential Permit since the original Bunce Creek PAR was approved in 2001, and since PJM and its supporters have already commented on the proposed flow to schedule PARs operating plan in their late interventions, ITC does not believe the issuance of an additional notice by DOE is necessary prior to approval of ITC's pending application. Instead, ITC believes that DOE should promptly approve the application without further notice so that the PARs can be placed into service and the substantial benefits of controlling Lake Erie loop flow can begin to be enjoyed.

Following approval of the application, DOE can issue a notice of its action, if it so chooses, and invite further comments on PARs operational issues. That will, among other things, allow PJM and its supporters to further pursue and develop their position that the PARs should not always be operated on a flow to schedule basis. One possible result of the comment process will be development of a data gathering program that will allow the parties to better assess the various impacts of PARs operations and better determine whether the current operational procedures should be modified. ITC is prepared to participate and cooperate in such a program, but it does not believe that development of the program should be allowed to further delay approval of the pending application and activation of the PARs.

III. Conclusion

WHEREFORE, ITC respectfully urges DOE to (1) promptly approve ITC's pending application to amend its Presidential Permit in this proceeding without conditions, (2) accept the ITC/MISO letter agreement, and the Amended and Restated IFA for filing in this docket, and (3) modify Articles 3, 9 and 10 of ITC's Presidential Permit as proposed herein.

Respectfully submitted,

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DATED: August 9, 2011

UNITED STATES OF AMERICA
DEPARMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

International Transmission Company d/b/a ITC*Transmission*	))))	**Docket No. PP-230-4**

CERTIFICATE OF SERVICE

I hereby certify that I have this day caused a copy of the foregoing document to be served on the parties on the attached service list.

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TAB 1

August 8, 2011

Richard Doying
Vice President of Operations
Midwest Independent Transmission System Operator, Inc.
701 City Center Drive
Carmel, IN 46032

Re: Operation of international electric transmission lines crossing the U.S./Canada border between Michigan and Ontario and associated facilities

Dear Mr. Doying:

International Transmission Company, dba ITC *Transmission*, ("ITC") owns the U.S. portions of four existing international electric transmission facilities that cross the U.S./Canada border between the State of Michigan and the Canadian Province of Ontario (the "U.S. Interface Facilities"). ITC's construction, ownership and operation of the U.S. Interface Facilities are authorized by a Presidential Permit issued to ITC by the Department of Energy ("DOE") in Order No. PP-230-3 dated February 26, 2003. The connecting facilities in Canada are owned by Hydro One Networks Inc. ("Hydro One"), pursuant to authorizations issued by the Canadian National Energy Board. Ontario's Independent Electricity System Operator ("IESO") has operational control of the Canadian facilities. Although ITC has not previously assigned the U.S. Interface Facilities to the functional control of the Midwest Independent Transmission System Operator, Inc. ("MISO"), MISO, acting as Reliability Coordinator for the ITC system, has had authority to direct actions regarding those facilities in order to prevent or respond to emergencies.

Phase angle regulators (PARs) are now in place on the Canadian side of the Border on the 230 kilovolt ("kV") Waterman – Keith circuit (J5D), the 345 kV St. Clair – Lambton circuit (L4D) and the 230 kV St. Clair – Lambton circuit (L51D). In addition, new PARs have been installed by ITC as part of the U.S. Interface Facilities on the 230kV Bunce Creek-Scott (B3N) circuit. ITC applied to DOE on January 5, 2009 in Docket No. PP-230-4 to amend its Presidential Permit to authorize the Bunce Creek PARs to be operated such that the electrical flow on the Michigan-Ontario interface will match scheduled flow to the maximum extent possible, considering operational feasibility, safety, equipment limitations and regulatory and statutory requirements. As of the date of this letter agreement, however, the Bunce Creek PARs are not yet in service because, among other things, ITC's Presidential Permit has not yet been amended by the DOE to permit their operation.

ITC and Hydro One entered into a revised Interconnection Facilities Agreement effective June 5, 2009, as amended on August 6, 2009 (the "IFA"), which applies to the U.S. Interface Facilities. ITC and Hydro One are currently finalizing an additional amendment to the IFA which will, among other things, set forth revised operating principles for the Michigan-Ontario PARs, including the Bunce Creek PARs. Similarly, MISO and IESO entered into a Coordination Agreement effective January 6, 2009 regarding their interconnected operations, and, pursuant thereto, they are currently finalizing an Operating Instruction entitled "Operation of the Michigan-Ontario Tie Lines and Associated Facilities"(the "CO2 Agreement"). Among other things, the CO2 Agreement, which has been reviewed by ITC, will set forth certain operating principles, consistent with those set forth in the forthcoming amendment to the IFA, which MISO and IESO will apply to the U.S. Interface Facilities, including the Bunce Creek PARs.

In these circumstances, and in order to clarify MISO's status and role with respect to the U.S. Interface Facilities (which term, as hereinafter used in this letter agreement shall be deemed to include the Bunce Creek PARs), MISO and ITC hereby agree as follows:

1) ITC hereby assigns the U. S. Interface Facilities to MISO's functional control pursuant to Paragraph 15 of the Appendix I Agreement between ITC and Midwest ISO dated August 31, 2001 (the "Appendix I Agreement"). In that regard, MISO hereby confirms that it is a Federal Energy Regulatory Commission-approved Regional Transmission Organization. Such assignment shall be effective as of the date on which ITC's application to amend its Presidential Permit in DOE Docket No. PP-230-4 is approved. All terms and conditions of the Appendix I Agreement shall apply to the assignment, including, without limitation, the provisions of Paragraph 12 regarding Dispute Resolution and the provisions of Paragraph 18 regarding Assumption of Liability, provided however, that notwithstanding anything to the contrary in this letter agreement or the Appendix I Agreement, ITC shall be entitled to withdraw the U. S. Interface Facilities from MISO's functional control, and terminate this letter agreement, with one year written notice. In the event of such withdrawal, the rights of users of the U.S. Interface Facilities under contracts in effect prior to the effective date of the withdrawal, and the respective rights of MISO and ITC with respect to revenues received from such users following the withdrawal and with respect to reimbursement for administrative charges relating to post-withdrawal service to such users, shall be the same as set forth in Paragraph 2.3 of the Appendix I Agreement regarding withdrawal of ITC as a member of MISO.

2) Consistent with the Agreement of Transmission Facilities Owners to Organize the Midwest Independent Transmission System Operator, Inc. a Delaware Non-Stock Corporation Appendix E Section II.A.8, MISO agrees a) that the U.S. Interface Facilities will at all times be operated in accordance with the then current terms of, and the operating principles and for the purposes set forth in, the Presidential Permit issued to ITC by DOE and any other applicable DOE orders, and b) that it will fully comply with

the then current terms of the IFA, it being understood that in the event of a conflict between that agreement and the Presidential Permit or other applicable DOE orders, the Presidential Permit and the DOE orders will control.

3) MISO agrees that following execution of this letter agreement it will fully support ITC's pending application to amend its Presidential Permit in DOE Docket No. PP-230-4.

4) MISO agrees that it will provide ITC with reasonably available information regarding the operation of the U.S. Interface Facilities that ITC may require from time to time in order to ensure compliance with the Presidential Permit and for other reasonable purposes and will use its best efforts to insure that IESO provides MISO with any such required information which it will then provide to ITC. ITC agrees to comply with applicable confidentiality requirements regarding the use of such information.

5) MISO agrees that, following the execution of this letter agreement and for so long as the U.S. Interface Facilities remain under MISO's functional control, MISO will not enter into or agree to any amendments of, or modifications to any operating agreements or any other agreements that apply to or affect those facilities without first consulting with and seeking the concurrence of ITC that the proposed modifications will not violate the then current terms of ITC's Presidential Permit or the IFA or be inconsistent with operational feasibility, safety, equipment limitations, or regulatory or statutory requirements. Further, MISO agrees that it will not knowingly enter into any other agreements or operating practices that would violate the terms of the Presidential Permit.

6) ITC agrees that, following the execution of this letter agreement, and for so long as the U.S. Interface Facilities remain under MISO's functional control, ITC will not agree to any amendments of or modifications to the IFA or the Presidential Permit without first consulting with MISO.

7) As indicated above, ITC and MISO recognize that, in addition to this letter agreement between MISO and ITC, the Coordination and CO2 Agreements between MISO and IESO and the IFA between ITC and Hydro One also apply to the U.S. Interface Facilities. ITC and MISO agree that promptly following the execution of this letter agreement, their respective representatives will meet to review and appropriately coordinate and allocate the various rights, responsibilities and obligations included in each of those agreements in order to ensure that all such responsibilities and obligations can and will be properly fulfilled. They will invite representatives of Hydro-One and IESO to participate in those discussions. As between ITC and MISO, in the event that any term or condition in any other document conflicts with ITC's Presidential Permit, MISO shall operate the transferred interface facilities consistent with the Presidential Permit.

Please confirm your agreement to the foregoing by countersigning this letter agreement in the space provided below and returning it to ITC at your earliest convenience.

Very truly yours,

International Transmission Company dba ITC*Transmission*

By Elizabeth A. Howell
Vice President, Operations

Acknowledge and Agreed To This 8th Day of August, 2011

Midwest Independent Transmission System Operator, Inc.

By Richard Doying
Vice President of Operations

TAB 2

PUBLIC

Interconnection Facilities Agreement

Between

Hydro One Networks Inc.

and

International Transmission Company

TABLE OF CONTENTS

THIS AMENDED AND RESTATED INTERCONNECTION FACILITIES AGREEMENT made this 8th day of August, 2011

BETWEEN:

HYDRO ONE NETWORKS INC., a corporation incorporated under the laws of the Province of Ontario (hereinafter referred to as "Hydro One" or "Hydro One Networks")

PARTY OF THE FIRST PART;
- and -

INTERNATIONAL TRANSMISSION COMPANY, a corporation incorporated under the laws of Michigan dba ITC*Transmission* (hereinafter referred to as "ITC" or "ITC *Transmission*")

PARTY OF THE SECOND PART;

Individually referred to as *Party* or collectively as *Parties*

WHEREAS Hydro One Inc. (formerly named Ontario Hydro Services Company Inc.) was established pursuant to the *Electricity Act, 1998* as a successor company to Ontario Hydro and certain assets, rights and obligations of Ontario Hydro were transferred to Hydro One Inc. by or pursuant to transfer orders made under Part X of the Act;

WHEREAS Hydro One Networks is a wholly owned subsidiary of Hydro One Inc., and the successor company to which the transmission and distribution assets of Ontario Hydro were transferred;

WHEREAS ITC and Hydro One Networks are the owners and operators of transmission facilities in the United States and in Canada respectively;

WHEREAS the transmission facilities of ITC and Hydro One Networks are interconnected pursuant to an agreement dated January 29th, 1975 and entitled Interconnection Agreement between Consumers Power Company, The Detroit Edison Company and Ontario Hydro as amended from time to time (*the "1975 Agreement*") to permit the coordinated operation of their respective transmission systems;

WHEREAS Ontario Hydro, Detroit Edison Company and Consumers Energy Company entered into an agreement dated December 21st, 1998 and entitled Interconnection Facilities Expansion *Agreement* (the "*1998 Expansion Agreement*") for the purpose of Ontario Hydro and Detroit Edison Company making certain improvements to the then existing *Interconnection Facilities.*

WHEREAS in accordance with the *Electricity Act, 1998* (Ontario), the *Independent Electricity System Operator* (the *"IESO"*) directs the operation of the *IESO-Controlled Grid* including Hydro One Networks' assets that form the part of the *Interconnection Facilities* located in the Province of Ontario;

WHEREAS pursuant to certain Federal Energy Regulatory Commission ("FERC") authorizations, the Regional Transmission Organization ("RTO") directs the operation of the various portions of the ITC transmission system with the exception of the facilities in the State of Michigan covered under this *Agreement* which are under the jurisdiction of the United States Department of Energy;

WHEREAS the *Parties* wish to permit their respective *Transmission Systems* to remain interconnected upon entering into this *Agreement* to describe the terms and conditions applicable to the operation of the *Interconnected Facilities* and the *Interconnection* of each *Party's Transmission Systems* to the other's.

NOW THEREFORE in consideration of the foregoing, and the mutual covenants, agreements, terms and conditions herein contained, the *Parties* intending to be legally bound hereby agree as follows:

ARTICLE I: <u>GENERAL</u>

1.1 This *Agreement* constitutes the entire agreement between the *Parties* with respect to the *Interconnection Facilities* and supersedes all prior oral or written representations and agreements concerning the subject matter of this *Agreement*, including, but not limited to the Interconnection Facilities Agreement dated June 5, 2009, as amended on August 9, 2009.

1.2 Notices

Any written notice required by this *Agreement* shall be deemed properly given and delivered if sent by registered mail, facsimiled or delivered to the addresses specified in Schedule "D". Notices shall be deemed to have been received on the date indicated on the delivery receipt if sent by registered mail; or on the date indicated on the delivery receipt or transmission slip if sent by courier or facsimile if delivered during normal business hours. If not delivered during normal business hours, delivery shall be deemed to have occurred on the next *Business Day.*

1.3 Person to be Notified

The designation of the person to be so notified or the address or facsimile number of such person may be changed at any time by either *Party* by written notice.

1.4 References

Unless otherwise specified, references in this *Agreement* to "Sections" or "Articles" are to sections and articles of this *Agreement*. Any reference in this *Agreement* to any statute or any section thereof will, unless otherwise expressly stated, be deemed to be a reference to such statute or section as amended, restated or re-enacted from time to time. The division of this *Agreement* into Articles and Sections is for convenience only, and shall not affect the interpretation of this *Agreement*. Unless the context requires otherwise, words importing the singular include the plural and vice versa and words importing gender include all genders. Where the word "including" or "includes" is used in this *Agreement* it means "including (or includes) without limitation".

1.5 Assignment

Either *Party* may assign this *Agreement* upon obtaining the consent of the other *Party*, which consent shall not be unreasonably withheld. This *Agreement* shall extend to, be binding upon and enure to the benefit of the said assigns and the respective successors of ITC and Hydro One Networks.

1.6 Rights and Remedies

Neither this *Agreement* nor any provision hereof is intended to confer upon any person other than the *Parties* hereto any rights or remedies hereunder.

1.7 Governing Law

Any actions arising under or pursuant to this *Agreement* may be initiated by a *Party* in the forum in which the other *Party* is resident. The *Agreement* shall be interpreted under and governed by the law of the State of New York, United States of America without regard to its law on conflict of laws.

1.8 Illegal, Invalid or Unenforceable

Any Article or Section of this *Agreement* or any other provision of this *Agreement* which is, or becomes, illegal, invalid or unenforceable shall be severed from this *Agreement*, and shall be ineffective to the extent of such illegality, invalidity or unenforceability, and shall not affect or impair the remaining provisions hereof.

1.9 Jurisdictions Incorporation

The *Parties* hereby agree to be bound by all regulatory requirements, codes, statutes and laws applicable to their jurisdiction which are hereby incorporated by reference into, and form part of this *Agreement*.

1.10 Modifications and Supplements

Except as otherwise provided herein, no modification or supplement to this *Agreement* shall be valid or binding unless set out in writing and executed by the *Parties* with the same degree of formality as the execution of this *Agreement*.

1.11 Licenses and Governmental Authority

This *Agreement* is subject to the initial and continuing governmental permissions and the obtaining of all requisite approvals and authority to establish, construct and maintain interconnections to interchange electrical energy.

1.12 If the *OEB*, the *NEB*, *FERC* or the United States Department of Energy (or any successor boards or agencies), a court of competent jurisdiction or other governmental entity with the appropriate jurisdiction (collectively, the "Regulatory Bodies") issues a rule, regulation, law or order that has the effect of canceling, changing or superseding any term or provision of this *Agreement* (the "Regulatory Requirement"), then this *Agreement* will be deemed modified to the extent necessary to comply with the Regulatory Requirement. Notwithstanding the foregoing, if the Regulatory Body materially modifies the terms and conditions of this *Agreement* and such modification(s) materially affect the benefits flowing to one or both of the *Parties*, the *Parties* agree to attempt in good faith to negotiate an amendment or amendments to this *Agreement* or take other appropriate action(s) so as to put each *Party* in effectively the same position in which the *Parties* would have been had such modification not been made. In the event that, within sixty (60) days or some other time period mutually agreed upon by the *Parties* after such modification has been made, the *Parties* are unable to reach agreement as to what, if any, amendments are necessary and fail to take other appropriate action to put each *Party* in effectively the same position in which the *Parties* would have been had such modification not been made, then either *Party* shall have the right to unilaterally terminate this *Agreement*.

Nothing in this *Agreement* shall be construed as affecting in any way the rights of either *Party* to unilaterally make application to any one or more of the Regulatory Bodies having jurisdiction over the *Party* for a change in rates, terms and conditions, charges, classifications of service, rule or regulation.

1.13 IESO and Hydro One Networks

Nothing in this *Agreement* shall be construed as requiring Hydro One Networks to act contrary to or refrain from acting in accordance with the IESO's direction.

1.14 The *Agreement* shall apply to the operation of the *Interconnection Facilities* regardless of their location or which of them (or portion thereof) are in service at any time.

1.15 This Agreement may be executed in counterparts, including facsimile counterparts, each of which shall be deemed an original, but all of which shall together constitute one and the same agreement.

ARTICLE II: DEFINITIONS

2.1 Defined Terms

In addition to the terms defined in Schedule "F", the following terms, wherever used in this *Agreement*, shall have the following meanings and are equally applicable to both the singular and plural form:

"Agent" means a *Qualified* person duly authorized by a *Party* to perform specific limited operations for the *Controlling Authority/Operating Authority*;

"Agreement" means this Agreement, the schedules attached hereto and all amendments made hereto by written agreement between the *Parties* in accordance with the terms of this *Agreement*;

"Automated Mode" means an arrangement which provides for automatically controlling the operation of *Equipment* under predetermined conditions;

"Business Day" means a day other than a Saturday, a Sunday or a public holiday in the Province of Ontario or the State of Michigan;

"Communication Facilities" means the transmitters, communication medium (fiber optics, twisted pair, radio frequency, power line carrier, microwave, etc.) and receivers, such that a signal can be transmitted from one device over the communication medium and received by another device. This definition implies that there is a common protocol for each device to ensure interoperability and that a receiving device understands, or can interpret the signal sent from the transmitting device;

"Communication Terminal Equipment" means the transmitter and receiver portion of the *Communication Facilities*, excluding the communication medium;

"Confidential Information" means:

(i) the terms of this *Agreement* and the operations and dealings under this *Agreement*;
(ii) all information disclosed by a *Party* to the other *Party* under this *Agreement* or in negotiating this *Agreement* which by its nature is confidential to the *Party* disclosing the information; and
(iii) all interpretative reports or other data generated by a *Party* that are based in whole or in part on information that is made *Confidential Information* by clauses (i) and (ii);

"Continuous Rating" as used in Schedule "G" for ratings of the *Interconnection* circuits is defined as the maximum load that may be carried continuously on the circuit (For ITC, this is the normal or day-to-day rating of the circuit);

"Electricity Act, 1998" or **"Act"** means the Electricity Act, 1998 being Schedule "A" of the Energy Competition Act, S.O. 1998, c. 15, as amended (Ontario);

"Effective Date" means the date that this Agreement is effective being the date that the *1975 Agreement* and the *1998 Expansion Agreement* were terminated;

"Emergency" means any abnormal system condition that requires remedial action to:

(a) ensure worker and public safety;
(b) protect the integrity of the interconnected system;
(c) protect the environment; or
(d) protect Equipment;

"End of Life" means the state where:

1. (a) the original in-service capabilities of equipment have been (or are expected to be) substantially diminished, and
(b) the cost of restoring or purchasing equipment to achieve the original in-service capabilities exceeds the cost of other viable alternatives, or
2. new physical requirements exceed the original in-service capabilities of the equipment;

"End of Life Replacement" means where *Equipment* needs to be replaced because the *Equipment* has reached *End of Life*;

"Equipment" means any structures, transmission lines or cables, transformers, breakers, disconnect switches, buses for the purpose of conveying electricity; and their related voltage/current transformers, protection systems, telecommunications systems, or any other auxiliary equipment;

"Extraordinary Maintenance or Repair" means an unexpected activity or activities required to be performed in response to unforeseen circumstances which include but are not limited to:
(a) Force Majeure;
(b) manufacturer's defect; or
(c) work other than *Routine Maintenance*.

For clarity, Extraordinary Maintenance or Repair does not include:
(a) damage that resulted from negligent operating, maintenance or construction practices;
(b) damage that resulted from failure to ensure physical security of the site (breach of security, e.g. trespassing/vandalism); and
(c) unit retrofit to increase life expectancy unless agreed by both *Parties*;

"FERC" means the Federal Energy Regulatory Commission established pursuant to the *Federal Power Act* (United States);

"Force Majeure Event" means, in relation to a person, any event or circumstance, or combination of events or circumstances,

(i) that is beyond the reasonable control of the person;
(ii) that adversely affects the performance by the person of its obligations under this *Agreement*; and
(iii) the adverse effects of which could not have been foreseen or prevented, overcome, remedied or mitigated in whole or in part by the person through the exercise of diligence and reasonable care and includes, but is not limited to, acts of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, civil disobedience or disturbances, vandalism or acts of terrorism, strikes, lockouts, restrictive work practices or other labour disturbances, unlawful arrests or restraints by government or governmental, administrative or regulatory agencies or authorities unless the result of a violation by the person of a permit, licence or other authorization or of any applicable law, and acts of God including lightning, earthquake, fire, flood, landslide, unusually heavy or prolonged rain or accumulation of snow or ice or lack of water arising from weather or environmental problems; provided however, for greater certainty, that the lack, insufficiency or non-availability of funds shall not constitute a *Force Majeure Event*;

"Forced Outage" means an unscheduled *Outage* due to the actual or potential failure of *Equipment*;

"Good Utility Practice" means any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry in North America during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgement in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. *Good Utility Practice* is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in North America;

"IESO" means the Independent Electricity System Operator established under Part II of the *Electricity Act, 1998* (Ontario) that directs the operations of Hydro One Networks' *Transmission System;*

"IESO-Controlled Grid" means the *Transmission Systems* with respect to which, pursuant to operating agreements, the *IESO* has authority to direct operations. For the purpose of this *Agreement*, *IESO-Controlled Grid* means those *Transmission Facilities* owned by Hydro One Networks that are part of the *IESO-Controlled Grid;*

"Interconnection" means the physical link to or through Hydro One Networks' *Transmission Facilities* and ITC's *Transmission Facilities*;

"Interconnection Facilities" means those facilities described in Schedule "A";

"Interconnection Point" means a point (or points as the case may be) of connection between Hydro One Networks' *Interconnection Facilities* and ITC's *Interconnection Facilities*;

"Long Term Emergency (LTE) Rating" as used in Schedule "G" for ratings of the *Interconnection* circuits is defined as the maximum load that may be carried on the circuit for up to 24 hours (For ITC, this is the emergency rating of the circuit);

"Maintenance" includes, but is not limited to, routine maintenance, *Extraordinary Maintenance or Repair, End of Life Replacement*, troubleshooting, repairs, approved changes, and such other modifications as may be required for the safe and efficient operation of the *Equipment;*

"Manual Mode" means the control of the operation of *Equipment* manually by operator action;

"Market Rules" means the rules made by the IESO under Section 32 of the *Electricity Act, 1998* (Ontario) applicable to Hydro One Networks and entities that are registered as market participants in accordance with the Market Rules;

"NEB" means the National Energy Board established pursuant to the *National Energy Board Act* (Canada);

"NERC" means the North American Electric Reliability Corporation.

"OEB" means the Ontario Energy Board established pursuant to the *Ontario Energy Board Act, 1998* (Ontario);

"Ontario Energy Board Act, 1998" means the *Ontario Energy Board Act, 1998* being Schedule "B" of the Energy Competition Act, S.O. 1998, c. 15, as amended (Ontario);

"Operating Orders" are orders issued by a *Controlling Authority/Operating Authority* to facilitate the removal or restoration of *Equipment* or to establish the necessary conditions for *Work Protection*;

"Outage" means the removal of *Equipment* from service, unavailability of *Equipment* connection or temporary de-rating, restriction of use, or reduction in performance of *Equipment* for any reason including, but not limited to, permitting the inspection, testing, maintenance or repair of *Equipment*;

"PARS" or **"Phase Angle Regulators"** means the Phase Angle Regulators installed in the J5D, L4D, L51D *Interconnections* as more particularly described in Schedule "A" and the Phase Angle Regulator(s) to be installed in the B3N *Interconnection* in accordance with the terms of this *Agreement;*

"Planned Outage" means an *Outage* that is scheduled, in advance, to occur at a pre-selected time, usually for construction, preventive maintenance or repair;

"Promptly" means performed in an expeditious manner and without undue delay, using due diligence, and with the intent of completing the required act or task as quickly as practicable;

"Protections" (Hydro One Networks) means *Equipment* designed to detect and isolate failed or faulted elements (ITC equivalent term is *Relays*);

"Qualified" means assessed by a *Party* in personal competency, familiarity with the knowledge of all applicable rules, regulations, guidelines, policies, codes, procedures, apparatus and *Equipment*, and dangers with respect to work and operation;

"Relays" (ITC) means equipment designed to detect and isolate failed or faulted elements (Hydro One Networks equivalent term is *Protections*);

"Regional Transmission Organization" or "RTO" means the large-scale (primarily multi-state) electric transmission system operator who is the Reliability Coordinator and the Market Operator for scheduled transactions over the ITC transmission system assets in the State of Michigan which is, as of the *Effective Date*, the Midwest Independent Transmission System Operator Inc., a Delaware non-stock corporation;

"Routine Maintenance" means work performed on a regular basis including without limitation:
(a) routine scheduled oil analysis;
(b) routine scheduled oil processing;
(c) routine scheduled inspections and checks including but not limited to visual and infra-red visual inspection;
(d) routine scheduled function and diagnostic tests;
(e) normal preventive cosmetic maintenance, corrosion touch up paint and corrective actions;
(f) minor oil leakage repairs;
(g) alarm/protection system checks; and
(h) minor-ancillary/equipment/component repair/replacement;

"Site" means the premises and the buildings on, in or around which *Transmission Facilities* are located;

"Transmission Facilities" means any and all equipment of any kind whatsoever owned by either *Party* and used in their respective *Transmission Systems* including, but not limited to, the *Interconnection Facilities* and associated protection and control facilities;

"Transmission System" means a system for transmitting electricity and includes any structures, *Equipment* or other things used for that purpose; and

"Transmission System Control Center" means:
(a) for Hydro One Networks, the Ontario Grid Control Centre ("**OGCC**") and Hydro One Networks' back up control centers; and
(b) for ITC, its Operations Control Room ("**OCR**") and ITC's back up control centers.

ARTICLE III: <u>SCOPE OF AGREEMENT</u>

3.1 Scope

3.1.1 This *Agreement* provides the basis for operating and maintaining the *Interconnection Facilities*. Specifically, it describes:

(a) the requirements for the safe operation, switching, notification, response to emergencies, and isolation of the *Interconnection Facilities*;
(b) the circumstances under which the *Interconnection Facilities,* in whole or in part, can be disconnected and the remedial actions required in order to permit the restoration of the operation of the *Interconnection Facilities* so disconnected; and
(c) the *Equipment* comprising the *Interconnection Facilities* and how it shall be operated for the mutual advantage and benefit of both *Parties*.

Schedule "A" contains a detailed description of the *Interconnection Facilities*.

ARTICLE IV: TERM

4.1 This *Agreement* shall take effect as of the *Effective Date* and shall continue in full force and effect until terminated.

4.2 Termination

4.2.1 This *Agreement* may be terminated at any time by mutual agreement. It may also be terminated upon at least one year prior notice in writing given by either *Party* to the other, provided that such unilateral termination shall not prejudice any outstanding obligations entered into under this *Agreement* that have accrued as of the date of termination. Without limiting the generality of the foregoing, the liability provisions, the confidentiality provisions and the obligations to pay monies owed prior to termination shall survive termination.

4.2.2 Neither *Party* may terminate this *Agreement* other than in accordance with the provisions providing for such termination set out in this *Agreement*.

ARTICLE V: ASSET OWNERS' COMMITTEE

5.1 General

Each *Party* shall assign, within 30 days of this *Agreement* becoming effective, a member and an alternate to an Asset Owners' Committee with the authority to act on their behalf with respect to actions or decisions taken by the Asset Owners' Committee. The members of the Asset Owners' Committee shall meet from time to time but at least once per calendar year unless delayed by mutual agreement to review issues of interest to the *Parties* in relation to the *Interconnection Facilities*. The Asset Owners' Committee may invite guests to their meetings. Invitations shall be by mutual agreement of the Asset Owners' Committee. Request for guest attendance approval shall be submitted by a *Party* at least two business days in advance to the meeting.

The Asset Owners' Committee shall review and address:
(a) *Interconnection Facilities*' utilization policies and principles;
(b) Deficiencies identified in the operation of the *Interconnection Facilities*;
(c) Opportunities to improve the operation of the *Interconnection Facilities* under the responsibilities of the *Parties* under this *Agreement*;
(d) *Equipment* ratings and operating restrictions;
(e) The *Outage* planning process used by the *Parties* and *Planned Outages*;
(f) Plans for changes on Hydro One Networks' *Transmission System* or ITC's *Transmission System* that may affect the operation of the *Interconnection Facilities*;
(g) Proposed upgrades or modifications to the *Protections, Relays* or communications facilities for the *Interconnection Facilities*;
(h) The impact on the *Interconnection Facilities* of the requirements of regulatory and reliability bodies including, but not limited to the *NERC*, the *IESO*, the *RTO*, the *NEB*, the *OEB*, *FERC* and the U.S. Department of Energy and their successor or replacement agencies;
(i) Incidents affecting the operation or performance of the *Interconnection Facilities*;
(j) Operating procedures, constraints and conditions for an *Emergency* operating mode on an annual basis; and
(k) Proposed revisions to this *Agreement*.

5.2 Authority

The Asset Owners' Committee shall have the authority to:

(a) approve and release changes to any or all of the schedules in this *Agreement* save and except for Schedules "I", as required from time to time to reflect changes in the operation of the *Interconnection*;
(b) write, approve and release new schedules to be part of this *Agreement* as required from time to time;
(c) determine and revise acceptable remedial actions required to ensure the acceptable operation and performance of the *Interconnection Facilities*;
(d) identify measures and technologies to be applied to minimize the risk of failure of *Equipment* that is subject to cost sharing arrangements;
(e) monitor *Maintenance* procedures on *Equipment* subject to cost sharing arrangements to ensure that *Good Utility Practice* is followed in the operation and *Maintenance* of such *Equipment;*
(f) address issues including, but not limited to, deficiencies associated with the protection, isolation, or control equipment for the *Interconnection Facilities* that impacts the operation of the *Transmission Systems* of either *Party*;

(g) resolve disputed matters submitted to the Asset Owners Committee as part of the Dispute Resolution process;
(h) establish such other committees, subcommittees, task forces, working groups or other bodies, as it deems appropriate for purposes of administering this *Agreement*; and
(i) negotiate alternatives to cost sharing arrangements in the event that *Extraordinary Maintenance* or *Repair* or *End-of-Life Replacement* is required on the *Interconnection Facilities* in accordance with the cost sharing provisions found in Section 6.1.1 and Schedule B.

ARTICLE VI: OBLIGATIONS

6.1 General

6.1.1 Except as specifically provided herein, each *Party* shall bear their own costs of compliance with this *Agreement*. These include, but are not limited to, costs associated with the operation, inspection and *Maintenance* of their respective assets comprising the *Interconnection Facilities* including associated protection control and communication equipment, in the manner described in this *Agreement*.

Each of ITC and Hydro One Networks shall be responsible individually for the performance of operation and *Maintenance* of the *Interconnection Facilities* owned by it, including all costs associated therewith. However, in the case of *Extraordinary Maintenance* or *Repair* or *End-of-Life Replacement* associated with the *Phase Angle Regulators* and the voltage regulating autotransformers described in Schedule "B" hereto, certain costs shall be shared equally as provided for in Schedule "B" provided that such equipment shall have been placed and remained in service under normal conditions, including regular under-load tap changing, where applicable, for at least one year.

The need for such *Extraordinary Maintenance* or *Repair*, or *End-of-Life Replacement*, the scope of work and the estimated costs therefore shall be agreed by the Asset Owners' Committee in advance, unless an *Emergency* makes the work necessary before review and concurrence of the Asset Owners' Committee can be obtained. In such case, the *Party* performing the *Extraordinary Maintenance or Repair* or *End-of-Life Replacement* shall notify the other *Party* as soon as it is practicable, of the scope of work and the reason(s) the *Extraordinary Maintenance* or *Repair End-of-Life Replacement* is necessary. The shared costs of *Extraordinary Maintenance* or *Repair* or *End-of-Life Replacement* shall include associated expenses for removal (if necessary), transportation and re-installation.

Schedule "B" contains the list of *Equipment* subject to cost sharing arrangements as well as details of inclusions and exclusions of shared cost.

6.1.2 Each *Party* shall follow *Good Utility Practice* in (a) the selection of, inspection and maintenance of *Equipment* comprising the *Interconnection Facilities;* (b) undertaking repairs required to correct any deficiencies; and (c) performing its obligations under this *Agreement.*

6.1.3 Each *Party* is responsible for ensuring that grounding devices on their *Equipment* have been removed prior to being placed on potential.

6.1.4 Each *Party* shall make reasonable attempts to accommodate the other *Party's* interests when planning changes to the *Interconnection Facilities*.

6.1.5 Each *Party* shall ensure that their respective staff or *Agents* are *Qualified* as having sufficient knowledge of the *Equipment*, policies and procedures described in this *Agreement* and that this knowledge will be monitored and applied. Evidence of staff or *Agents*' qualification shall be made available upon request.

6.1.6 In order to ensure the safe, efficient and effective operation of ITC's *Interconnection Facilities* and Hydro One Networks' *Interconnection Facilities*, ITC and Hydro One Networks hereby agree to disclose to each other operating data and other relevant information that may affect the operations of their respective *Interconnected Facilities*.

6.1.7 Duty to Repair

The *Parties* recognize the mutual benefit of operation with all *Interconnection Facilities* operational and all *Equipment* in service. Therefore, subject to Section 1.11 hereof, both *Parties* have a duty to repair any *Equipment* that is a part of the *Interconnection Facilities* as soon as practical using commercially reasonable efforts.

6.2 Normal Operations

6.2.1 Each *Party* shall remove *Equipment* or *Interconnection Facilities* from service in accordance with their reporting and scheduling obligations described in this *Agreement.* However, if removal from service is necessary to prevent damage to either *Party's* equipment or *Interconnection Facilities* or to protect the safety of employees, the public or the environment, the removing *Party* shall *Promptly* notify the other *Party's Controlling Authority/Operating Authority.*

6.2.2 The *Parties* shall cooperate to establish equipment ratings and monitor power flows for their respective *Interconnection Facilities*.

6.2.3 The *Parties* agree that *Equipment* in the *Interconnection Facilities* shall be operated within *Continuous Ratings* for normal operating conditions.

6.2.4 When potential is being applied to *Equipment*, which extends into the other *Party's Transmission System*, the *Controlling Authority/Operating Authority* of the *Party* applying potential shall obtain approval from his/her counterpart.

6.3 Equipment Protections / Relays Settings

The *Parties* shall cooperate in determining and establishing the settings of *Protections* and *Relays* to preserve the integrity of its assets and security of their respective *Transmission Systems*. This cooperation may include submission to the other *Party* of relevant electrical drawings and proposed settings of the *Protections* and *Relays* associated with the *Interconnection Facilities* for their review prior to their implementation.

6.4 Emergency Operations (Preparedness)

6.4.1 The operating procedures, constraints and conditions for an *Emergency* operating mode are described in Schedule "E", including reporting instructions and *Emergency* contacts.

6.4.2 Each *Party* shall provide the other *Party* with all necessary instructions and phone numbers for Emergency responses and mutual assistance including reporting procedures. This information will be kept up to date by each *Party* and is found in Schedule "C".

6.4.3 Each *Party* agrees that *Equipment* in the *Interconnection Facilities* shall be operated within post contingency ratings for the prescribed period of time immediately after the occurrence of a contingency event affecting the *Interconnection Facilities*. Operation of *Equipment* beyond agreed upon post-contingency ratings shall be at the owner's discretion.

ARTICLE VII: PLANNING FOR NEW OR MODIFIED CONNECTION FACILITIES

7.1 Each *Party* shall provide written notice to the other *Party's* Asset Owners' Committee member of proposed new or modified connection facilities (generation, load and/or transmission) that may affect the other *Party's Transmission System* as soon as the proposed new or modified connection facilities are public knowledge or sooner if the *Party* is able to obtain any required authorization to disclose information that might be deemed confidential or proprietary by the third party proposing the proposed new or modified connection facilities.

7.2 The *Parties* agree to cooperate in the undertaking of studies to assess the impact that new or modified connection facilities may have in the other *Party's Transmission System*.

7.3 Each *Party* shall provide further written notice to the other *Party's* Asset Owners' Committee member, when a facility study has been completed and when a connection/construction agreement has been signed and/or regulatory approval has been granted for the proposed new or modified connection facilities that may affect the other *Party's Transmission System*.

7.4 Each *Party* shall determine the cost of modifications, enhancements and reinforcements on the *Party's Transmission Facilities* required to accommodate new or modified connection facilities in the other *Party's Transmission System*. Such modifications, enhancements and reinforcements include but are not limited to the following:

(a) protective relay and control facilities, and associated telecommunications attributed to the project;
(b) modifying existing connection lines attributed to the project;
(c) breakers attributed to the project;
(d) disconnect switches; and
(e) bus sections at the terminal stations in the network pool attributed to the project.

7.5 The following factors shall be considered in calculating the costs applicable to section 7.4:

(a) advancement costs of replacing existing breakers and switches before the end of their useful life; and
(b) the costs of upgrading the *Equipment* to the next practical rating, including, but not limited to, removal and decommissioning cost less any salvage value of the removed facilities.

7.6 Each *Party* agrees to submit the cost recovery issues of the other *Party* to the regulatory bodies in their respective jurisdictions and, if permissible, support recovery of such costs, where one *Party* is affected by a proposed new or modified connection to the other *Party*'s *Transmissions System*.

7.7 Each *Party* shall be required to, on a reasonably practical basis but no less than once per year, provide the other *Party* with system information which might affect the flow patterns and ratings of the *Interconnection*. Hydro One Networks will provide ITC with system information pertaining to changes to transmission system equipment which affects impedance values or ratings. However, information that pertains to changes to Ontario generator and load will be provided to ITC after Hydro One Networks has obtained it from publicly available sources. Each *Party* will actively support the other *Party* in their endeavors to obtain all necessary information from the respective reliability coordinator to conduct system impact and/ or other reliability studies.

ARTICLE VIII: COMMUNICATION

8.1 Compliance

The *Parties* agree to comply with their obligations regarding operational requirements, reporting standards, and communications protocol as described in Schedule "E".

8.2 Information

Each *Party* shall endeavour to maintain an ongoing interchange of information about operation (including *Planned Outages* and *Forced Outages*, system tests, etc.) which could reflect into, or be of significance to, either *Transmission System* prior to the actual operation when appropriate.

8.3 Organizations and Authorities

The operating organizations and *Controlling and Operating Authorities* involved in the operation of the *Interconnection Facilities* are described in Schedule "E".

8.4 Telephone Numbers

A list of important business telephone numbers pertinent to this *Agreement* is attached as Schedule "C".

8.5 Communication Path

The Communication path for the operation of the *Interconnected Facilities* under normal and *Emergency* conditions is attached as Schedule "E".

8.6 Terminology

Schedule "F" summarizes the approved operating terminology and their meanings to be used in communication between Controlling and Operating Authorities.

ARTIXLE IX: OUTAGE COORDINATION

9.1 Obligations

9.1 ITC and Hydro One Networks shall use reasonable efforts to coordinate any required *Planned Outages* to maximize the availability of the *Interconnection Facilities.* Typically, this will include all *Interconnection Facilities* and any equipment within each *Transmission System* which may have a direct impact on the transmission capability of the *Interconnection.*

9.2 ITC and Hydro One Networks shall establish an *Outage* planning process to comply with the reporting and scheduling obligations set out in Schedule "H".

ARTICLE X: PHASE ANGLE REGULATORS

10.1 In accordance with the terms of the *1998 Expansion Agreement*, Hydro One Networks:

(a) installed a 230 kV 850 MVA *Phase Angle Regulator* and associated bypass switching facilities in the L4D *Interconnection* terminal at the Lambton Generating Station;
(b) installed a 230 kV 850 MVA *Phase Angle Regulator* and associated bypass switching facilities in the L51D *Interconnection* terminal at the Lambton Generating Station; and
(c) reconfigured the existing 230/345 kV voltage-regulating 600 MVA autotransformer in the L51D *Interconnection* such that it will operate in parallel with the existing 230/345 kV voltage-regulating 600 MVA autotransformer in the L4D *Interconnection.*

10.2 In accordance with the terms of the *1998 Expansion Agreement,* ITC installed:

(a) a 230 kV 645 MVA *Phase Angle Regulator* and associated bypass switching facilities in the B3N *Interconnection* terminal at its Bunce Creek Station which later failed; and

(b) a 230/345 kV voltage-regulating 1000 MVA autotransformer in the L51D *Interconnection* at its St. Clair Power Plant facility.

10.3 Due to the failure of the *Phase Angle Regulator* referenced in Subsection 10.2(a) above, ITC agrees to install one or more *Phase Angle Regulators* with a combined total capacity of at least 645 MVA in the B3N *Interconnection* terminal at its Bunce Creek Station.

10.4 To the extent that that they have not already done so for their respective *Phase Angle Regulators*, the *Parties* shall make reasonable commercial efforts to establish automatic and manual control of the *Phase Angle Regulators* including, but not limited to installing and making operational:

(a) integrated phase-angle control facilities and suitable *Communication Facilities* at their respective *Transmission System Control Centers* suitable for control of the *Phase Angle Regulators* in *Automated Mode* and *Manual Mode*; and
(b) *Communication Terminal Equipment* suitable for receiving control signals from, and transmitting *Phase Angle Regulator* tap position status to, the remote control location between the *Parties* respective *Transmission System Control Centers* for all of the *Phase Angle Regulators* in operation.

To this end and in recognition of the need for a compatible protocol for *Communication Facilities* between controlling stations and remote stations, the *Parties* agree to collaborate fully to develop functional design specifications for the *Communication Facilities* and the *Communication Terminal Equipment* referenced in 10.4 (a) and (b) above.

Furthermore, if either *Party* has to purchase or lease new *Communication Facilities*, excluding *Communication Terminal Equipment*, for the purpose of this Section 10.4, the *Parties* shall share such costs equally.

10.5 At any time when the *Phase Angle Regulators* are being controlled in *Manual Mode*, the *Parties* agree that control of the *Phase Angle Regulators* in *Manual Mode* will be implemented by the *IESO* and the U.S entity that has functional control over the *Interconnection Facilities* located in the U.S. giving jointly agreed upon operating orders to the entity(ies) with the physical control of the *Phase Angle Regulators* in operation. Each of the *Parties* hereby agrees to *Promptly* respond to such operating orders. However, if a *Party* does not respond to any such operating order because responding may cause damage to that Party's equipment or *Interconnection Facilities* or endanger the safety of employees, the public or the environment, the non-responding party shall *Promptly* notify the other *Party*, the *IESO* and the above-referenced U.S. entity.

10.6 The *Parties* agree that control of the *Phase Angle Regulators* in *Manual Mode* is an interim measure and they shall make reasonable commercial efforts to establish control of the *Phase Angle Regulators* in *Automated Mode*.

To this end, the *Parties* agree to collaborate fully to develop functional design specifications for, and install and make operational, an integrated automated controller for the *Phase Angle Regulators* and any additional associated *Communication Facilities* and *Communication Terminal Equipment* that might be required in this regard.

10.7 The *Parties* agree to comply with and operate the *Phase Angle Regulators* in accordance with:

(a) the operating principles set forth in Schedule "I" (the "*Principles*"); and

(b) the direction for the normal operation of the *Phase Angle Regulators* agreed by ITC and Hydro One Networks as set out in the Standard Operating Practice described in Section 10.8 below

10.8 The *Parties* agree to use their best efforts to develop a detailed standard operating practice (the "PAR SOP"), to implement the *Principles* no later than thirty days following the *Effective Date*. Thereafter, the *Parties* agree to comply with and operate the *Phase Angle Regulators* in accordance with the *PAR SOP*.

The *Parties* agree that if there is a conflict between the *Principles* and the *PAR SOP*, the *Principles* shall govern.

ARTICLE XI: <u>REQUIREMENTS FOR WORK SAFETY CONDITIONS</u>

11.1 The execution of all work, whether planned or *Emergency*, shall be performed under safe working conditions on *Interconnections* or *Equipment* connected to them.

11.2 Each *Party* shall have and maintain documented procedures to establish and maintain specified safety conditions until all working personnel have been reported clear of the *Equipment* and the *Work Protection* has been surrendered.

11.3 Each *Party* shall carry out work on its *Equipment* in accordance with their safety and *Work Protection* practices as described in Schedule "F".

ARTICLE XII: <u>LIABILITY AND *FORCE MAJEURE*</u>

12.1 Liability

Other than for sums payable under this *Agreement*, a *Party* will only be liable to the other *Party* for any damages that arise directly out of willful misconduct or gross negligence in meeting their respective obligations under this *Agreement*. Despite the foregoing, neither *Party* shall be liable under any circumstances whatsoever for any loss of profits or revenues, business interruption losses, loss of contract or loss of goodwill, or for any indirect, consequential, special or incidental damages, including but not limited to punitive or exemplary damages, whether any of the said liability, loss or damages arise in statute, contract, tort or otherwise.

12.2 *Force Majeure*

Neither *Party* shall be in default or deemed to be in default in the performance of its obligations under this *Agreement*, to the extent that performance of any such obligation is prevented or delayed by *Force Majeure Event*. If a *Party* is prevented or delayed in the performance of any such obligation by a *Force Majeure Event*, such *Party* shall immediately provide notice to the other *Party* of the circumstances preventing or delaying performance and the expected duration thereof. Such notice shall be confirmed *promptly* in writing. The *Party* so affected by the *Force Majeure Event* shall endeavour to remove the obstacles, which prevent performance and shall resume performance of its obligations as soon as reasonably practicable. The time for performing the obligation shall be extended for a period equal to the time during which the *Party* was subject to the *Force Majeure Event*. Both *Parties* shall explore all reasonable avenues available to avoid or resolve *Force Majeure Events* in the shortest time possible, but this requirement shall not oblige the *Party* suffering a strike, lockout or labour dispute to compromise its position in such dispute.

ARTICLE XIII: DEFAULT

13.1 General

If either *Party* fails to or neglects at any time to fully perform, observe and comply with all the terms, conditions and covenants herein, then the non-defaulting *Party* shall as soon as practicable, notify the defaulting *Party* in writing of such default and the defaulting *Party* shall correct such default to the satisfaction of the non-defaulting *Party* within thirty (30) days of the issuance of such notice or sooner in the case of an emergency, as may be determined by the non-defaulting *Party* or within a longer time period if agreeable to the other *Party*, failing which the non-defaulting *Party* may forthwith terminate this *Agreement* and the rights and privileges herein granted.

13.2 Termination Due to Bankruptcy or Insolvency of a *Party*

Either *Party* shall be entitled, at its option, to terminate this *Agreement* immediately upon written notice to the other *Party* upon the other *Party* becoming bankrupt or insolvent or upon the other *Party* ceasing to carry on business.

13.3 Disconnect

When a non-defaulting *Party* has terminated the *Agreement* under Sections 4.2, 13.1 or 13.2, the non-defaulting *Party* may disconnect the *Interconnection Point* and shall be entitled to de-commission and remove any of its *Equipment* associated with the *Interconnection Facilities* and the *Interconnection Point*.

13.4 Force and Effect

If this *Agreement* is terminated under Sections 4.2, 13.1 or 13.2, then upon termination the *Agreement* will, subject to Section 13.5, be of no further force and effect.

13.5 Rights and Obligations

If this *Agreement* is terminated under Sections 4.2, 13.1 or 13.2, the termination of this *Agreement* shall not affect any rights or obligations of either *Party* that may have accrued before termination, nor affect either *Party's* rights or obligations of this *Agreement*, which will continue in full force and effect notwithstanding the termination of this *Agreement* (such as, but not limited to the liability provisions in Section 12.1).

13.6 Exercising Rights and Remedies

Subject to the limitation of liability in Section 12.1 hereof, the rights and remedies of the *Parties* in this *Agreement* are not intended to be exclusive but rather are cumulative and are in addition to any other right or remedy otherwise available to the *Parties* at law or in equity. Either *Party* may exercise one or more of its rights and remedies from time to time, independently or in combination, without prejudice to any other right or remedy that either *Party* may have exercised. This subsection shall not operate to void the application of Article XV of this *Agreement*, to any dispute arising between the *Parties*.

13.7 Other Rights and Remedies

If any of the remedies provided for and chosen by a non-defaulting *Party* are found to be unenforceable, the non-defaulting *Party* may exercise any other right or remedy available to it at law or in equity.

ARTICLE XIV: CONFIDENTIAL INFORMATION

14.1 General

All *Confidential Information* shall at all times be treated as confidential, and shall be prepared, given, and used in good faith. The *Parties* shall use the *Confidential Information* only for the requirements of the work being performed including, but not limited to, planning or operating the *Parties' Interconnection Facilities* or *Transmission Systems*, and not for any other purpose, and shall not disclose it to any third party, directly or indirectly, without the prior written consent of the *Party* that provided the *Confidential Information*, and in such events the third party must agree to use the *Confidential Information* solely for the requirements of the work as specified. *Confidential Information* shall not be used for any commercial purpose of any kind whatsoever other than contemplated herein.

14.2 Exclusions

"*Confidential Information*" does not include:

(a) information that is in the public domain, provided that specific items of information shall not be considered to be in the public domain merely because more general information about a given item is in the public domain, and provided that the information is not in the public domain as a result of a breach of confidence by the *Party* seeking to disclose the information or a person to whom it has disclosed the information;

(b) information that is, at the time of the disclosure, in the possession of the recipient, provided that it was lawfully obtained either from the other *Party* or from sources, who did not acquire it directly or indirectly from the other *Party* under an obligation of confidence; and

(c) information that must be disclosed in compliance with a judicial or governmental order or other legal process.

14.3 Exceptions

Each *Party* shall keep *Confidential Information* confidential except:

(a) as may be necessary in an *Emergency*;
(b) to the extent required by law;
(c) if required in connection with legal proceedings, arbitration or any expert determination relating to the subject matter of this *Agreement*, or for the purpose of advising a party in relation thereto;
(d) to the extent required by the *Party's* license; or
(e) to the extent required by the *Market Rules* or as may be required to enable a *Party* to fulfill its obligation to any reliability organization.

14.4 Disclosure

In the event the Receiving *Party* is required to disclose *Confidential Information* of the Disclosing *Party*, the Receiving *Party* shall *Promptly* notify the Disclosing *Party* prior to disclosing the *Confidential Information*, to the extent practicable, so that the Disclosing *Party* may seek an appropriate protective order or other appropriate protection and/or waive the Receiving *Party*'s compliance with this *Agreement*. Unless the Disclosing *Party* agrees that all *Confidential Information* may be disclosed, the Receiving *Party* shall furnish only that portion of the *Confidential Information* which it is legally required to disclose, and will exercise all reasonable efforts to obtain reliable assurance that confidential treatment will be accorded the *Confidential Information*.

14.5 Co-operation

The *Parties* shall make any information required to be provided or communicated under the terms of this *Agreement* available to each other in a timely and co-operative manner.

14.6 Duration of Survival

The confidentiality provisions of this Article XV will continue and survive for a period of 6 years after the termination of this *Agreement*.

ARTICLE XV: DISPUTE RESOLUTION

15.1 Role of Asset Owners' Committee

All disputes shall first be submitted for resolution to the Asset Owners' Committee. Any dispute submitted for resolution to the Asset Owners' Committee which is not resolved by the Asset Owners' Committee within five (5) Business Days following submission of the dispute to the Asset Owners' Committee and any disputes of the Asset Owners' Committee itself, shall be submitted to the designated corporate officer(s) of each *Party* for resolution by good faith negotiations.

15.2 Arbitration Notice

15.2.1 Failing resolution of the dispute by the corporate officers pursuant to Section 15.1 within twenty (20) *Business Days* following the first notice of submission of the dispute to them, the *Parties* may mutually agree to submit the dispute to final and binding arbitration to be conducted in Ontario or Michigan in accordance with this *Agreement* and the commercial Arbitration Rules of the American Arbitration Association. If both *Parties* are agreeable to submit the dispute to final and binding arbitration but cannot agree on the location, the *Parties* agree that the arbitration will be conducted in the State of New York.

15.2.2 The *Parties* shall meet within ten *Business Days* of agreeing to submit the dispute to arbitration, to attempt to agree on an arbitrator *Qualified* by experience, education and training to arbitrate the dispute. If the *Parties* fail to meet, or otherwise are unable to agree on the selection of a single arbitrator within those ten Business Days, each *Party* will select one arbitrator. The two arbitrators so selected shall, within ten Business Days following their selection, jointly appoint a third arbitrator to be the sole arbitrator, after which appointment the role of the first two arbitrators shall end. If the two arbitrators selected by the *Parties* are unable to agree on the selection of the third arbitrator within ten Business Days following their selection, those two arbitrators may apply to a court of competent jurisdiction to appoint the sole arbitrator within ten Business Days following the request. Each arbitrator must be qualified by education, training and experience to pass upon the particular matter to be decided and shall have no relationship, direct or indirect, with either of the *Parties*.

15.2.3 The arbitrator(s) will be instructed that time is of the essence in the arbitration proceeding. The arbitrator shall proceed as soon as is practicable to hear and determine the dispute, and shall be directed by the *Parties* to provide a written decision resolving the dispute within 60 days following his or her appointment or such other date as may be agreed in writing by the *Parties*. The *Parties* shall provide such assistance and information as may be reasonably necessary to enable the arbitrator to determine the dispute. Any decision of the arbitrator will be in writing and will be final and binding upon the *Parties*, with no right of appeal from it and subject to Section 15.4 below, shall deal with the question of costs of arbitration and all related matters.

15.3 Performance During Dispute Resolution

While any dispute (other than a dispute that a *Party* has reasonable grounds for alleging is a fundamental breach of this *Agreement*) is being resolved, the *Parties* shall continue to perform all obligations under this *Agreement* with due diligence and continue to comply with all terms of this *Agreement* to preserve the integrity of the *Interconnection Facilities*.

15.4 Legal Costs of Dispute

Each *Party* shall be liable for all legal, expert and other costs incurred by it in resolving any dispute under this Article XV and the decision of the arbitrator relating to costs shall deal only with the fees and expenses of the arbitrator(s).

[Intentionally Left Blank]

IN WITNESS WHEREOF, the *Parties* hereto have caused this *Agreement* to be executed in duplicate attested by the signatures of their duly authorized officers, as of the day and year first written above.

ITC

Elizabeth Howell

I have the authority to bind International Transmission Company

Elizabeth A. Howell
Vice President, Operations

hydro one

I have the authority to bind Hydro One Networks Inc.

Laura Formusa
President and CEO

IN WITNESS WHEREOF, the *Parties* hereto have caused this *Agreement* to be executed in duplicate attested by the signatures of their duly authorized officers, as of the day and year first written above.

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I have the authority to bind International Transmission Company

Elizabeth A. Howell
Vice President, Operations

hydro one

I have the authority to bind Hydro One Networks Inc.

Laura Formusa
President and CEO

SCHEDULE "A" **Brief Description of the Interconnection Facilities.**

REDACTED

SCHEDULE "B" Cost Sharing for Extraordinary Maintenance and Repair

B1.1 List of Equipment

The following *Equipment* is subject to cost sharing in the case of *Extraordinary Maintenance* or *Repair*, or *End-of-Life replacement.*

Interconnection	*Equipment*	Owner
L4D	Autotransformers T7 and T8	Hydro One Networks
L4D	Phase angle regulator PS4	Hydro One Networks
L51D	Phase angle regulator PS51	Hydro One Networks
L51D	Autotransformer 351	ITC
B3N	Autotransformer 201	ITC
B3N	Phase angle regulator (Currently not in service as of the *Effective Date*)	ITC
J5D	Transformer / *Phase Angle Regulator* PSR5	Hydro One Networks

B1.2 Details of Work Subject to Cost Sharing and Exclusions

The attached Table B-1 describes the work that is subject to cost sharing and, where applicable, exclusions.

B1.3 Eligibility

To make *Equipment* in the above list eligible for cost sharing, it must have been in use under normal conditions, including regular under-load tap changing, where applicable, for at least one year.

B1.4 Regular Maintenance

The owner shall keep records of all commissioning logs, inspection checks, corrective and planned maintenance activities and agrees to provide copies to the other *Party* upon request.

Table B-1

Details of Work Subject to Cost Sharing and Exclusions as Appropriate

Work	Shared Cost	Exclusions
Repair of any internal transformer or phase shifter failure that requires the transformer or *Phase Angle Regulator* to be dismantled, transported to a repair facility, repaired, reassembled and re-commissioned for operation or storage.	Corrective work related to the failed components and co-lateral damage to the transformer or phase shifter arising from the failure.	Customary paint, gasket, protective device, pump, fan and tap changer maintenance work performed while at the repair facility. Premature maintenance costs for the transformer or phase shifter related to the above shall not be shared unless damaged by the failure that initiated the repair or during disassembly and transport to the repair facility.
Repair of any sub-component failure that requires the oil to be drained from the tank or tap changer compartment, including bushing failures, pump failures, internal lead failures, turret failures, major leaks	Any such action with the transformer or *Phase Angle Regulator* failure frequency exceeding four occurrences over the transformer or phase shifter life.	End-of-life disposal or oil maintenance.
Bushing replacement due to failure of the transformer or phase shifter.	Yes.	No.
Tapchanger diverter or selector switch. Replacement due to failures	Yes.	Overhauled diverter swaps for maintenance. Contact and/or spring replacements
Repair of oil leakage between main oil and under-load tapchanger compartments.	Yes.	No.
Installation of intensive-care monitoring (such as a transformer nursing unit, on-line Power Discharge monitoring) with the intent to monitor an observed defect to the main unit.	Yes	No.
Manufacturer supervision during transformer or *Phase Angle Regulator* , or sub-component thereof, disassembly/erection	If repair warranty is of one year or longer.	If owner chooses to have a warranty of less than one year.
Removals and re-assembly of enclosures/ walls/ support structures not directly attached to the transformer tank to permit transformer or *Phase Angle Regulator* handling.	No.	Excluded.
Legal action with respect to suing manufacturers or contractors for design defects or errors that cause damage to the equipment including contracting third party consultants with respect to the legal action.	Yes. Costs and claim awards shall be shared proportionally to the shared cost ratio for both *Parties*.	No.
Correction of other defects/deficiencies related to changes in the transformer or *Phase Angle Regulator* arising from de-ratings or changes in performance expectations (e.g. installation of new lightning arresters if they are required to	No.	Excluded.

Work	**Shared Cost**	**Exclusions**
provide increased overvoltage protection margin for a transformer that has had its lightning impulse level de-rated)		
Repair of damage or replacement of shared cost equipment and the associated control, monitoring and protective devices as a result of the breach of station security or vandalism.	No.	Excluded.
Failures resulting from unscheduled parallel flows of electric energy across the *Interconnection Facilities.*	Yes.	No.
End of Life Replacement	Yes.	No.

SCHEDULE "C": Contacts and Business Telephone Numbers

REDACTED

SCHEDULE "D" Official Mailing Addresses for Legal and Corporate Notices

HYDRO ONE NETWORKS INC.

Secretary
483 Bay Street
North Tower, 15th Floor
Toronto, Ontario
M5G 2P5

Facsimile: (416) 345-6240

With a copy to:

General Counsel
483 Bay Street
North Tower, 15th Floor
Toronto, Ontario
M5G 2P5

Phone: (416) 345 - 6301
Facsimile: (416) 345-6240
E-mail: joe.agostino@HydroOne.com

INTERNATIONAL TRANSMISSION COMPANY

Vice President & General Counsel, Utility Operations
27175 Energy Way
Novi, Michigan 48377

Phone: (248) 946-3000
Facsimile: (248) 946-3552
E-mail: csoneral@itctransco.com

SCHEDULE "E": Communications, Operating Organizations and Evacuation Procedures

REDACTED

SCHEDULE "F" <u>Protection for Work and Terminology to be Used for Work Protection</u>

REDACTED

SCHEDULE "G" Technical Characteristics of *Interconnection Facilities* (Line, Transformer, and *Phase Angle Regulator* Ratings and Description of Protection Systems)

REDACTED

SCHEDULE "H" Outage Coordination Process

ITC Transmission and Hydro One Networks have established the following process for reporting and scheduling outages.

Applications to ITC:

1. Hydro One Operating Planning will email the "Customer Report for ITC" to ITC Outage Coordination every Thursday. This spreadsheet contains outages that are scheduled to occur in the following six month period. This report is for informational purposes only.

2. Hydro One Operating Planning will process an outage. Hydro One will contact ITC Outage Coordination by phone and/or email to confirm and discuss availability (minimum 10 business days notice).

3. ITC Outage Coordination then processes the outage. ITC will send a written notice to Hydro One Operating Planning (by e-mail/fax) confirming that the outage has been processed.

4. If "Protection/Supporting Guarantee" is required, Hydro One Operating Planning will send an "Outage Information Form" by email to ITC Outage Coordination. ITC will send a follow up e-mail to Hydro One confirming that the details on the form are correct. After the details in the form are confirmed, there will generally be no further communication between ITC Outage Coordination and Hydro One Operating Planning. Exceptions are, but are not limited to, when an outage is revised for any reason and/or is denied by MISO and/or IESO.

Applications to Hydro One:

1. ITC Outage Coordination will process an outage. ITC will contact Hydro One Operating Planning by phone and/or email to confirm and discuss availability (minimum 15 business days notice).

2. Hydro One Operating Planning then processes the outage. Hydro One will send a written notice to ITC Outage Coordination (by e-mail/fax) confirming that the outage has been processed.

3. If "Protection/Supporting Guarantee" is required, ITC Outage Coordination will provide this information in the initial written notice to Hydro One Operating Planning. Hydro One Operating Planning will then send an "Outage Information Form" by email to ITC Outage Coordination. ITC will send a follow up e-mail to Hydro One confirming that the details on the form are correct. After the details in the form are confirmed, there will generally be no further communication between ITC Outage Coordination and Hydro One Operating Planning. Exceptions are, but are not limited to, when an outage is revised for any reason and/or is denied by MISO and/or IESO.

SCHEDULE "I": Operating Principles for the Phase Angle Regulators

For the purposes of this Schedule "I" and the PAR SOP, the following terms shall have the following meanings:

Circuit Target Flow(s) means the desired power flow (MW) on a specific circuit(s) of the Interface.

Control Band means the maximum allowable Interface Deviation of ± 200 MW, maintained within practical considerations.

Interface Deviation means the difference between the Interface Flow and Interface Schedule.

Interface means, collectively, the four circuits that comprise the Ontario-Michigan interconnection (J5D, L4D, L51D, B3N).

IESO means the Independent Electricity System Operator established under Part II of the *Electricity Act 1998* (Ontario) that directs the operations of Hydro One Networks' transmission system.

Interface Flow means the power flow (MW) on the Interface, including a net direction.

Interface Schedule means the net total of the approved interchange across the Interface, as well as emergency interchange implemented by the MISO and the IESO.

Local Interface Facilities means transmission facilities in Michigan or Ontario that meet any of the following criteria:

a) facilities that directly comprise the Interface, or;

b) equipment at the terminal stations of the Interface, or;

c) transmission circuits that emanate from the terminal stations of the Interface, or;

d) other facilities associated with the Interface that are directly and significantly affected by the distribution of flows between the circuits that comprise the Interface, as noted below:

- Ontario - transmission circuits that emanate from Lauzon TS
- Michigan - Transmission facilities in the eastern Detroit / Port Huron area(s).

Max Tap means the Interface (PARs collectively) has reached the maximum ability to control flow, in either direction.

U.S. Controlling Entity means the entity that has functional control over the Interface facilities in Michigan.

1. The PARs shall be operated in accordance with the following operating principles:

- The Interface Deviation is maintained to the maximum extent practical considering operational feasibility, safety, equipment limitations and regulatory and statutory requirements; and
- The System Operating Limit(s) ("SOLs") of the Interface and Local Interface Facilities are respected; and
- The Interface Deviation may exceed the Control Band as necessary to prevent or resolve declared emergency operating situations as specified in Sections 3 and 5, provided that normal PAR operations are resumed as soon as practical; and
- When a disagreement occurs over operating conditions or limits for the Interconnection Facilities, the most restrictive approach shall apply.

2. The PARs will normally be adjusted as necessary to maintain the Interface Deviation within the Control Band, within practical considerations.

3. The PARs are to be operated such that the Interface Deviation is maintained within the Control Band to the maximum extent practical, while staying within the SOLs of the Interface and Local Interface Facilities. Proactive adjustments will be implemented when the Interface Deviation is reasonably expected to exceed the Control Band. The Circuit Target Flows between the individual circuits will be optimized such that the Interface Deviation is maintained within the Control Band for as long as possible before reaching Max Tap.

In order to prevent an Emergency in the balancing authority areas of the U.S. Controlling Entity or IESO, the PARs may be adjusted such that the Interface Deviation exceeds the Control Band provided that other actions are utilized first, time permitting, including re-dispatch, curtailing interchange transactions, Transmission Loading Relief ("TLR"), re-configuration, etc. while respecting SOLs on the Local Interface Facilities.

4. When the Interface reaches Max Tap, the Interface will be controlled to its applicable interface limits. Actions (e.g. TLR's, generation re-dispatch, re-configuration, etc.) will not be taken solely to return the Interface Deviation to within the regulating capability of the PARs.

5. The U.S Controlling Entity and IESO shall discuss and agree on the Interface Flows, Circuit Target Flows, PAR Target Settings, including the PAR setting implementation time if different from the normal interchange ramping period taking into consideration operational constraints identified by ITC and Hydro One, and shall issue the jointly agreed upon operating instructions to ITC and Hydro One.

Operating instructions will be implemented by ITC and Hydro One unless such actions will exceed SOLs of the Interface or Local Interface Facilities, or violate safety, regulatory or statutory requirement(s). If unable to implement any operating instruction, ITC or Hydro One will promptly notify the other, and the U.S Controlling Entity and IESO as appropriate.

6. All appropriate actions will be implemented, time permitting, including full utilization of the PARs, generation re-dispatch, TLR and re-configuration in order to resolve a Declared Emergency (an emergency declared by the applicable Reliability Coordinator) within the balancing authority areas of the U.S. Controlling Entity or IESO, or a Declared Emergency of an entity outside of those balancing authority areas, if such action contributes to relieving the condition, as set forth in the following Sections 6.a and 6.b:

a. If the emergency is within the balancing authority areas of the U.S. Controlling Entity or IESO, the PARs may be adjusted up to Max Tap utilizing emergency thermal limits as appropriate. If and when sufficient relief has been effected, or when the condition has been corrected such that emergency PAR operations are no longer required, the PARs shall be returned to normal operations, as soon as practical.

   If emergencies are declared in the balancing authority areas of both the U.S. Controlling Entity and IESO, tap positions for the PARs shall be set in the position(s) that best mitigates or assists with the mitigation of, the overall scope of the emergencies in both areas and that achieves, to the extent practical, a fair sharing of relief requirements between the areas.

b. If the emergency is outside of the balancing authority areas of the U.S. Controlling Entity and IESO, the PARs may be operated to assist with the emergency under the following conditions:
   (i) The requesting entity has taken all mitigating steps except voltage reduction and shedding of firm load; and
   (ii) PAR operation being considered to assist another entity will not result in voltage reduction, firm load shedding or exceeding an SOL or an Interconnection Reliability Operating Limit ("IROL") in Michigan or Ontario; and
   (iii) The entity makes every available effort following the implementation of emergency PAR operations to quickly restore their system to a position such that normal PAR operations can be resumed.

   The PARs shall be considered as one of the control actions available to assist the affected system, and may be adjusted up to Max Tap utilizing emergency limits as appropriate. The type of assistance shall be agreed upon and directed by the U.S. Controlling Entity and the IESO.

   If and when sufficient relief has been effected, or when the condition has been corrected such that emergency PAR operations are no longer required, the PARs shall be returned to normal operations as soon as practical.

7. If the U.S. Controlling Entity and IESO agree to suspend operation of the PARs as a result of unforeseen operational or market outcomes within their service areas, they shall so inform ITC and Hydro One and the PARs will be bypassed or operated at or near neutral tap, with no attempt being made to control to the Interface Schedule, until the U.S. Controlling Entity and IESO provide additional operating instructions to ITC and Hydro One.

8. Reactive transfers on the Michigan-Ontario interface shall be arranged in accordance with the then currently applicable Michigan-Ontario Interface Voltage Control Procedure in place between the U.S. Controlling Entity and IESO.

TAB 3

MISO -IESO

Operating Instruction

PUBLIC

MISO-IESO-C02-R0

Effective Date: August 8, 2011

Review Date: August 8, 2014

Expiry Date: N/A

Operation of the Michigan-Ontario Tie Lines and Associated Facilities

1.0 INTRODUCTION

Michigan and Ontario are interconnected by four synchronous tie lines, which are the J5D, L51D, L4D, and B3N lines, and associated facilities, including the Phase Angle Regulating transformers ("PARs") located on Lines J5D, L51D and L4D in Ontario and on Line B3N in Michigan (the "Interconnection Facilities").

Hydro One Networks Inc. ("Hydro One") owns and operates the Interconnection Facilities located in Ontario. The Independent Electricity System Operator ("IESO") is the Reliability Coordinator, Balancing Authority and Transmission Operator in Ontario. IESO directs the operation of the Interconnection Facilities in Ontario.

International Transmission Company, dba ITC Transmission, ("ITC") owns and operates the Interconnection Facilities located in Michigan. ITC is the Transmission Operator of its transmission equipment in Michigan. The Midwest Independent Transmission System Operator, Inc. ("MISO") is the Reliability Coordinator and Balancing Authority of the ITC service area in Michigan, including Interconnection Facilities, and will direct actions regarding the Michigan-Ontario Interconnection facilities in Michigan.

Operation of the Interconnection Facilities shall be in conformance with North American Electric Reliability Corporation ("NERC") or Regional Standards and any other regulatory and statutory requirement(s).

This operating instruction sets forth instructions related to the operation of the Interconnection Facilities pursuant to the provisions of the "Coordination Agreement By and Between Midwest Independent Transmission System Operator, Inc. (Midwest ISO) and Independent Electricity System Operator (IESO)" (the "Coordination Agreement"). MISO and IESO will jointly coordinate operation of the Interconnection Facilities in accordance with this document regardless of the location or the status at any time of any of the Interconnection Facilities.

2.0 DEFINITIONS

Circuit Target Flow(s) – The desired power flow (MW) on a specific circuit(s) of the Interface.

Control Band – The maximum targeted Interface Deviation of ± 200 MW, maintained within practical considerations.

Interface Deviation – The difference between the Interface Flow and the Interface Schedule.

Interface – Collectively, the four circuits that comprise the Ontario-Michigan interconnection (J5D, L4D, L51D, B3N).

Interface Control Mode(s)

Regulated Mode – The Interface is within operational limitations and retains the ability to maintain the Interface Deviation within the Control Band, as described in Section 3.4.1

Non-Regulated Mode – The Interface has reached Max Tap and the Interface Deviation is exceeding or expected to exceed the Control Band.

Bypass Mode – The Interface is in the Bypass Mode when the PARs are either:

a) Physically bypassed or;

b) In-service PARs are at or near neutral tap and no attempt is being made to control to the Interface Schedule. The PARs may be adjusted as necessary to respect System Operating Limits ("SOLs") of the Interface and Local Interface Facilities.

Interface Flow – The power flow (MW) on the Interface, including a net direction.

Interface Schedule - The net total of the approved interchange across the Interface, as well as emergency interchange implemented by MISO and the IESO.

Local Interface Facilities – MISO or IESO transmission facilities that meet any of the following criteria:

a) Facilities that directly comprise the Interface, or;

b) Equipment at the terminal stations of the Interface, or;

c) Transmission circuits that emanate from the terminal stations of the Interface, or;

d) Other facilities associated with the Interface that are directly and significantly affected by the distribution of flows between the circuits that comprise the Interface, as noted below:

- IESO - transmission circuits that emanate from Lauzon TS
- MISO - Transmission facilities in the eastern Detroit / Port Huron area(s).

Max Tap – The Interface (PARs collectively) has reached the maximum ability to control flow, in either direction.

3.0 PAR OPERATIONS

MISO and the IESO mutually agree to operate the PARs in order to meet the following operating principles.

The PARs shall be operated such that:

- The Interface Deviation is maintained within the Control Band to the maximum extent practical considering operational feasibility, safety, equipment limitations and regulatory and statutory requirements, and;
- System Operating Limit(s) of the Interface and Local Interface Facilities are respected, and;
- The Interface Deviation may exceed the Control Band as necessary to prevent or resolve declared emergency operating situations as specified in Sections 3.4 and 3.5, provided that normal PAR operations are resumed as soon as practical, and;
- When a disagreement occurs over operating conditions or limits for the Interconnection Facilities, the most restrictive approach shall apply.

3.1 Operational Planning

3.1.1 The facility ratings are determined and provided by the asset owners. The conditions under which these ratings apply (e.g. ambient temperature, equipment temperature and available/unavailable cooling, equipment loading, wind speed) shall be specified by ITC and Hydro One.

3.2 Scheduling

3.2.1 Normal scheduling limits will reflect all known restrictions, outages or deratings to equipment that form part of the Interface.

3.2.2 Scheduling limits will normally assume that the PARs are (or will be) able to control the Interface Deviation within the Control Band. During periods when the PARs are unable, or anticipated to be unable to acceptably regulate the Interface Deviation, scheduling limits shall account for expected loop flows.

3.2.3 The IESO and MISO shall jointly approve and confirm the MISO-IESO schedules (on the Michigan interface) prior to schedule implementation.

3.3 Market Operations

3.3.1 Scheduling limits in the day-ahead or future operational planning time frame will normally assume that the PARs are (or will be) able to control the Interface Deviation within the Control Band. During periods when the PARs are projected to be unable to acceptably regulate the Interface Deviation, forecasts of tie line flows shall account for anticipated loop flows. As required, MISO and the IESO agree to discuss day-ahead operations and share their assumptions when determining these expected flows.

3.4 Real-Time Operations - Normal

3.4.1 The PARs will normally be adjusted as necessary to maintain the Interface in Regulated Mode.

3.4.2 In Regulated Mode, the PARs are to be operated such that the Interface Deviation is maintained within the Control Band to the maximum extent practical, while staying within the SOLs of the Interface and Local Interface Facilities. Proactive adjustments will be implemented when the Interface Deviation is reasonably expected to exceed the Control Band.

The Circuit Target Flows between the individual circuits will be optimized such that the Interface remains in the Regulated Mode for as long as possible before reaching Max Tap.

Prevention of an emergency

In order to prevent an emergency in MISO or Ontario, PARs may be adjusted such that the Interface Deviation exceeds the Control Band providing other actions are utilized first, time permitting. Actions that are to be implemented include re-dispatch, curtailing interchange transactions, TLR, re-configuration, etc. while respecting SOLs on the Local Interface Facilities.

3.4.3 The IESO shall set the IDC status flag for the Michigan-Ontario Interface to Regulated, Non-Regulated or Bypass Mode, reflecting the ability of the PARs to maintain the Interface Deviation within the Control Band. Whenever possible, this flag should be set in sufficient time to allow other Reliability Coordinators to understand the impact of the PARs and incorporate those impacts on their operation (i.e. TLRs).

3.4.4 In Non-Regulated Mode, the interface will be controlled to its applicable interface limits. Actions (e.g. TLR's, generation re-dispatch, re-configuration, etc.) will not be taken solely to return the Interface Deviation to within the regulating capability of the PARs.

MISO and the IESO shall discuss and agree on the Interface Flows, Circuit Target Flows, PAR Target Settings, including the PAR setting implementation time if different from the normal interchange ramping period taking into consideration operational constraints identified by ITC and Hydro One.

MISO and the IESO understand that operating instructions will be implemented by ITC and Hydro One unless such actions will exceed SOLs of the Interface or Local Interface Facilities, or violate safety, regulatory or statutory requirement(s). If unable to implement any operating instruction, ITC or Hydro One will promptly notify the other and MISO and the IESO.

3.5 Emergency Operations

All appropriate actions will be implemented, time permitting, including full utilization of the PARs, generation re-dispatch, TLR and re-configuration in order to resolve a declared emergency within MISO or Ontario, or a declared emergency of an entity outside of MISO and Ontario, if such action contributes to relieving the condition, as set forth in Sections 3.5.1 and 3.5.2.

3.5.1 If the emergency is within MISO or Ontario, the PARs may be adjusted up to Max Tap utilizing emergency thermal limits as appropriate. If and when sufficient relief has been effected, or when the condition has been corrected such that emergency PAR operations are no longer required, the PARs shall be returned to normal operations, as soon as practical.

If emergencies are declared in both MISO and Ontario, tap positions for the PARs shall be set in the position(s) that best mitigates, or assists with the mitigation of, the overall scope of the emergencies in both areas and that achieves, to the extent practical, a fair sharing of relief requirements between the areas.

3.5.2 If the emergency is outside of MISO and Ontario, the PARs may be operated to assist with the emergency under the following conditions:

1. The requesting entity has taken all mitigating steps except voltage reduction and shedding of firm load, and;
2. PAR operation being considered to assist another entity will not result in voltage reduction, firm load shedding or exceeding an SOL or an IROL in MISO or Ontario, and;
3. The entity makes every available effort following the implementation of emergency PAR operations to quickly restore their system to a position such that normal PAR operations can be resumed.

The PARs shall be considered as one of the control actions available to assist the affected system, and may be adjusted up to Max Tap utilizing emergency limits as appropriate. The type of assistance shall be agreed upon and directed by MISO and the IESO.

If and when sufficient relief has been effected, or when the condition has been corrected such that emergency PAR operations are no longer required, the PARs shall be returned to normal operations as soon as practical.

3.6 Voltage Control

Reactive transfers on the Michigan-Ontario interface shall be arranged in accordance with instruction MISO-IESO-C03 Michigan-Ontario Interface Voltage Control Procedure.

3.7 Communications

Communications will be via a telephone conference ("blast call"), as outlined in Appendix A, Table A.1. Any party identified in Appendix A may initiate a call if flows are causing or are anticipated to cause a reliability or operational concern.

4.0 COORDINATION OF OPERATIONS

MISO and the IESO will coordinate the overall operation of the PARs. Given the change in electrical flows that will occur when the PARs are placed in Regulated Mode, it is recognized that normal operation of the PARs may result in unforeseen operational or market outcomes within MISO or the IESO. Depending on the nature of the event, the most appropriate or only mitigating action may be to suspend normal operation of the PARs, i.e. change the Interface Control Mode from Regulated Mode to Bypass Mode.

Suspension of normal PAR operation:

- Will only occur with the mutual consent of MISO and the IESO, and such consent shall not be unreasonably withheld, and;
- Will only occur as a last resort after all other reasonable efforts have been made to resolve the unforeseen operational or market outcomes, and;
- In the case of anomalous market outcomes in either jurisdiction, will only occur after consultation with other affected markets

If normal operation of the PARs is suspended, the PARs will be operated in the Bypass Mode.

Normal operations of the PARs will remain suspended until mutual agreement is reached to restore them to Regulated Mode or regulatory action occurs and a subsequent resolution plan developed and implemented.

In all cases, MISO and the IESO will properly coordinate and implement all actions as as soon as practical, with the goal of resuming normal operation of the PARs as quickly as possible.

5.0 DISPUTE RESOLUTION

5.1 Real-Time Operations

MISO and the IESO agree to make reasonable attempts to accommodate requested tap changes. In the event that MISO and the IESO are unable to agree on an appropriate action in real-time, shift staff should not spend an inordinate amount of time discussing conflicts.

In the event of a tap position disagreement, the tap position that would result in the Interface Flow equal to the Interface Schedule should be the default position, unless this will cause a reliability concern. On-shift staff should make reasonable attempts to accommodate requested tap changes unless the proposed action will cause undue equipment or safety concerns.

The dispute will be reviewed by the management of parties during the next business day. If necessary, changes will be implemented to mitigate future similar disputes.

5.2 Operational Coordination

In the event that mutual consent cannot be reached as described in Section 4 (Coordination of Operations) of this operating instruction, MISO and the IESO agree to:

1) Refer the issue to their respective market monitoring units for recommendation, and;
2) Refer the dispute to the Coordination Committee for resolution per Section 12 of the Coordination Agreement.

If either MISO or the IESO market monitoring units returns a recommendation that includes the suspension of normal operation of the PARs, the change in operations will be implemented per Section 4.

6.0 DATA AND EXCHANGE INFORMATION

The parties agree to provide in a timely manner to the asset owners data and information requested by them to comply with regulatory requirements or to aid in the analysis of emergency operations, equipment failures, or disturbances.

In the event the PARs are operated in the emergency operating state, the parties agree that each event will be reviewed and a report prepared for the MISO - IESO Coordinating Committee. These reports will be shared in a timely manner with the asset owners.

7.0 REVISION HISTORY

Revision No.	Reason for Issue	Revised by:	Issue Date	Effective Date
MISO-IESO-C02-R0	Creation of Operation of the Michigan-Ontario Tie Lines and Associated Facilities Procedure	Coordinating Committee	08-Aug-2011	08-Aug-2011

Approved by the Coordination Committee:

MidwestISO

Dated: 8/8/11

ieso
Power to Ontario.
On Demand.

Dated: August 8, 2011

APPENDIX A:

Communications and Operating Procedures

Table A.1:

Initiator (tap change):	**IESO**	**MISO**	**ITC - TO**
Originating entity contacts (single call):	MISO ITC-TO ITC-BA (MECS) HONI	IESO ITC-TO ITC-BA (MECS) HONI	IESO MISO ITC-BA (MECS) HONI

Contact Information:

IESO - Markets (Schedules) [redacted]

- System (Reliability) [redacted]

MISO - East Reliability RC [redacted]

ITC-TO - Senior Transmission System Coordinator [redacted]

ITC-BA (MECS) - Senior BA Controller [redacted]

Hydro One Networks - Sector 1 Controller [redacted]

Day-Ahead Planning/Scheduling (not included in Real-Time Blast Call):

IESO - Market Forecasts & Integration [redacted]

MISO -Operations Engineering [redacted]

- Scheduling [redacted]

APPENDIX B:

PAR Operations Examples

The following table provides examples of PAR operation under a number of different scenarios. These scenarios illustrate application of PAR operations described in Sections 3.4 and 3.5.

Each example shows the difference between flow and schedule on the Michigan – Ontario interface before any action is taken and the anticipated difference following tap movement. In some cases, these schedule/flow differences are used to determine the appropriate course of action.

The 'Action' column describes the response to the scenario, including any considerations. In some instances, a decision point is based on a time period. This is a nominal value and may differ in any given event according to MISO and the IESO's judgment based upon actual operational conditions.

Table B.1:

Local Interface Facility SOL		
Interface Deviation Before Any Action	**Anticipated Interface Deviation After Tap Change**	**Action**
Any	+/- 200 MW	• Adjust PARs on affected circuits to prevent/relieve SOL

Prevent an Emergency in MISO or Ontario		
Interface Deviation Before Any Action	**Anticipated Interface Deviation After Tap Change**	**Action**
Any	Any	• Utilize other actions prior to using the PARS , provided there is enough time • Other actions include re-dispatch, curtailing interchange transactions, TLR, and reconfiguration • Adjust PARS if other actions have been used or won't resolve the emerging problem quickly enough • Ensure Local Interface Facility SOLs respected

Declared Emergency in MISO or Ontario		
Interface Deviation Before Any Action	**Anticipated Interface Deviation After Tap Change**	**Action**
Any	Any	• Utilize all appropriate actions including adjusting the PARS • May adjust taps on PARs up to Max Tap • May use emergency thermal limits on the interface • Return to normal PAR operation as soon as practicable

Declared Emergency in both MISO and Ontario		
Interface Deviation Before Any Action	**Anticipated Interface Deviation After Tap Change**	**Action**
Any	Any	• Utilize all appropriate actions including adjusting the PARS • May adjust taps on PARs up to Max Tap • May use emergency thermal limits on the interface • Use tap position that best mitigates the overall emergency and shares relief between the two areas, to the extent practical

Declared Emergency Outside MISO and Ontario		
Flow/Schedule Δ Before Any Action	**Anticipated Flow/Schedule Δ After Tap Change**	**Action**
Any	Any	• If the external entity requesting assistance has taken all steps up to voltage reduction and firm load shedding *and,* • Use of PARs won't result in the need for voltage reduction or firm load shedding or cause an SOL or IROL exceedance in MISO or Ontario then: o Use all appropriate actions including adjusting the PARS up to Max Tap • Note that requesting area must make every effort to quickly restore their system to the point where the PARS can be returned to normal operation

TAB 4

Article 3. The facilities described in Article 2 above, including the phase-shifting transformers in the B3N circuit, shall be designed and operated in compliance with all policies and standards of the North American Electric Reliability Corporation (NERC) or its successor, Regional Entities, or NERC-Registered Reliability Coordinators, as appropriate, on such terms as expressed therein, and as such criteria, standards, and guides may be amended from time to time. ITC shall operate the phase-shifting transformers in B3N circuit consistent with the principles set forth in Schedule I of the Amended and Restated Interconnection Facilities Agreement dated August 8, 2011 ("IFA") between ITC and Hydro One Networks, Inc. which has been filed and made a part of this docket. Thus, under normal system conditions, ITC shall operate the phase-shifting transformers in the B3N circuit such that the electrical flow on the Michigan-Ontario interface will match Michigan-Ontario scheduled transactions across the interface to the maximum extent possible considering operational feasibility, safety, equipment limitations and regulatory and statutory requirements. The phase-shifting transformers in the B3N circuit may be operated without electrical flow matching scheduled transactions across the interface 1) if anomalous market results occur in the market of the regional transmission organization that has functional control over the transformers or in Ontario, 2) as necessary to respect system operating limits within Michigan or Ontario, or 3) in order to prevent or resolve declared emergency operating situations consistent with NERC standards and the provisions of the above-referenced Schedule I of the IFA.

Article 9. ITC shall arrange for the installation and maintenance of appropriate metering equipment to record the hourly flow of all electric energy transmitted between the United States and Canada over the facilities authorized herein. ITC shall make, and preserve for a period of seven (7) years, full and complete records with respect to all electric energy transmitted between the United States and Canada over those facilities. ITC shall complete and file with the Energy Information Administration ("EIA") the sections of EIA's Form OE-781R relating to the Transmission Owner's role, as assigned to ITC by EIA.

Article 10. Neither this permit nor the facilities covered by this permit, or any part thereof, shall be transferable or assignable, except in the event of the involuntary transfer of the facilities by the operation of law. In the case of such an involuntary transfer, this permit shall continue in effect for a period of 60 days and then shall terminate unless an application for a new permit pursuant to Title 10, Code of Federal Regulations, section 205.323, has been received by DOE. Upon receipt by DOE of such an application, this existing permit shall continue in effect pending a decision on the new application. During this decision period, the facilities authorized herein shall remain substantially the same as before the transfer. Notwithstanding the foregoing, functional control of the facilities covered by this permit may be assigned to an FERC-approved Regional Transmission Organization ("RTO") upon notice to the Office of Fossil Energy and the filing of an agreement whereby the RTO commits to comply with all applicable provisions of this permit.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-4

Date	Difference Between Scheduled and Actual Power Flows, measured at the NYISO IESO Border		
4/1/2011 0:00	583.66	4340	Hours within Bandwidth
4/1/2011 1:00	508.59	49.41%	Percent of Hours within Bandwidth
4/1/2011 2:00	436.05		
4/1/2011 3:00	469.84		
4/1/2011 4:00	451.48		
4/1/2011 5:00	315.04		
4/1/2011 6:00	-10.23		
4/1/2011 7:00	119.04		
4/1/2011 8:00	213.43		
4/1/2011 9:00	244.03		
4/1/2011 10:00	298.02		
4/1/2011 11:00	183.40		
4/1/2011 12:00	158.07		
4/1/2011 13:00	-79.58		
4/1/2011 14:00	-158.34		
4/1/2011 15:00	-158.62		
4/1/2011 16:00	-151.36		
4/1/2011 17:00	16.69		
4/1/2011 18:00	94.88		
4/1/2011 19:00	177.06		
4/1/2011 20:00	122.74		
4/1/2011 21:00	-24.36		
4/1/2011 22:00	46.41		
4/1/2011 23:00	370.92		
4/2/2011 0:00	531.25		
4/2/2011 1:00	639.78		
4/2/2011 2:00	449.40		
4/2/2011 3:00	427.22		
4/2/2011 4:00	452.35		
4/2/2011 5:00	435.50		
4/2/2011 6:00	275.26		
4/2/2011 7:00	208.51		
4/2/2011 8:00	202.95		
4/2/2011 9:00	211.54		
4/2/2011 10:00	286.98		
4/2/2011 11:00	264.05		
4/2/2011 12:00	379.08		
4/2/2011 13:00	281.31		
4/2/2011 14:00	418.92		
4/2/2011 15:00	568.64		
4/2/2011 16:00	457.09		

4/2/2011 17:00	469.07
4/2/2011 18:00	423.74
4/2/2011 19:00	443.56
4/2/2011 20:00	200.88
4/2/2011 21:00	-32.81
4/2/2011 22:00	423.23
4/2/2011 23:00	212.82
4/3/2011 0:00	214.55
4/3/2011 1:00	216.03
4/3/2011 2:00	193.37
4/3/2011 3:00	291.07
4/3/2011 4:00	321.20
4/3/2011 5:00	445.16
4/3/2011 6:00	469.50
4/3/2011 7:00	424.50
4/3/2011 8:00	250.69
4/3/2011 9:00	262.32
4/3/2011 10:00	295.37
4/3/2011 11:00	207.30
4/3/2011 12:00	335.61
4/3/2011 13:00	320.60
4/3/2011 14:00	205.64
4/3/2011 15:00	62.81
4/3/2011 16:00	89.91
4/3/2011 17:00	117.79
4/3/2011 18:00	102.29
4/3/2011 19:00	323.42
4/3/2011 20:00	327.90
4/3/2011 21:00	127.22
4/3/2011 22:00	206.00
4/3/2011 23:00	257.37
4/4/2011 0:00	175.91
4/4/2011 1:00	302.05
4/4/2011 2:00	278.56
4/4/2011 3:00	404.51
4/4/2011 4:00	278.47
4/4/2011 5:00	71.76
4/4/2011 6:00	-23.79
4/4/2011 7:00	223.58
4/4/2011 8:00	1.87
4/4/2011 9:00	167.84
4/4/2011 10:00	8.34
4/4/2011 11:00	-133.83
4/4/2011 12:00	-218.81
4/4/2011 13:00	-174.60
4/4/2011 14:00	-152.49
4/4/2011 15:00	-268.38

4/4/2011 16:00	-248.26
4/4/2011 17:00	-231.83
4/4/2011 18:00	-203.89
4/4/2011 19:00	-215.36
4/4/2011 20:00	-277.90
4/4/2011 21:00	-213.04
4/4/2011 22:00	146.35
4/4/2011 23:00	291.25
4/5/2011 0:00	300.23
4/5/2011 1:00	113.00
4/5/2011 2:00	3.14
4/5/2011 3:00	-76.24
4/5/2011 4:00	32.35
4/5/2011 5:00	109.11
4/5/2011 6:00	-127.55
4/5/2011 7:00	119.78
4/5/2011 8:00	114.94
4/5/2011 9:00	-180.46
4/5/2011 10:00	-95.10
4/5/2011 11:00	-191.56
4/5/2011 12:00	-336.66
4/5/2011 13:00	-143.60
4/5/2011 14:00	-200.84
4/5/2011 15:00	80.11
4/5/2011 16:00	-28.22
4/5/2011 17:00	-33.78
4/5/2011 18:00	5.05
4/5/2011 19:00	252.86
4/5/2011 20:00	33.55
4/5/2011 21:00	155.15
4/5/2011 22:00	233.44
4/5/2011 23:00	317.18
4/6/2011 0:00	395.39
4/6/2011 1:00	370.84
4/6/2011 2:00	262.29
4/6/2011 3:00	217.05
4/6/2011 4:00	231.40
4/6/2011 5:00	213.97
4/6/2011 6:00	360.94
4/6/2011 7:00	250.55
4/6/2011 8:00	310.16
4/6/2011 9:00	132.75
4/6/2011 10:00	38.68
4/6/2011 11:00	-242.83
4/6/2011 12:00	-36.60
4/6/2011 13:00	70.37
4/6/2011 14:00	-66.20

4/6/2011 15:00	-76.82
4/6/2011 16:00	27.17
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3/27/2012 10:00	-597.42
3/27/2012 11:00	-759.85
3/27/2012 12:00	-739.78
3/27/2012 13:00	-826.51
3/27/2012 14:00	-826.85
3/27/2012 15:00	-747.09
3/27/2012 16:00	-635.04
3/27/2012 17:00	-563.97
3/27/2012 18:00	-575.17
3/27/2012 19:00	-462.52
3/27/2012 20:00	-475.56
3/27/2012 21:00	-426.70
3/27/2012 22:00	-498.21
3/27/2012 23:00	-610.72
3/28/2012 0:00	-558.16

3/28/2012 1:00	-568.32
3/28/2012 2:00	-552.93
3/28/2012 3:00	-502.22
3/28/2012 4:00	-421.18
3/28/2012 5:00	-242.43
3/28/2012 6:00	-383.68
3/28/2012 7:00	-521.12
3/28/2012 8:00	-651.14
3/28/2012 9:00	-766.24
3/28/2012 10:00	-688.58
3/28/2012 11:00	-716.23
3/28/2012 12:00	-661.56
3/28/2012 13:00	-770.84
3/28/2012 14:00	-620.93
3/28/2012 15:00	-602.21
3/28/2012 16:00	-527.93
3/28/2012 17:00	-594.61
3/28/2012 18:00	-564.03
3/28/2012 19:00	-516.31
3/28/2012 20:00	-491.75
3/28/2012 21:00	-540.43
3/28/2012 22:00	-606.63
3/28/2012 23:00	-626.41
3/29/2012 0:00	-691.36
3/29/2012 1:00	-529.04
3/29/2012 2:00	-397.90
3/29/2012 3:00	-419.20
3/29/2012 4:00	-463.16
3/29/2012 5:00	-536.70
3/29/2012 6:00	-626.03
3/29/2012 7:00	-667.17
3/29/2012 8:00	-706.60
3/29/2012 9:00	-725.11
3/29/2012 10:00	-855.93
3/29/2012 11:00	-688.05
3/29/2012 12:00	-766.45
3/29/2012 13:00	-731.06
3/29/2012 14:00	-742.87
3/29/2012 15:00	-767.58
3/29/2012 16:00	-607.56
3/29/2012 17:00	-568.53
3/29/2012 18:00	-657.80
3/29/2012 19:00	-590.60
3/29/2012 20:00	-606.18
3/29/2012 21:00	-554.43
3/29/2012 22:00	-506.93
3/29/2012 23:00	-676.91

3/30/2012 0:00	-529.33
3/30/2012 1:00	-420.36
3/30/2012 2:00	-444.10
3/30/2012 3:00	-435.71
3/30/2012 4:00	-511.48
3/30/2012 5:00	-481.46
3/30/2012 6:00	-467.00
3/30/2012 7:00	-470.07
3/30/2012 8:00	-442.20
3/30/2012 9:00	-513.17
3/30/2012 10:00	-433.41
3/30/2012 11:00	-475.32
3/30/2012 12:00	-436.82
3/30/2012 13:00	-339.24
3/30/2012 14:00	-418.76
3/30/2012 15:00	-473.28
3/30/2012 16:00	-522.02
3/30/2012 17:00	-511.40
3/30/2012 18:00	-314.99
3/30/2012 19:00	-448.94
3/30/2012 20:00	-430.82
3/30/2012 21:00	-362.17
3/30/2012 22:00	-564.10
3/30/2012 23:00	-396.26
3/31/2012 0:00	-340.18
3/31/2012 1:00	-419.90
3/31/2012 2:00	-299.91
3/31/2012 3:00	-356.31
3/31/2012 4:00	-396.77
3/31/2012 5:00	-375.80
3/31/2012 6:00	-335.68
3/31/2012 7:00	-338.14
3/31/2012 8:00	-279.73
3/31/2012 9:00	-349.32
3/31/2012 10:00	-412.26
3/31/2012 11:00	-268.74
3/31/2012 12:00	-218.56
3/31/2012 13:00	-210.30
3/31/2012 14:00	-226.22
3/31/2012 15:00	-201.73
3/31/2012 16:00	-14.77
3/31/2012 17:00	47.85
3/31/2012 18:00	237.80
3/31/2012 19:00	239.59
3/31/2012 20:00	325.56
3/31/2012 21:00	67.33
3/31/2012 22:00	-6.99

3/31/2012 23:00	-67.20

Date	Difference Between Scheduled and Actual Power Flows, measured at the NYISO IESO Border		
1/1/2011 0:00	80.77	4249	Hours within Bandwidth
1/1/2011 1:00	344.89	48.50%	Percent of Hours within Bandwidth
1/1/2011 2:00	376.07		
1/1/2011 3:00	280.09		
1/1/2011 4:00	167.08		
1/1/2011 5:00	-8.20		
1/1/2011 6:00	-31.54		
1/1/2011 7:00	-185.01		
1/1/2011 8:00	227.64		
1/1/2011 9:00	95.35		
1/1/2011 10:00	103.15		
1/1/2011 11:00	118.94		
1/1/2011 12:00	208.94		
1/1/2011 13:00	187.95		
1/1/2011 14:00	123.70		
1/1/2011 15:00	62.05		
1/1/2011 16:00	170.51		
1/1/2011 17:00	209.72		
1/1/2011 18:00	129.10		
1/1/2011 19:00	70.31		
1/1/2011 20:00	49.82		
1/1/2011 21:00	-38.04		
1/1/2011 22:00	-295.93		
1/1/2011 23:00	-345.87		
1/2/2011 0:00	-392.94		
1/2/2011 1:00	-324.01		
1/2/2011 2:00	-377.61		
1/2/2011 3:00	-421.03		
1/2/2011 4:00	-486.08		
1/2/2011 5:00	-578.07		
1/2/2011 6:00	-491.60		
1/2/2011 7:00	-385.81		
1/2/2011 8:00	-53.65		
1/2/2011 9:00	-78.82		
1/2/2011 10:00	205.77		
1/2/2011 11:00	209.31		
1/2/2011 12:00	372.84		
1/2/2011 13:00	175.70		
1/2/2011 14:00	300.89		
1/2/2011 15:00	166.75		
1/2/2011 16:00	151.48		

1/2/2011 17:00	206.57
1/2/2011 18:00	254.81
1/2/2011 19:00	157.72
1/2/2011 20:00	68.13
1/2/2011 21:00	-8.94
1/2/2011 22:00	-227.76
1/2/2011 23:00	-244.47
1/3/2011 0:00	-209.32
1/3/2011 1:00	-237.79
1/3/2011 2:00	-455.26
1/3/2011 3:00	-586.35
1/3/2011 4:00	-637.02
1/3/2011 5:00	-303.46
1/3/2011 6:00	-304.92
1/3/2011 7:00	-145.84
1/3/2011 8:00	75.15
1/3/2011 9:00	120.24
1/3/2011 10:00	77.12
1/3/2011 11:00	135.25
1/3/2011 12:00	78.38
1/3/2011 13:00	10.66
1/3/2011 14:00	62.91
1/3/2011 15:00	76.84
1/3/2011 16:00	84.85
1/3/2011 17:00	254.98
1/3/2011 18:00	242.81
1/3/2011 19:00	354.69
1/3/2011 20:00	362.72
1/3/2011 21:00	356.51
1/3/2011 22:00	35.42
1/3/2011 23:00	-82.81
1/4/2011 0:00	98.63
1/4/2011 1:00	28.46
1/4/2011 2:00	128.03
1/4/2011 3:00	213.25
1/4/2011 4:00	170.24
1/4/2011 5:00	224.95
1/4/2011 6:00	314.06
1/4/2011 7:00	125.71
1/4/2011 8:00	177.87
1/4/2011 9:00	181.04
1/4/2011 10:00	311.75
1/4/2011 11:00	401.63
1/4/2011 12:00	218.57
1/4/2011 13:00	240.36
1/4/2011 14:00	154.45
1/4/2011 15:00	218.18

1/4/2011 16:00	128.38
1/4/2011 17:00	88.51
1/4/2011 18:00	-54.13
1/4/2011 19:00	-74.86
1/4/2011 20:00	-99.38
1/4/2011 21:00	46.66
1/4/2011 22:00	-27.30
1/4/2011 23:00	22.94
1/5/2011 0:00	152.36
1/5/2011 1:00	78.08
1/5/2011 2:00	147.62
1/5/2011 3:00	72.54
1/5/2011 4:00	-5.75
1/5/2011 5:00	-61.96
1/5/2011 6:00	-212.80
1/5/2011 7:00	-231.23
1/5/2011 8:00	-189.34
1/5/2011 9:00	-50.32
1/5/2011 10:00	-76.24
1/5/2011 11:00	-252.82
1/5/2011 12:00	-79.66
1/5/2011 13:00	-159.25
1/5/2011 14:00	-61.43
1/5/2011 15:00	61.61
1/5/2011 16:00	77.31
1/5/2011 17:00	186.16
1/5/2011 18:00	58.27
1/5/2011 19:00	326.88
1/5/2011 20:00	408.15
1/5/2011 21:00	345.82
1/5/2011 22:00	535.34
1/5/2011 23:00	549.79
1/6/2011 0:00	442.46
1/6/2011 1:00	280.90
1/6/2011 2:00	357.75
1/6/2011 3:00	173.02
1/6/2011 4:00	229.10
1/6/2011 5:00	313.51
1/6/2011 6:00	450.24
1/6/2011 7:00	213.94
1/6/2011 8:00	333.46
1/6/2011 9:00	419.80
1/6/2011 10:00	390.72
1/6/2011 11:00	380.27
1/6/2011 12:00	388.07
1/6/2011 13:00	542.66
1/6/2011 14:00	603.35

1/6/2011 15:00	610.93
1/6/2011 16:00	709.04
1/6/2011 17:00	278.39
1/6/2011 18:00	273.80
1/6/2011 19:00	453.99
1/6/2011 20:00	682.96
1/6/2011 21:00	519.32
1/6/2011 22:00	603.15
1/6/2011 23:00	342.32
1/7/2011 0:00	339.88
1/7/2011 1:00	425.07
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1/7/2011 6:00	544.41
1/7/2011 7:00	496.91
1/7/2011 8:00	509.70
1/7/2011 9:00	586.29
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1/7/2011 12:00	295.49
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1/7/2011 14:00	534.23
1/7/2011 15:00	428.43
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1/7/2011 18:00	301.92
1/7/2011 19:00	277.85
1/7/2011 20:00	455.54
1/7/2011 21:00	480.29
1/7/2011 22:00	489.33
1/7/2011 23:00	553.91
1/8/2011 0:00	631.36
1/8/2011 1:00	590.87
1/8/2011 2:00	583.46
1/8/2011 3:00	464.01
1/8/2011 4:00	513.83
1/8/2011 5:00	526.42
1/8/2011 6:00	455.45
1/8/2011 7:00	446.37
1/8/2011 8:00	636.81
1/8/2011 9:00	525.39
1/8/2011 10:00	536.08
1/8/2011 11:00	600.18
1/8/2011 12:00	587.55
1/8/2011 13:00	386.09

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1/8/2011 15:00	382.33
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1/8/2011 17:00	485.60
1/8/2011 18:00	603.20
1/8/2011 19:00	680.86
1/8/2011 20:00	729.28
1/8/2011 21:00	531.84
1/8/2011 22:00	447.63
1/8/2011 23:00	377.60
1/9/2011 0:00	549.48
1/9/2011 1:00	493.20
1/9/2011 2:00	486.39
1/9/2011 3:00	468.27
1/9/2011 4:00	528.31
1/9/2011 5:00	539.50
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1/9/2011 11:00	517.04
1/9/2011 12:00	446.48
1/9/2011 13:00	446.47
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1/9/2011 15:00	346.72
1/9/2011 16:00	434.13
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1/15/2011 23:00	464.45
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1/16/2011 2:00	422.63
1/16/2011 3:00	419.37
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1/18/2011 7:00	97.40
1/18/2011 8:00	432.10

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1/18/2011 13:00	250.16
1/18/2011 14:00	129.84
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1/19/2011 3:00	270.58
1/19/2011 4:00	385.35
1/19/2011 5:00	172.29
1/19/2011 6:00	588.48
1/19/2011 7:00	436.90
1/19/2011 8:00	250.45
1/19/2011 9:00	272.45
1/19/2011 10:00	262.40
1/19/2011 11:00	287.32
1/19/2011 12:00	257.56
1/19/2011 13:00	188.85
1/19/2011 14:00	46.22
1/19/2011 15:00	94.60
1/19/2011 16:00	38.99
1/19/2011 17:00	149.92
1/19/2011 18:00	200.94
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12/19/2011 2:00	383.95
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12/19/2011 20:00	67.26
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12/19/2011 23:00	493.69
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12/20/2011 1:00	286.94
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12/31/2011 19:00	174.52
12/31/2011 20:00	-48.77
12/31/2011 21:00	-130.08
12/31/2011 22:00	-133.33
12/31/2011 23:00	#NAME?

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-5

NYTO/MISO 1-9. If the current rate filing is approved please explain any and all service obligations that either MISO or ITC will have to NYISO and any circumstances under which MISO or ITC could have financial liability to the NYISO related to the operation of the Replacement PARs or lack thereof.

Response: MISO objects to this request to the extent it is overly broad and unduly burdensome (i.e., "any circumstances"), presumes certain facts that do not exist or which have not been proven, and callsfor speculation regarding legal theories involving possible claims that NYISO may raise regarding operation of the PARs, and to the extent that the request does not apply to MISO (i.e., "or ITC").

Notwithstanding this objection, MISO responds that approval of the current rate filing will not affect or alter MISO's existing service obligations as defined under Section 38 of the MISO Tariff and related agreements identified therein. MISO's current limitation of liability provisions under its Tariff (Section 10) and related agreements are unaffected by the current rate filing. At present, NYISO is not a MISO Transmission Owner, Transmission Customer, or Market Participant, and MISO does not have service obligations to NYISO related to these categories.

Sponsored by: Counsel

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-6

NYISO/MISO 3-3. Should the Commission ultimately accept MISO's proposed tariff revisions and require NYISO customers and PJM customers to pay for a portion of the cost of ITC's Replacement PARs:

a. Will the MISO and/or ITC be subject to an obligation to provide reliable service to NYISO customers and PJM customers that are not otherwise MISO customers?

   i. If so, please identify any/all laws, regulations, FERC precedent and/or court precedent relied on to prepare Recipient's response to NYISO/MISO 3-3a.

b. Identify and explain the nature of any and all service obligations MISO and/or ITC will become subject to with regard to the NYISO customers and PJM customers that are not otherwise MISO customers.

   i. For each service obligation MISO and/or ITC will assume, identify any/all laws, regulations, FERC precedent and/or court precedent relied on to prepare Recipient's response to NYISO/MISO 3-3b.

Response: No. See response to NYISO TO/MISO 1-9 which has already been provided to NYISO on February 14, 2012.

Sponsored by: Counsel

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-7

NYISO/MISO 3-4. If the Replacement PARs permanently fail (not recoverable) shortly after they enter service, should PJM customers and NYISO customers still be required to pay for the Replacement PARs?

a. Explain your response to NYISO/MISO 3-4and identify any/all laws, regulations, Commission precedent and/or court precedent relied on to respond to this question.

NYISO/MISO 3-5. If the Replacement PARs require a lengthy (6 month to 2 year) unscheduled outage, should PJM customers and NYISO customers still be required to pay for the Replacement PARs while the Replacement PARs are out-of-service?

a. Explain your response to NYISO/MISO 3-5 and identify any/all laws, regulations, Commission precedent and/or court precedent relied on to respond to this question.

NYISO/MISO 3-6. If one or more of the Hydro One PARs require a lengthy (6 month to 2 year) unscheduled outage, should PJM customers and NYISO customers still be required to pay for the Replacement PARs while the Hydro One PARs are out-of-service?

a. Explain your response to NYISO/MISO 3-6 and identify any/all laws, regulations, Commission precedent and/or court precedent relied on to respond to this question.

NYISO/MISO 3-7. If one or more of the Hydro One PARs permanently fail (not recoverable) shortly after the Replacement PARs enter service, should PJM customers and NYISO customers still be required to pay for the Replacement PARs?

a. Explain your response to NYISO/MISO 3-7 and identify any/all laws, regulations, Commission precedent and/or court precedent relied on to respond to this question.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-8

NYISO/MISO 3-4. If the Replacement PARs permanently fail (not recoverable) shortly after they enter service, should PJM customers and NYISO customers still be required to pay for the Replacement PARs?

a. Explain your response to NYISO/MISO 3-4and identify any/all laws, regulations, Commission precedent and/or court precedent relied on to respond to this question.

Response: Yes. MISO is obligated to charge the rates set forth in its Tariff. *See* MISO Tariff https://www.midwestiso.org/Library/Tariff/Pages/Tariff.aspx. *See also*, Sections 205 and 206 of the Federal Power Act.*See also*, *Midwest Independent Transmission System Operator, Inc.*, 133 FERC ¶61,275 (2010), *reh'g pending*; *Midwest Independent Transmission System Operator, Inc.*, 134 FERC ¶61,185 (2011).

Sponsored by: Counsel

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-9

NYTO/ITC 1-14. Please describe what service obligation ITC would have to the NYISO or any NYTO to the extent the NYISO or any NYTO is required to pay for any portion of the Replacement PARs.

Response NYTO/ITC1-14: As far as ITC knows, none. This question should be addressed to MISO.

Response prepared by Dave Grover

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-10

US Department of Energy

OCT 1 3 2011

Electricity Delivery and
Energy Reliability

UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

International Transmission Company d/b/a ITC*Transmission*	)))	**Docket No. PP-230-4**

JOINT COMMENTS OF THE MIDWEST INDEPENDENT TRANSMISSION SYSTEM OPERATOR, INC. AND THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR ANSWERING PETITION TO INTERVENE AND REQUEST FOR A COMMENT PERIOD OF NEW YORK INDEPENDENT SYSTEM OPERATOR, INC.

The Midwest Independent Transmission System Operator, Inc. ("MISO") and the Independent Electricity System Operator ("IESO") submit these joint comments in response to the petition to intervene and request for comment period by the New York Independent System Operator, Inc. ("NYISO") regarding International Transmission Company d/b/a ITC *Transmission's* ("ITC") request to amend Presidential Permit PP-230-3.

A. Background

On January 5, 2009, ITC applied to the Department of Energy ("DOE") in this proceeding to amend its Presidential Permit PP-230-3 to authorize the installation and operation of two 700-MVA phase shifting transformers ("PARs") connected in series at its Bunce Creek Station in Marysville, Michigan. On March 12, 2009, both MISO and the IESO filed comments in support of ITC's application, conditioned in part on the completion of all necessary operational documents governing the operation of the PARs. On March 31, 2009 ITC filed a response to the comments stating that operational documents would be filed in this case for review by the DOE. ITC subsequently filed its supplemental reply comments on August 9, 2011, to support DOE's decision in the proceeding. In addition to the governing Interconnection

Facilities Agreement between the equipment owners, the filing included an informational copy of the CO2 Operating Instruction ("CO2"), the operating procedure between MISO and IESO which describes the operating principles and reliability requirements regarding the coordinated operation of all of the PARs that form part of the Michigan-Ontario interconnection.

On August 19, 2011 NYISO filed a petition to intervene and request for comment period ("Petition"). In support of the petition, NYISO raised a number of issues; many (if not most) of which were directly related to the interpretation of language contained in the CO2. We believe that the issues that NYISO raised in regard to the CO2 are based on an apparent misunderstanding of the intended interpretation of the language and provisions in the CO2.

It is important to note that the CO2 sets out the various existing operating principles, statutory, regulatory and North American Electric Reliability Corporation ("NERC") reliability requirements that apply to the coordinated operation of the PARs and does not define new rules or regulations. At no point does the CO2 put interconnected reliability at risk. It appears to MISO and IESO that the reliability related concerns that NYISO raised in its Petition stem from two basic concerns; 1) how the PARs are intended to be operated and 2) how the TLR process is incorporated into the CO2. Responses to the NYISO's concerns are set out in detail below. MISO and IESO have engaged in discussions with NYISO to address these matters. As a result of these discussions, NYISO agrees that its reliability concerns related to the modeling of the PARs in the NERC Interchange Distribution Calculator ("IDC") have been addressed by the additional explanation of how the PARs at the Ontario/Michigan interface will be operated, and the explanation of the intended meaning of the term "Max Tap" in these joint comments.

B. PAR Operational Methodology

In its Petition, NYISO states that the provisions of the CO2 would not properly implement NERC rules as they currently exist, and that the provisions of CO2 may threaten the reliability of the electric system.[1] MISO and IESO do not believe this to be true and have spent an extraordinary amount of time and effort over a number of years ensuring that this is not this case.

As NYISO has correctly noted, this effort included discussions within industry forums such as NERC's Interchange Distribution Calculator Working Group ("IDCWG") as well as through direct discussions between NYISO and MISO. These discussions in fact led to enhancements in the manner that MISO and IESO intend to control loop flows using the PARs.

In its filing, NYISO states that provisions in the current CO2 are very similar to changes that MISO had proposed to the NERC IDCWG in October 2010.[2] While this discussion included how the PARs were intended to be operated (at that point in time), it was not the primary purpose of the discussion. For example, it is important to distinguish between the requirements for the setting of inputs into the IDC versus the operation of the IDC itself. The presentation that MISO made to the IDCWG was regarding the latter subject, specifically how the IDC treats electrical transactions. More importantly however, the discussion was predicated on a proposed control methodology that was not pursued, in part due to concerns raised by NYISO.

Since and during the IDCWG discussion in October 2010, NYISO did raise concerns about the proposed control methodology that MISO and the IESO were planning on implementing and its impact on the NERC Transmission Line Loading Relief ("TLR") process. Initially MISO and IESO proposed a "one change per hour with reliability exceptions" approach to controlling loop flows using the PARs. This proposal was made in order to address asset owner concerns regarding wear

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1 *See* Petition at 5.

2 *Id.* at 8.

and tear on the assets in question. Further, this approach envisioned the PARs being adjusted once an hour unless certain reliability related exceptions required additional intra-hour changes. While well intended, this approach could have allowed some additional loop flow to occur between PAR tap changes while still considering loop flows to be controlled, or "regulated" (discussed below). The approach would also have introduced certain challenges in relation to the NERC TLR process. At the time, NYISO argued that an "agreed upon bandwidth" would be a more appropriate and reliable approach. This approach envisioned that loop flow would always be controlled within an appropriate bandwidth, as long as the PARs had the capability to do so.

Pursuant to conversations with NYISO, MISO and IESO performed additional studies and concluded that a "bandwidth" approach was indeed appropriate and was further endorsed by the asset owners. The current CO2 reflects that change by implementing a 200MW bandwidth approach for controlling the interface. The 200MW bandwidth itself was based on prior agreement with NYISO on certain of the reliability exceptions in the previous "one change an hour" approach. Specifically, the CO2 now provides that the PARs are to be operated such that the difference between the Interface Flow and the Interface Schedule[3] is maintained within ±200 MW[4] to the maximum extent practical, while staying within all applicable operational limitations[5]. More simply, this change requires MISO and IESO to implement all practical actions necessary to keep loop flow within the ± 200MW bandwidth, as long as operational limitations of the PARs (or surrounding

[3] *See* section 2.0 of the CO2 Operating Instruction, which defines the "Interface Deviation" to be "The difference between the Interface Flow and the Interface Schedule."

[4] *See* section 2.0 of the CO2 Operating Instruction, which defines the "Control Band" to be "The maximum targeted Interface Deviation of ± 200 MW, maintained within practical considerations."

[5] The 200 MW bandwidth may be intentionally exceeded if such action would be necessary and effective in preventing or resolving emergency operating situations within MISO, IESO, NYISO or the PJM interconnection ("PJM"), providing that normal PAR operations are resumed as soon as practical.

transmission system) allow. The CO2 now reduces the prospect of periods where loop flow is not actively being controlled and resolves the challenges related to the NERC TLR process.

C. Consistency with NERC TLR Process

NYISO also appears to misunderstand the manner in which MISO and IESO intend for the CO2 to implement the TLR process, as currently approved by NERC.[6]

NERC's TLR process has been used for many years in order to control excess unscheduled electrical flows. The IDC is the primary tool used to implement this process, and in effect defines the way in which the TLR process is implemented. As the NERC TLR process evolves, the operation of the IDC is modified by "change orders" which specify the details of the agreed upon changes to the IDC. These changes are discussed and approved by rigorous NERC committee processes.

In the early 2000's, the industry initiated an effort to enhance the way PARs are "modeled" in the IDC, specifically the PARs on the Michigan-Ontario interconnection. The changes to the IDC were detailed in IDC Change Order ("CO") 38i entitled "Phase Shifter Modeling Enhancements", which was approved for implementation in February 2003 by the NERC Operating Reliability Subcommittee with testing and implementation completed on January 1, 2005. CO38i required the IDC to model PAR regulation, depending on the regulation status[7] of the PAR(s). The Michigan-Ontario PARs mirror approved NERC protocols.

The CO2 seeks to implement the existing IDC requirements. MISO and IESO are not proposing to define a new IDC modeling construct. The two primary regulation statuses are fairly straightforward (regulate or non-regulate). What becomes more difficult and complicated is the

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6 *Id.* at 10.

7 This is the PAR(s) ability to fully control the electrical flows associated with the transactions scheduled across the PAR(s).

determination of the transition between regulation statuses, or exactly when the PARs are no longer able to fully control flows across the interface.

The CO2 uses the terminology that has historically been used in the industry to describe this situation, or "Max Tap". Conceptually, it is relatively easy to understand that this would apply when a PAR, or all PARs in a set, has reached the physical limitation of the PAR(s). In actuality, however the situation is more complex, particularly when addressing a coordinated set of PARs - as in this case[8]. In situations where a set of PARs are being coordinated not only to control overall flow, but to distribute flows across the various local transmission elements interconnecting the PARs, a local transmission system limitation may become the factor limiting the ability of the PARs to continue regulating flows. In other words, there may situations where tap range on any given PAR (or PARs) are "available" (have not been used up), but cannot be utilized because doing so would result in an overload on the local or underlying transmission system. Given the various configuration changes (transmission outages, PAR outages, transmission reconfigurations, etc.) that will occur, it is simply not possible to exactly define all of the operational situations which may end up limiting the PARs ability to control flow over the Ontario/Michigan interface. The CO2 recognizes this reality by generally defining the "Max Tap" state as those operating situations where the "Interface", defined as all 4 transmission circuits (and all 5 PARS), can no longer be controlled[9]. NYISO appears to have misinterpreted the intended meaning of the term "Max Tap" and concluded that a Max Tap condition need only be recognized by MISO and IESO when each and every one of the PARs at the interface have reached their maximum regulating capability (either physical limitation of the PARs

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8 The Michigan-Ontario interface is comprised of four transmission circuits (J5D, L4D, L51D, and B3N) and other related facilities. When in service, five PARs will collectively be operated to regulate electrical flows across the interface. The two PARs on the B3N circuit will operate in series. The CO2 provides for the coordinated operation of these facilities.

9 *See* section 2.0 of the CO2 Operating Instruction, which defines "Max Tap" as when "The Interface (PARs collectively) has reached the maximum ability to control flow, in either direction."

or local transmission limitations). In fact, a Max Tap condition will occur any time MISO and IESO are unable to control power flows to closely (within the Control Band) match schedules at the Ontario/Michigan interface.

Taken together, the provisions of the CO2 require that MISO and IESO take actions to regulate loop flow for as long as possible. When that ability is exhausted, and loop flow exceeds (or is expected to exceed) ±200MW, the IDC status flag will be set to "Non-Regulate".

D. Other Clarifications

In its Petition, NYISO incorrectly states that the CO2 provides the responsibility and capability to determine and implement correct IDC control mode setting solely to IESO. This conclusion is inconsistent with the coordinated approach clearly required for operating these international facilities. As indicated above, this determination is not simple and requires the participation of both MISO and IESO. The intent of the CO2 is that all decisions regarding the operation of the facilities will be discussed and coordinated between MISO, IESO, ITC and Hydro One. Joint communications are required[10] and the CO2 specifically points out many of the operational parameters to be coordinated. As far as the IDC status flag is concerned, the CO2 merely assigns the responsibility for implementing this joint decision to the IESO. It does not assign independent discretion to IESO to make this determination. Regardless of which entity sets the IDC status flag, the CO2 requires that the flag be set such that the ability of the PARs to control loop flows is accurately reflected in the IDC and that that any change occur in a timely and fully transparent manner in order to allow other Reliability Coordinators (*i.e.*, NYISO and PJM) to incorporate the change into their operational processes. Additionally, MISO and IESO have

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10 *See* section 3.7 of the CO2 Operating Instruction, which states "Communications will be via a telephone conference ("blast call"), as outlined in Appendix A, Table A.1". The referenced table requires a single call between MISO, IESO, ITC and Hydro One ("HONI").

committed to provide NYISO and PJM with the information (flows, schedules, deviation, PAR taps, etc) necessary to independently evaluate the appropriate IDC status flag setting.

E. Conclusion

As discussed herein, MISO and IESO respectfully submit that the concerns NYISO has set out in its Petition involving the adverse impact of the CO2 on reliability and reliability processes are the result of a number of unfortunate misunderstandings regarding the terms and provisions of the CO2; particularly with regard to recent changes that were made to the CO2.

Rather, the terms and conditions of the CO2 demonstrate that:

- The CO2 is fully consistent with applicable NERC rules and regulations, as well as any other applicable safety, regulatory and statutory requirements. Specifically, the CO2 correctly and reliably implements the NERC TLR process and will permit the NYISO to avail itself of the TLR process when necessary to protect reliability in New York;
- MISO and IESO did not ignore NYISO's concerns regarding provisions of the CO2. Instead, MISO and IESO implemented fundamental changes to the CO2 in response to those concerns;
- The IESO cannot unilaterally determine the PAR(s) regulating/non-regulating status that will be used in the NERC IDC. Rather, IESO has simply been assigned the responsibility of implementing a decision made jointly by MISO and IESO; and
- Operation of the PARs per the provisions of the CO2 will not negatively impact reliability (in New York or elsewhere), but will substantially enhance reliability in all electrical areas by helping to control Lake Erie loop flow.

As stated above, MISO and IESO have engaged in discussions with NYISO to address these matters. As a result of these discussions, NYISO agrees that its reliability concerns related to the modeling of the PARs in the NERC IDC have been addressed by the additional explanation of how the PARs at the Ontario/Michigan interface will be operated, and the explanation of the intended meaning of the term "Max Tap" in these joint comments.

Respectfully submitted,

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UNITED STATES OF AMERICA
DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY

International Transmission Company d/b/a ITC*Transmission*	)))	**Docket No. PP-230-4**

CERTIFICATE OF SERVICE

I hereby certify that I have caused a copy of the foregoing document to be served on each person on the attached list on October 12, 2011.

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DOCKET NO. ER11-1844
EXHIBIT NO. NYI-11

MEN-2001_Summer_Assessment_Report-body.pdf

MAAC-ECAR-NPCC Study Committee 2001 Summer MEN Interregional Transmission System Reliability Assessment

May 2001

p26. In March 2001 the final PAR to be installed in the Michigan-Ontario (M-O) interface failed a factory test. In April, 2001 the in-service circuit L51D phase shifter was automatically removed from service for an internal fault. These failures make it unlikely that the M-O PARs will be able to provide significant inter-regional emergency assistance before the end of the 2001 summer period. The following discussion describes the sensitivity of the inter-regional transfer capability to an unregulated Michigan-Ontario interface.

MEN01-02_Winter_Assessment_report body.pdf

2001/02 Winter MEN Interregional Transmission System Reliability Assessment

November 2001

p30. The Michigan-Ontario interface and the Queenston Flow West (QFW) interface in Ontario have been susceptible to large parallel flows and Transmission Loading Relief (TLR) curtailments. This condition will continue through the 2001/2002 Winter period since completion of the Michigan - Ontario Phase Angle Regulating (M-O PAR) project has been delayed due to the L4D and L51D PAR failures.

MEN-2002_Summer_Assessment_Report-body.pdf

MAAC-ECAR-NPCC Study Committee 2002 Summer MEN Interregional Transmission System Reliability Assessment.

May 2002

p9. Another difference between the 2001 and 2002 study is the representation of the four Ontario-Michigan Interface circuit phase angle regulators (PARs). In anticipation of their installation, these PARs were represented in service for the summer 2001 analysis and were utilized to assist the MEN regional power transfers. However, because of failures of some of the PARs and delays in restoring them to service, only the Keith-Waterman 230 kV J5D interconnection PAR is represented in the 2002 analysis.

p30. The Michigan - Ontario interface and the Queenston Flow West (QFW) interface in Ontario have been susceptible to large parallel flows and Transmission Loading Relief (TLR) curtailments. Delays have prevented the three new Phase Angle Regulating (PAR) transformers on the Michigan – Ontario Interface from becoming operational. Transformer testing failures have impacted the Lambton PARs, L51D and L4D, and operating agreements have impeded the B3N PAR from becoming operational. The J5D PAR is the only operating unit modeled in the 2002 Summer base case.

NPCC_Reliability_Assessment_for_Summer_2003.pdf

Northeast Power Coordinating Council Reliability Assessment For Summer 2003

May 2003

p21. The final phase angle regulator installation on the Michigan-Ontario Interface (345 kV circuit L4D) is not expected to be completed until the end of August.

The B3N (230 kV circuit Scott - Bunce Creek) phase angle regulator was forced from service in March 2003. The return to service of the PAR is not known at this time. This has created additional uncertainty to the projection of having all Michigan-Ontario Interface phase angle regulators in service for any portion of the summer operating period. Therefore it is assumed that the Michigan-Ontario Ties will remain free flowing for a major portion of the study period.

summer2003.pdf
2003 SUMMER ASSESSMENT Reliability of the Bulk Electricity Supply in North America
May 2003
p9. Michigan–Ontario Transfers (ECAR to NPCC) — The Michigan–Ontario Phase Angle Regulator (PAR) project has been further delayed and its completion is not expected until after the summer. This delay will reduce the transfer capability of the Michigan–Ontario interface and the ability to control parallel flows. As a result, the Michigan–Ontario interface and the Queenston Flow West interface in Ontario will continue to be susceptible to Transmission Loading Relief (TLR) curtailments.
Transfers from Michigan to Ontario are expected to be reduced by about 150 MW on occasion until about the end of July due to the forced outage of circuit B3N in Ontario as the result of a tower failure. Transfers from Ontario to Michigan are not expected to be affected.

NPCC_Reliability_Assessment_for_Summer_2004.pdf
Northeast Power Coordinating Council Reliability Assessment For Summer 2004
May 2004
p24. Inter-Regional Transmission Adequacy
Evolution of the interconnected network is continuing in the northeastern U. S. Present plans are for the integration of Commonwealth Edison as part of PJM's energy market operations prior to this summer with AEP and Dominion Resources following later in 2004.
A tower on the B3N circuit between Ontario and Michigan (230 kV circuit Scott - Bunce Creek) was damaged in April of 2003. The options to return the circuit to service are still being explored. At the current time, it is estimated that the circuit will not return until after the summer operating period.
As a result, the ability to transfer energy into / out of Ontario on the Ontario- Michigan Interface will remain the same as last summer.
The B3N phase angle regulator (PAR) was forced from service in March 2003. The return to service of the PAR is not known at this time. Additionally, the final phase angle regulator installation on the Michigan-Ontario Interface (Lambton-St. Clair 345 kV circuit L4D) is not expected to be completed until the end of September. For the study period it has been assumed that the Michigan-Ontario Ties will remain free flowing.
It is expected that the transmission system is adequate to support the anticipated Inter-Regional transfers.

summer2004.pdf
2004 SUMMER ASSESSMENT, Reliability of the Bulk Electricity Supply in North America. North American Electric Reliability Council
May 2004
p39. *Transmission* — The Ontario transmission system is expected to be adequate to supply the coming summer's demand under the forecast conditions. The ability to have total control over the flows across the Michigan-Ontario interface using the four phase-angle regulators continues to be delayed by equipment failures and will not be available for summer 2004. In the meantime, operating guides are in place to ensure that the interface is operated reliably.

The Scott-Bunce Creek 230 kV interconnection (circuit B3N) between Ontario and Michigan is currently forced out of service. The scheduled date for its return-to-service is September 30, 2004, but further delay could occur. This outage increases the upper import limit capability of Michigan-Ontario transfers by 200 MW in the summer and by 300 MW in the winter; the Ontario-Michigan export limit decreases by approximately 500 MW in the summer and in the winter.

NPCC%20Reliability%20Assessment_2004-05Winter_Final_041223.pdf

Northeast Power Coordinating Council Reliability Assessment For Winter 2004/2005 Final Report

December 17, 2004

p21. Inter-Regional Transmission Adequacy

A tower on the B3N circuit (230 kV circuit Scott - Bunce Creek) was damaged in April of 2003. The options to return the circuit to service are still being explored. At the current time, it is estimated that the circuit will not return during the Winter Operating Period. The capability of this circuit has been removed from transfer capabilities identified in Diagram 1.

The final phase angle regulator is expected to be installed on the Michigan-Ontario Interface (345 kV circuit L4D) before the end of December. Operating agreements dictating their operation are under development. Until the phase shifters become operational any expected transfer capability on the Michigan - Ontario and the New York - Ontario (Niagara) interfaces must be rationalized by the impact of Lake Erie Circulation.

Additionally, a review of the policy regarding the method in which ratings for the Michigan and NY-Niagara interconnections are applied pre and post contingency is underway. Until the results of this work are complete, the CO-12 Working group assumed the worst case scenario and has identified the lowest feasible transfer capabilities in Diagram 1.

It is expected that the transmission system is adequate to support the anticipated Inter- Regional transfers.

NPCC_Reliability_Assessment_for_Summer_2005.pdf

Northeast Power Coordinating Council Reliability Assessment For Summer 2005

April 2005

p25. Inter-Regional Transmission Adequacy

The third phase angle regulator on the Michigan - Ontario Interface (Lambton PS4) associated with 345 kV circuit L4D (Lambton - St Clair) was placed in service in February 2005. All counter parties to the project are working to complete a joint instruction that adheres to the principle of schedule equals flow. Pending completion of the joint instruction, the phase angle regulators will only be operated off neutral as a last resort to prevent load shedding.

A tower on the 230 kV circuit B3N (Bunce Creek - Scott) between Ontario and Michigan was damaged in April of 2003, with the associated phase angle regulator failing a month earlier. This circuit will remain out of service through this summer operating period.

Therefore until the joint instruction is completed, the ability to transfer energy into / out of Ontario on the Ontario-Michigan Interface is assumed to be the same as experienced last summer, until the phase shifter agreement can be completed. It is expected that the transmission system is adequate to support the anticipated Inter-Regional transfers.

summer2005-Revised.pdf

2005 SUMMER ASSESSMENT Reliability of Bulk Electricity Supply in North America

North American Electric Reliability Council,

May 19, 2005

p40. There are currently three phase angle regulators (PARs) in service on the Michigan-Ontario interface, including a new 845 MVA PAR on 230 kV circuit L4D. All three PARs are operating at neutral tap position. An operational agreement is being negotiated with the Midwest ISO for the operation of the PARs. Until such an agreement is in place, the PARs will only be operated off neutral tap to prevent shedding firm load.

Due to a forced outage, the 230 kV circuit B3N (Scott Transformer Station x Bunce Creek, Michigan) is expected to be unavailable until December 31, 2005. The B3N outage increases the upper capability of the Michigan-to-Ontario import limit by 200 MW in the summer and by 300 MW in the winter. The Ontario-to-Michigan export limit decreases by about 500 MW in the summer and in the winter. Once the B3N circuit and PAR are returned to service, the previous limits will be restored and all four tie lines will have phase angle control.

Interregional transmission transfer capability studies have been conducted to determine levels of external assistance that can be imported during the forecast 2005 summer peak demand.

CO12_NPCC_Reliability_Assessment_2005-06W_FINAL.pdf
Northeast Power Coordinating Council Reliability Assessment For Winter 2005 - 2006
Conducted by the NPCC CO-12 Working Group
November 2005

p26. **Inter-Regional Transmission Adequacy**

The phase angle regulator (PAR) installation on the Michigan - Ontario Interface (PS4 on 230 kV circuit L4D) is in-service and at neutral tap position. The 230 kV PAR on circuit L51D (PS51) is also available and at neutral tap position. Agreement of the involved transmission owners, Hydro One and International Transmission Company, is critical in achieving full PAR control on the Ontario-Michigan interconnections. Until necessary agreements are in place, PS4 and PS51 will only be operated off neutral tap to prevent 5% voltage reduction in Ontario or Michigan, to prevent shedding firm load or for testing. Therefore it is assumed that the Michigan - Ontario Ties will remain free flowing for the study period. Due to a forced outage, 230 kV circuit B3N (230 kV Scott – Bunce Creek circuit) is expected to be unavailable through the study period.

caa_SIAReport_2006-EX291.pdf
ASSESSMENT SUMMARY letter to Hydro One Networks Inc. from IESO
October 27, 2006

1.0 GENERAL DESCRIPTION

B3N is a 230 kV interconnection line of 6.9 km in length connecting Scott TS and phase shifter #3 in Bunce Creek, Michigan. A portion of the circuit was damaged on April 20, 2003 and has been out of service since. Hydro One is proposing to reconstruct this section of the circuit using 795 kcmil ACSS (30/19) conductor instead of the original 636 kcmil ACSR (30/19) conductor which is no longer available. The new conductor can also be operated at a higher temperature than an ACSR conductor. The segments being replaced are the span over the river and the spans on either side of the river span....

CO12_NPCC_Reliability_Assessment_2006-07W_Final.pdf
Northeast Power Coordinating Council Reliability Assessment For Winter 2006 - 2007
Conducted by the NPCC CO-12 Working Group

November 2006
p22. Inter-Regional Transmission Adequacy
The phase angle regulators (PARs) on the Michigan - Ontario Interface (PS4 on 230 kVcircuit L4D and PS51 on circuit L51D) are available but are presently by-passed, pending completion of an agreement being negotiated with the International Transmission Company for the operation of the PARs. Until this agreement is in place, PS4 and PS51 will only be operated off neutral tap under emergency conditions, prior to voltage reductions or load shedding operating actions. Due to a forced outage, 230 kV circuit B3N (230 kV Scott – Bunce Creek circuit) has been out of service since 2003. The circuit was returned to service in November 2006 without a phase shifter at Bunce Creek. Until a new phase shifter is installed replacing one that failed at Bunce Creek (estimated to be 2008) and/or the agreement can be reached, it was assumed that the Michigan - Ontario Ties will remain free flowing for the study period.

RFC-NPCC%202006-07%20Winter%20Final%20Report.pdf
Winter 2006/07 MEN Interregional Transmission System Reliability Assessment REGIONAL APPRAISALS.
November 2006
p36. When the assessment was conducted the B3N 230 kV circuit (Scott Transformer Station x Bunce Creek, Michigan) was expected to be back in service by the end of 2006, however the in service date of the PAR on B3N is unknown. The B3N circuit was actually returned to service in mid-November 2006 with no PAR. The return of B3N without its PAR does not significantly improve transfer capability and thus has been omitted from this Winter NPCC-RFC study. Once the B3N circuit and PAR are returned to service, previous limits will be restored and all four tie lines will have phase angle control.

RFC-SERCEast_2007S_Report_Final.pdf
2007 SUMMER SERC EAST-RFC INTERREGIONAL TRANSMISSION SYSTEM RELIABILITY ASSESSMENT.
May 2007
p30. The Michigan-Ontario PARS have not yet achieved long-term steady operation of all units. The B3N phase shifter has failed and is modeled as out of service this summer. The L4D PS4 and L51D PS51 are modeled in service and can be operated off nominal tap to control flows. The Keith-Waterman J5D is in service and regulating for a 0 MW flow.

LTRA2007.pdf
NERC 2007 Long-Term Reliability Assessment.
October 2007
p173. The Scott-Bunce Creek B3N circuit on the Michigan-Ontario interface is expected to be fully controlled by phase angle regulators (PARs) by the summer of 2009. Facility failures during the past few years have delayed the full operation of this circuit. A new PAR has been ordered for the B3N circuit in Michigan, and the transmission line on that circuit has been restored. An operational agreement is being negotiated. Until that agreement is in place, the existing PARs on the three other Michigan-Ontario tie lines may now be used for emergency conditions (e.g. if load shedding is pending or in a 5 percent voltage reduction case, etc.) if needed. The PARs are intended to improve the ability to manage power flow around Lake Erie.

RFC-SERCEast_2007-08W_Report_Final.pdf

2007/08 WINTER SERC EAST-RFC INTERREGIONAL TRANSMISSION SYSTEM RELIABILITY ASSESSMENT.
November 2007
p24. The Michigan-Ontario PARS have not yet achieved long-term steady operation of all units. The B3N phase shifter has failed and is modeled as out of service this winter. The L4D PS4 and L51D PS51 are modeled in service and can be operated off nominal tap to control flows. The Keith-Waterman J5D is in service and regulating for a 0 MW flow.

NPCC_Reliability_Assessment_2007-08_Winter_Final_Report.pdf
Northeast Power Coordinating Council Reliability Assessment For Winter 2007 – 2008.
November 2007
p26. Inter-Regional Transmission Adequacy
Phase angle regulators (PARs) PS4 on circuit L4D and PS51 on circuit L51D on the Michigan - Ontario Interface are available but are currently by-passed pending an operational agreement with Midwest ISO (MISO). An operational agreement is currently being negotiated with MISO for the operation of the PARs. Until such an agreement is in place, PS4 and PS51 will only be operated off neutral tap under emergency conditions, prior to voltage reductions or load shedding operating actions. Therefore it was assumed that the Michigan - Ontario Ties will remain free flowing for the study period. The last page of Appendix III shows transfer capabilities from Regions external to NPCC into Ontario and New York

NERC summer2008.pdf
NERC 2008 Summer Reliability Assessment.
May 2008
p76. Phase angle regulators (PARs) are installed on three of the four Michigan to Ontario interconnections. One PAR, on the Keith to Waterman 230 kV circuit J5D has been in service and regulating since 1975. The other two available PARs, on circuits L51D and L4D, which had been bypassed pending completion of agreements between the IESO, the Midwest ISO, Hydro One and the International Transmission Company, were placed in service on April 14, 2008, and are expected to start regulating before the summer. All parties have committed to completing the necessary operating agreements to meet this schedule. The operation of the PARs will assist in the management of system congestion and control of circulating flows. The fourth PAR, located in Michigan at the Bunce Creek terminal of circuit B3N, responsible for controlling the tie flow on the 230 kV circuit B3N, remains unavailable and is undergoing replacement.
p92. Phase Angle Regulators (PARs) are located on all major ties between northeastern PJM and southeastern New York to help control unscheduled power flows. The Ramapo PARs in NPCC control flow from RFC to NPCC. The Michigan-Ontario PARs have not yet achieved long-term operation of all four units. The B3N PAR that previously failed will still be out-of-service this summer. An operations agreement for controlling the interface is expected to be completed by the summer, after which the remaining three PARs are expected to control flows (i.e. will be regulating).

2008S_SERC-East-RFC_Final_Report.pdf
2008 SUMMER SERC EAST-RFC INTERREGIONAL TRANSMISSION SYSTEM RELIABILITY ASSESSMENT,
May 2008

p 26. Phase Angle Regulators (PARs) on all major ties between northeastern PJM and southeastern New York help control unscheduled power flows through PJM resulting from non-PJM power transfers. In all of the simulations conducted for this study, a 1000 MW wheeling schedule was maintained through Public Service (PS). The Ramapo PARs are controlling a 454 MW flow on the 500 kV circuit from Branchburg to Ramapo as related to the interchange between PJM and NPCC. The Michigan-Ontario PARS have not yet achieved long-term steady operation of all units. The B3N phase shifter has failed and is modeled as out of service this summer. The L4D PS4 and L51D PS51 are modeled in service and can be operated off nominal tap to control flows. The Keith-Waterman J5D is in service and regulating for a 0 MW flow.

Federal Register Application To Amend Presidential Permit; International Transmission Company, d-b-a ITCTransmission.mht

Application To Amend Presidential Permit; International Transmission Company, d/b/a ITCTransmission

A Notice by the Energy Department on

February 10, 2009

On September 26, 2000, DOE issued a Presidential permit to International Transmission Company (ITC) in Order No. PP-230, authorizing it to construct, operate, maintain, and connect electric transmission facilities at the international border of the United States and Canada. Those facilities are currently authorized by Presidential Permit No. PP-230-3 and include:Show citation box

(1) One 230,000-volt (230-kV) transmission line, including one 675-MVA phase-shifting transformer connecting the Bunce Creek Station, located in Marysville, Michigan, with Hydro One's Scott Transformer Station, located in Sarnia, Ontario (identified as the B3N facility);Show citation box

(2) One 230-kV transmission line connecting the Waterman Station, located in Detroit, Michigan, with Hydro One's J. Clark Keith Generating Station, located in Windsor, Ontario (identified as the J5D facility);Show citation box

(3) One 345-kV transmission line connecting the St. Clair Generating Station, located in East China Township, Michigan, with Hydro One's Lambton Generating Station, located in Moore Township, Ontario (identified as the L4D facility); andShow citation box

(4) One 230-kV transmission line connecting the St. Clair Generating Station with Hydro One's Lambton Generating Station (identified as the L51D facility).Show citation box

In March 2003, the phase shifting transformer installed on the B3N facilities failed. On January 5, 2009, ITC applied to DOE to amend Presidential Permit PP-230-3 by authorizing it to replace the failed 675-MVA transformer with two 700-MVA phase shifting transformers connected in series.

RFC-NPCC_2014S_Report_and_Appendix_Final.pdf

RFC-NPCC Interregional Transmission System Reliability Assessment For the 2014 Summer.

December 1, 2009

Table A-2, Transmission Facility Changes Expected for 2014 Summer

Replace PAR with two 800 MVA (Summer Normal) PARS in series at Bunce Creek

OASIS%20B3N%20posting%20Aug%205%202010.pdf
ITC*Transmission* – Hydro One Interconnection Status Update
August 5, 2010
Restoration of the B3N interconnection between ITC*Transmission* and Hydro One Networks Inc. of Canada was completed November 15, 2006.
The ITC*Transmission* Bunce Creek (B3N) Phase Angle Regulating transformer that failed in March 2003 was retired and has been out of service since that time. The transformer has been replaced by two (in series) Phase Angle Regulating transformers. Installation of the transformers was complete in December 2009. Protective system work, in coordination with Hydro One, was completed in July 2010.
ITC*Transmission* and Hydro One executed a new Interconnection Facilities Agreement which became effective June 5, 2009. The Phase Angle Regulating transformers on the ITC*Transmission* — Hydro One interconnections will be energized and tested to control interconnection flows pending the receipt by ITC*Transmission* of an amended Presidential Permit from the U.S. Department of Energy and completion of various contractual and operational agreements between and among the respective Transmission Owners and Reliability Coordinators.
Until ITC*Transmission* and Hydro One are authorized to begin operating the B3N Phase Angle Regulating transformers to control flows, the Phase Angle Regulating transformers on the L4D and L51D interconnections will remain in a by-pass mode.

RFC-NPCC_2010-2011_Winter_Assessment.pdf
2010-2011 Winter RFC-NPCC Interregional Transmission System Reliability Assessment, December 7, 2010
p4. 5. In current real time operations, the Keith-Waterman J5D Phase Angle Regulator (PAR) is in service and regulating. The Lambton-St. Clair L4D and L51D PARs are bypassed for normal operations but can be used in response to emergency conditions, if necessary. The phase angle regulator on the Scott-Bunce Creek B3N circuit is physically in place, but unavailable for both normal and emergency operation due to a lack of an operating agreement.
p5. 6. Because the 2010-2011 winter study represents emergency conditions, the PARs for three out of the four Michigan-Ontario interface circuits (J5D, L4D, and L51D) were modeled to reflect their anticipated winter schedules and operation. The B3N PAR is by-passed with the circuit modeled as a free flowing tie. This is also how this equipment was modeled for the 2008-2009 winter study.

ERAG%20Study%20Procedure%20Manual%20v1c.pdf
ERAG Study Procedure Manual SERC East-ReliabilityFirst-NPCC (SeRN)
Midwest Reliability Organization-ReliabilityFirst-SERC West-Southwest Power Pool (MRSwS) Version 1c:
January 23, 2012
p5. Refer to Table A-7 “PAR Controlled Interchange” for a listing of the base case and transfer case flows of the Phase Angle Regulating transformers (PARs) on the interface between RFC and NPCC that are of particular concern in this study.

In this study, all four PARs on the Michigan interface were assumed to be available to control flows anticipating that the necessary agreements would be ready for the summer of 2012.

Table A-6 note. The “SCHEDULE” is the sum of the three PARS that are in service (L51D, L4D and J5D). “By-pass” means that this phase angle regulator was by-passed because no agreement enabling its operation has been signed.

PP-230-4%20ITCTransmission.pdf

PRESIDENTIAL PERMIT

February 24, 2012

Facilities currently authorized by Presidential Permit No. PP-2303 (issued September 2000) include:

(I) One 230,000-volt (230-kV) transmission line, including one 675-MVA phase shifting transformer connecting the Bunce Creek Station, located in Marysville, Michigan, with Hydro One Networks, Inc.'s (Hydro One) Scott Transformer Station, located in Sarnia, Ontario (identified as the B3N facility);

(2) One 230-kV transmission line connecting the Waterman Station, located in Detroit, Michigan, with Hydro One's J. Clark Keith Generating Station, located in Windsor, Ontario (identified as the J5D facility);

(3) One 345-kV transmission line connecting the St. Clair Generating Station, located in East China Township, Michigan, with Hydro One's Lambton Generating Station, located in Moore Township, Ontario (identified as the L4D facility); and

(4) One 230-kV transmission line connecting the St. Clair Generating Station with Hydro One's Lambton Generating Station (identified as the L51D facility).

In March 2003, the phase shifting transformer installed on the B3N facilities failed. On January 5, 2009, ITC applied to DOE to amend Presidential Permit PP-230-3 by authorizing it to replace the failed 675-MVA transformer with two 700-MVA phase shifting transformers connected in series. Because of the complexity of the issues raised by this proceeding and in the interest of clarity, a new Presidential Permit is being issued.

Non-Signatory Commenters

The entities that filed comments and interventions in this proceeding that were not a signatory to the Settlement Agreement include the New York Independent System Operator (NYISO), the New York Transmission Owners (NYTO), the Independent Electricity System Operator of Ontario (IESO), and The Public Utilities Commission of Ohio (PUCO). NYISO filed a comment with DOE on March 9, 2009 in support of ITC's filing. On November 4, 2011, NYISO filed supplemental comments with DOE supporting ITC's proposed operation of the PARs as well as expressed its intention to work with ITC, MISO, and PJM to consider whether, and on what terms, NYISO is willing to participate in the data collection arrangement. NYTO submitted a request to intervene in this proceeding on April 5, 2011, requesting an opportunity to review the operational agreement when it became available. As discussed above, DOE provided an opportunity for public comment on ITC's proposed operation of the PARs by notice in the *Federal Register*, and NYTO did not Comment. According to the November 4, 2011 ITC filing accompanying the Settlement Agreement, IESO, which is a Canadian entity and not subject to U.S. jurisdiction, authorized ITC to inform DOE that it supports the settlement and intends to voluntarily participate in the data collection process and the PARs operational discussions. That same filing also indicated that PUCO did not oppose the Settlement Agreement.

In regards to the Settlement Agreement, DOE appreciates the efforts of the parties to resolve their differences and allow the installation and operation of the PARs in a manner that should better control the Lake Erie loop flow. DOE also supports the decision to collect data regarding the impacts of the operation of the PARs in order to achieve the best operating principles to mitigate any negative impact on electric reliability. However, DOE is not in a position at this time to prejudge how it may evaluate concerns from parties regarding changes to the operation of the PARs. As noted in the Settlement Agreement, nothing prevents any of the parties to this proceeding from proposing to DOE at any time changes in the operating principles of the PARs in order to protect the reliability of the U.S. electric transmission grid: DOE will evaluate any request at that time to determine the appropriate manner in which to handle the matter and the best course of action to follow.

2012.03.23 Michigan-Ontario Interface Notice2.docx
Michigan-Ontario Interface Phase Angle Regulators.
March 2012
In March 2003, the ITCTransmission ("ITC") Bunce Creek ("B3N") Phase Angle Regulator ("PAR") was retired and has been out of service. The B3N PAR was one of four PAR's on the Michigan-Ontario interface which, when operated together, was designed to help mitigate loop flow in the Lake Erie region by controlling electrical flow across the Michigan-Ontario interface. The other three PARs, owned and operated by Hydro One, are located at Lambton (L4D and L51D) and Keith (J5D).

The retired B3N transformer has been replaced by two PARs (connected in series). Installation of the transformers was complete in December 2009 and protective system work, in coordination with Hydro One, was completed in July 2010.

As an international facility, regulatory authorization (Presidential Permit) from the U.S. Department of Energy ("DOE") is required prior to commissioning and operating the B3N PAR. All contractual and operational agreements between ITC and Hydro One were filed with the DOE and ITC took receipt of the amended Presidential Permit on February 24, 2012. With operational agreements between MISO and the IESO also in place, all requirements necessary to commission and operate the ITC B3N PAR have been fulfilled. ITC has started the process of energizing and testing the B3N PAR, which is scheduled to be completed by EOD, April 4, 2012.

In late 2011, Hydro One removed the L4D from service due to early indications of an electrical issue with the PAR. Testing on the L4D PAR will continue through mid-May, and the L4D PAR is not expected to be available for use prior to the commissioning of the B3N PAR.

MISO, IESO, ITC and Hydro One have formally set 1000 hours EDT Thursday April 5, 2012 as the target for starting coordinated operation of PARs on the Michigan-Ontario interface. The objective of coordinated operations is to help mitigate loop flows in the Lake Erie region by conforming actual electrical flows across the interface to scheduled electrical flows, to the maximum extent practical.

Coordinated interface operations without the L4D PAR in service will reduce the overall capability to control loop flow by an estimated 40-50%, which significantly reduces the time that the interface will be fully regulated (loop flow exceeds collective ability of remaining PARs to control flow). As a result, MISO does not intend to change the methodology for pricing transactions scheduled across the Michigan-Ontario interface in conjunction with the start of coordinated operations (April 5th) as originally planned. The existing pricing methodology will remain in place until further notice.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-12

Question NYISO/IESO 3-1:

Provide an outage history for each of the Hydro One PARs from 1999-2008 identifying all outages that were 3 months or longer in duration. In each case, please explain:

a. why the Hydro One PAR was removed from service (maintenance outage, forced outage), and include a short explanation of reason for outage;
b. whether the Hydro One PAR had to be returned to the manufacturer for repair; and
c. provide the duration of each reported outage.

IESO Response:

The IESO only has outage information back to January 1, 2006. For the period of January 1, 2006 to 2008 there were no outages 3 months or longer in duration for any of the Hydro One PARs.

Response Provided by: Nicholas Ingman, Manager, Operational Excellence

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-13

NYISO/ITC 5-1. Were one or more of the Hydro One PARs out-of-service during the time period when the Original PAR was in-service? If so:

a. Identify all Hydro One PARs that were out-of-service during the time period when the Original PAR was in-service;

b. Describe the reason(s) for the outage; and

c. Identify the manufacturer, model, model number and year placed into service for each of these Hydro One PARs.

Response to NYISO/ITC 5-1: ITC has objected to providing information regarding the Original PAR. Nevertheless, it is ITC's understanding that Hydro One's L4D and L51D PARs had not been installed at that time. ITC, however, has no further details on the matter and does not have additional information responsive to Parts a, b, or c of this question.

Response prepared by: Counsel

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-14

Responses

NYISO/DTE 3-1.

Were one or more of the Hydro One PARs out-of-service during the time period when the Original PAR was in-service?

If so:
a. Identify all Hydro One PARs that were out-of-service during the time period when the Original PAR was in-service;
b. Describe the reason(s) for the outage; and
c. Identify the manufacturer, model, model number

Detroit Edison's Response:

Detroit Edison has no knowledge with respect to whether one or more Hydro One PARs were out-of-service during the time period when the Original PAR was in-service. As described in Detroit Edison's Response to NYISO 2-2, and to the best of Detroit Edison's knowledge, Detroit Edison believes that the Hydro One PARs were operated by Hydro One. Detroit Edison does not have custody of or access to the assets, records or personnel of Hydro One.

Prepared by:

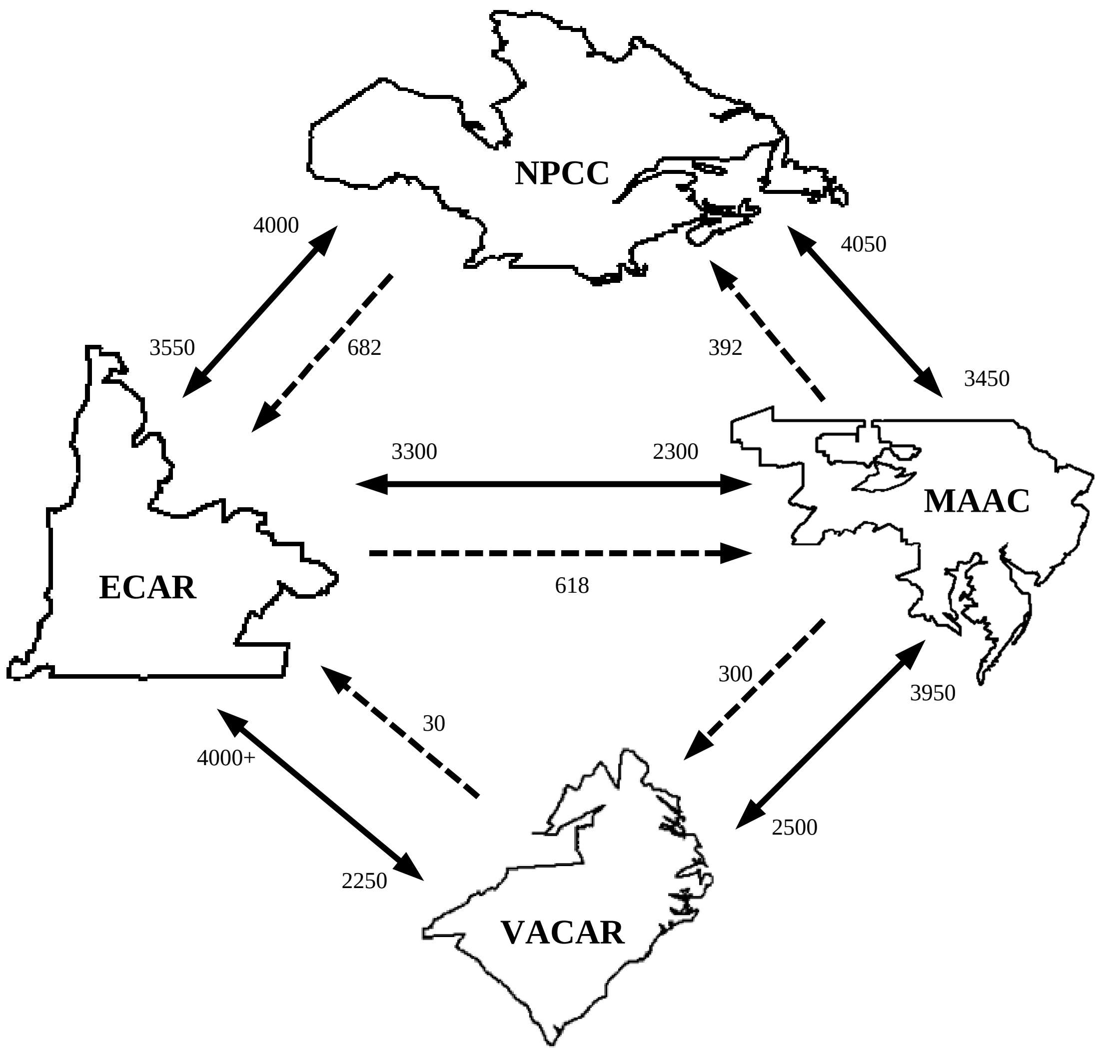
Brian Drumm

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-15

MAAC-ECAR-NPCC
Study Committee

2001 Summer
MEN Interregional Transmission System
Reliability Assessment

May 2001



MAAC - ECAR - NPCC Study Committee

Mr. W. L. Harm	PJM Interconnection	**MAAC**
Mr. J. F. Schmitt (Chairman)	ITC/Detroit Edison Company	**ECAR**
Mr. J. C. Stephens	ATSI/FirstEnergy Corporation	**ECAR**
Mr. P. A. Roman	Northeast Power Coordinating Council	**NPCC**
Mr. R. W. Waldele	New York ISO	**NPCC**

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MAAC - ECAR - NPCC Operating Studies Working Group

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Mr. D. G. Leitch	Consumers Energy	**ECAR**
Mr. J. M. Voldrich	ATSI/FirstEnergy Corporation	**ECAR**
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Mr. G. Eng	New York Power Authority	**NPCC**
Mr. K. Layman	New York ISO	**NPCC**
Mr. H. Q. Le	Northeast Power Coordinating Council	**NPCC**
Mr. P. Metsa	Hydro-Québec (TransÉnergie)	**NPCC**

TABLE OF CONTENTS

Report on the MAAC-ECAR-NPCC
2001 Summer Interregional Transmission System Reliability Assessment

1. Introduction

The MAAC - ECAR - NPCC (MEN) Working Group, under the direction of the MEN Study Committee, has conducted an appraisal of the interregional transmission system performance among the MEN regions for the conditions expected in the 2001 Summer period. The purpose of this study is to provide:

- an analysis of First Contingency Incremental Transfer Capabilities (FCITC) for selected transfers which may occur simultaneously among, or through, the MEN regions.
- First Contingency Incremental Transfer Capabilities (FCITC) and First Contingency Total Transfer Capabilities (FCTTC), as defined in Appendix E, for non-simultaneous emergency transfers between ECAR and NPCC and between MAAC and NPCC. Once determined, no attempts have been made to optimize transfers between regions by changing dispatches and/or phase angle regulator settings.
- a sensitivity analysis of study results.
- an appraisal for MAAC, ECAR, and NPCC regions.

The FCITCs and FCTTCs reported in this study are calculated under a set of simulated conditions based on a prediction of many factors which will change in daily operation of the power system. Actual transfer capabilities will vary from those calculated. Among these variable factors are:

- load forecasts and generation availability
- geographic distribution of load and generation
- transmission system configuration
- simultaneous inter-system power transfers
- operation based on regional requirements to respect local constraints
- control settings of Phase Angle Regulators (PARs)

Distribution factors and other operating guides are therefore included in this report to aid system operators in the daily operation of the interconnected network.

An appraisal of the interregional system performance among the VACAR-ECAR-MAAC (VEM) regions is presented in the companion VEM Study Committee Report: 2001 VEM Summer Interregional Transmission System Reliability Assessment, dated May 2001.

1. Introduction (cont'd)

Available Transfer Capability vs. MEN Seasonal Study Incremental Transfer Capability (ITC)

FERC Order 889 mandated that each US transmission provider calculate Available Transfer Capability (ATC) and post such values to an Open Access Same Time Information System (OASIS). FERC deferred the development of ATC methodology to NERC, which has developed a series of technical references, including *Available Transfer Capability Definitions and Determination*, which describes the methodology of calculating ATC/TTC and the application of Transmission Reliability Margin (TRM) and the Capacity Benefit Margin (CBM). The underlying concepts for both the ATC methodology and the methodology used to perform MEN seasonal studies are found in the *Transmission Transfer Capability* document published by NERC in 1995. These concepts include the First Contingency Incremental Transfer Capability (FCITC) and First Contingency Total Transfer Capability (FCTTC).

Thus, the methodology of ATC as calculated by transmission providers and the regional transfer capabilities developed by MEN are similar. Both calculate incremental and total transfer capabilities, with the magnitude of transfer capability based on increasing transfer levels until transmission limits are incurred.

The primary differences between ATC calculations and the MEN study are:

- **Scope**: ATC is calculated by transmission providers, which generally corresponds to the control area level; MEN studies are calculated at the NERC regional level.
- **Margins**: ATC determination uses margins (TRM/CBM) to provide for variation in system operating conditions; MEN reports FCITCs without applying margins.
- **Tie Capacity**: ATC between adjacent control areas is limited by scheduling limits based on the tie capacity between control areas; MEN reports inter-regional network transfer capabilities regardless of scheduling limits between individual control areas.
- **Timeframe**: ATC is calculated hourly, daily, weekly, monthly; MEN studies are conducted semi-annually based on a snapshot of anticipated conditions.
- **Publishing**: ATC is posted to an OASIS for use by the commercial markets; MEN study results are published for use as an interregional reliability assessment.

2. Results

A. Executive Summary

The following conclusions and observations can be made based on the results of the 2001 Summer Assessment:

1. Assuming all transmission facilities are in service, power flows on the MAAC, ECAR, and NPCC bulk power transmission systems are within acceptable limits for the base case power transfers (Appendix A, Table A-1). Also, assuming all operating procedures are appropriately employed, no single contingency on the bulk power transmission system will overload the remaining facilities, which are significantly affected by the transfers reported in this study. After a single contingency, voltage levels can be maintained within acceptable limits.

2. Compared to the 2000 Summer Operating Study, changes in base conditions have occurred and the net effect of these changes impact to varying degrees the loading on critical interfaces and facilities. Section 2.C, as well as Appendix A, Tables 1, A-1 and A-5, provide some year-to-year comparisons. Major changes in Base Case modeling from the 2000 Summer Transmission Assessment to the 2001 Summer Base Case include:

   Additions:
   - Michigan-Ontario Interface PAR status (Note: see the NPCC Appraisal for the expected status and sensitivity analysis of the M-O PARs)
     - Scott – Bunce Creek B3N is in service
     - Lambton – St. Clair L4D is in service
     - Lambton – St. Clair L51D is in service
     - Keith – Waterman J5D is in service
   - Approximately 2500 MW of generation capacity additions within MAAC, of which approximately 2000 MW are new generation facilities
   - Approximately 4500 MW of new generation within ECAR
   - Approximately 3800 MW of new generation within NPCC

   Returned to Service:
   - ECAR: D. C. Cook Nuclear Unit 1 (1000 MW) is returned to service

A. Executive Summary (cont'd)

3. Figures 1A, 1B and 1C are plots of the FCTTC limits between MAAC, ECAR and NPCC during simultaneous transfers. Table 1 presents the first reported FCITCs and the corresponding FCTTCs between MAAC and NPCC and between ECAR and NPCC, as well as direct comparisons between the FCTTCs obtained in this study to those determined in the previous two summer assessments. Table 2 details the 2001 Summer FCITCs between MAAC and NPCC and between ECAR and NPCC. All transfer limits presented in this report have been rounded down to the nearest 50 MW. The following facilities may be thermal limits for regional transfers:

    Homer City 345/230 kV
    Glade – Glade Tap 230 kV
    Homer City – Shelocta 230 kV
    Erie South – Erie East 230 kV
    Scott - Buchanan 220 kV
    North Meshoppen 230/115 kV
    Erie West 345/115 kV

4. Based on the analysis documented in this study, transfer limits changed as follows:

Transfer Path	FCTTC Change from 2000 Summer
NPCC to MAAC	700 MW higher
NPCC to ECAR	900 MW higher
MAAC to NPCC	1100 MW higher
ECAR to NPCC	200 MW lower

The primary reason for changes in FCTTC as compared to the 2000 Summer study is the modeling of the Michigan-Ontario PARs. General causes for the increase in FCTTC include changes in base transfers and study transfer dispatches that affect the loading on critical interfaces and facilities in the MEN/VEM base case.

Dynamic Security

As part of its ongoing responsibility, the MEN Study Committee has reviewed the results of dynamic security assessments that have been recently conducted. These assessments include the MEN 1998 Summer Peak Load Dynamic Study and the dynamic assessment conducted as part of the Michigan-Ontario PAR analysis by OHSC for NPCC. Based on this review the Study Committee concludes that the MEN interconnected network is expected to be dynamically secure at the steady state transfer limits for Summer 2001.

B. Simultaneous Transfer Capability

The simultaneous transfer capability plots (Figures 1A, 1B and 1C) graphically portray the anticipated effect on transfer capability when one system is simultaneously transferring power to or from two separate systems. They reveal how the sensitivity of a particular system limit to one transfer differs from the same limit's sensitivity to the other transfer. These results are based on linear analysis, while actual system performance is influenced by a number of nonlinear factors.

The results of this analysis stress the continued need for close coordination and communication among the users of the interconnected systems in order to maximize the utilization of the network without jeopardizing its reliability.

Figure 1A shows the simultaneous transfers between MAAC and its adjacent regions NPCC and ECAR. Figure 1B shows the simultaneous transfers between ECAR and its adjacent regions MAAC and NPCC. Figure 1C shows the simultaneous transfers between NPCC and its adjacent regions MAAC and ECAR.

In the simultaneous transfer plots, the cross-hair symbol represents the base case level of transfers between the study region and each of the two adjacent regions. The shaded area represents different combinations of simultaneous transfers between the study system and each of the adjacent regions, at which the system can be operated reliably without encountering any pre-contingency or post-contingency overloads. The dark solid lines represent points at which the first limit to transfers would be expected to be encountered as transfers increase from the base case levels. The dashed lines represent points at which a pre-contingency or post-contingency overload would be expected to occur at levels of transfers beyond the first limit.

Interpretation of the simultaneous transfer plots is best illustrated with an example. Referring to Figure 1C, the NPCC to MAAC/ECAR Simultaneous Transfer Capability plot, the crosshairs indicate that the base case contains transfers of 392 MW from MAAC to NPCC (-392 on the abscissa) and 682 MW from NPCC to ECAR (+682 on the ordinate). From this base case operating point, holding the base transfers from NPCC to ECAR constant at +682 MW, transfers from NPCC to MAAC may be increased to 3050 MW before encountering the Homer City transformer limit (Line A). This correlates with the results in Table 1 under "NPCC-MAAC". However, if the transfers from ECAR to NPCC are changed to 300 MW (-300 on the ordinate), simultaneous transfers from NPCC to MAAC may be as high as 3900 MW before encountering the limits for both the Homer City transformer and the Glade – Glade Tap line (at the intersection of lines A and B).

Simultaneous schedules which plot within the shaded area of the respective Simultaneous Transfer Capability plots will not overload any of the limiting facilities in the study model.

B. Simultaneous Transfer Capability (cont'd)

Retrospective on Summer 2000 FCTTC vs. Actual Scheduled Interchange

Figures 2A, 2B and 2C compare MEN 2000 Summer study results to the actual interregional transfer schedules by superimposing the schedules on the Simultaneous Transfer Capability results from the study. These plots provide a sense of validity to the limits being identified by the study and verification of selection of the base case operating point. Each data point represents one day, and is the hourly-integrated, aggregate regional scheduled interchange for hour ending 1700, weekdays, 6/1/00 to 8/31/00.

From an overall perspective, the plots provide an indication of the magnitude of regional market activity during the summer of 2000. Weather patterns across the MEN region were such that a large diversity existed between individual company peak loads. One result of this diversity was a wide variation in simultaneous power exchanges between the MEN regions. The MAAC region experienced all combinations of imports and exports with ECAR and NPCC. However, the highest concentration of points is in the lower left quadrant (see Figure 2A), indicating simultaneous imports from both ECAR and NPCC. The ECAR and NPCC plots (Figures 2B and 2C, respectively) show the prevalence of simultaneously exporting to MAAC, while showing more limited scheduling activity between themselves, with NPCC generally exporting to ECAR between 300 to 650 MW. It should be noted that Figures 2B and 2C can only show scheduling activity between ECAR and NPCC over the Michigan-Ontario interface; scheduling activity between ECAR and NPCC through MAAC can best be discerned in Figure 2A.

As the vast majority of data points lie within the shaded boundaries, the thermal and voltage limits identified by the study seem to have valid correspondence with actual scheduling activity, which is coupled to the availability of transmission service. Two points lie outside the shaded areas, and are most easily seen on Figure 2A (MAAC to NPCC/ECAR). The first point outside the shaded area is above the boundary defined by the Dumont 765/345 kV transformer limit and corresponds to 6/14/00. This day was characterized by heavy MAAC exports to ECAR to support the summer peak of several ECAR companies. The Dumont 765/345 kV transformer did not limit the MAAC exports due to the fact that Cook unit #2, connected on the high side of the Cook 765/345 kV transformer, was out of service.

The second point outside of the shaded area on Figure 2A occurred on 8/3/00, and the boundary exceeded is a voltage limit (Bedington – Doubs 500 kV for L/O Mt. Storm – Doubs 500 kV). In MAAC this reflects a day of high economic purchases from ECAR that occurred within a week of MAAC's summer peak on 8/8/00. The voltage limit depicted on the plot is highly dependent on the availability of units in western MAAC and eastern ECAR, and the particular unit availability provided sufficient reactive support to facilitate this simultaneous transfer.

B. Simultaneous Transfer Capability (cont'd)

Retrospective on Summer 2000 Circulation

Figures 2D, 2E and 2F compare scheduled interregional transfers to actual interregional tie flow, superimposed on the Simultaneous Transfer Capability results from the MEN 2000 Summer study. By incorporating actual interregional tie flow, these plots further the goals of Figures 2A, 2B and 2C by providing a means of visually portraying the circulating, or loop, flows that occur among the MEN and neighboring regions, as well as verification of the Interregional Transfer Distribution Factors portrayed in Figures B-1.1 to B-1.4. Each data pair joined by a connecting line represents one day - the "plus-signs" being the hourly-integrated, aggregate regional scheduled interchange, the "zeros" being the hourly-integrated, aggregate regional tie flow - for hour ending 1700, weekdays, 7/1/00 to 7/31/00.

The actual circulating flows experienced by the MEN systems last July generally consisted of the following elements:

- Counter-clockwise Lake Erie flow throughout the MEN systems
- SERC to MAAC transfers utilizing ECAR systems

The MAAC region generally experienced flows higher than scheduled imports from ECAR and exports to NPCC. Using Figure 2D, this places the actual interregional tie flow ('0') down and to the right of the schedule ('+'). The counter-clockwise Lake Erie circulation adds to the already increased ECAR to MAAC flows, and also increases the MAAC to NPCC flow above schedule. Flow higher than scheduled imports from ECAR to MAAC are composed primarily of SERC to MAAC transfers utilizing the ties between ECAR and MAAC for a sizable portion of their transfers. On the other hand, NPCC to MAAC flows were generally less than scheduled.

ECAR (Figure 2E) experienced higher flows than scheduled imports from NPCC and higher export flows than scheduled to MAAC, the majority of which consisted of Lake Erie circulation utilizing the NPCC to ECAR and then the MAAC to NPCC paths. SERC to MAAC transfers also utilized the ties between ECAR and MAAC for a sizable portion of their transfers.

The highest magnitude of circulating flow can be seen in the NPCC plot (Figure 2F), and is purely composed of the Lake Erie circulation: higher flows than scheduled exports from NPCC to ECAR and flow higher than scheduled imports from MAAC to NPCC. The Phase Angle Regulating transformers being added on the Michigan-Ontario interface will mitigate Lake Erie circulation.

C. Discussion of Results

The FCTTCs and FCITCs calculated were determined for peak load conditions as presently forecasted and with mainly firm, capacity backed transfers. It should be noted that the FCTTCs and FCITCs are used only as indicators of the relative strength of the interconnected system. They cannot be used as absolute indices of operating capability of the system because they are determined for the one set of specific conditions represented in this study. Any changes to the system condition, such as variations in generation dispatch or simultaneous transfers that are not modeled in this study, can significantly affect transfer capabilities.

As noted earlier, the FCITCs and FCTTCs represent a possible method to compare and measure the relative strength of the system from one season or appraisal period to the next. Hence, a comparison of the FCTTC values determined for this summer and the corresponding values determined for the previous two summers are provided in Table 1.

Due to the integrated nature of the bulk supply network, power transfers between areas can result in incremental power flows throughout all three MEN regions. In some cases, the resulting power flow through a part of the region not involved in the transfer can be significant.

When considered by themselves, these transfers may not appear to pose a problem within the maximum permissible transfer value. But for certain combinations of simultaneous power transfers, portions of the interconnected network could experience significant power flow increases when the response to the transfer is in the same direction.

Conversely, a transaction may also decrease the prevailing flow and allow for increased transfers. The responsiveness of selected elements within the MEN network to multiple transfers can be evaluated by use of the transfer response factors given in Appendix B. Using superposition, these tables enable the calculation of the power flows on facilities and interfaces for combinations of simultaneous transfers. These response characteristics demonstrate the possibility for strong interaction among certain transfers.

Voltage limits are recognized by use of proxy thermal limits to determine interregional transfer capabilities. None of the FCITCs reported in Tables 1 and 2 are voltage-limited.

C. Discussion of Results (cont'd)

Comparison of 2001 Summer Results with 2000 Summer Results

The following discussion of differences between the 2001 Summer and 2000 Summer FCTTCs is based principally on the results presented in Table 1.

The use of the FCTTC values to compare results from one time period to another, as opposed to using the FCITCs, is deemed more appropriate to capture the effect of variation in base case transfers. The FCTTC values used in the comparison are the algebraic sums of the FCITC values and the appropriate total interregional base case transfers.

NPCC Export Limits

NPCC to MAAC

The *increase* in the reported NPCC to MAAC transfer capability of 700 MW can be attributed primarily to the increased ability to control pre-contingency flow on bulk power facilities due to the installation of the Michigan-Ontario PARs. The redirection of NPCC to MAAC flows through ECAR result in decreased transfer distribution factors through limiting facilities.

NPCC to ECAR

The *increase* in the reported NPCC to ECAR transfer capability of 900 MW can be primarily attributed to the return to service of Cook unit #1. This removes the Dumont 765/345 kV transformer limit for the loss of the Cook 765/345 kV transformer which was experienced last summer.

NPCC Import Limits

MAAC to NPCC

The *increase* in the reported MAAC to NPCC transfer capability of 1100 MW can be attributed primarily to the modeling of the Michigan-Ontario PARs to support transfers. This redistribution of MAAC to NPCC flows unloads facilities along the northern PJM/NYISO interface, resulting in higher transfer capability.

ECAR to NPCC

The *decrease* in the reported ECAR to NPCC transfer capability of 200 MW can be attributed to the modeling of the Michigan-Ontario PARs to support transfers. This redistribution of ECAR to NPCC flows, in addition to higher generation levels modeled at Lambton, results in IMO facilities overloading before facilities along the northern PJM/NYISO interface.

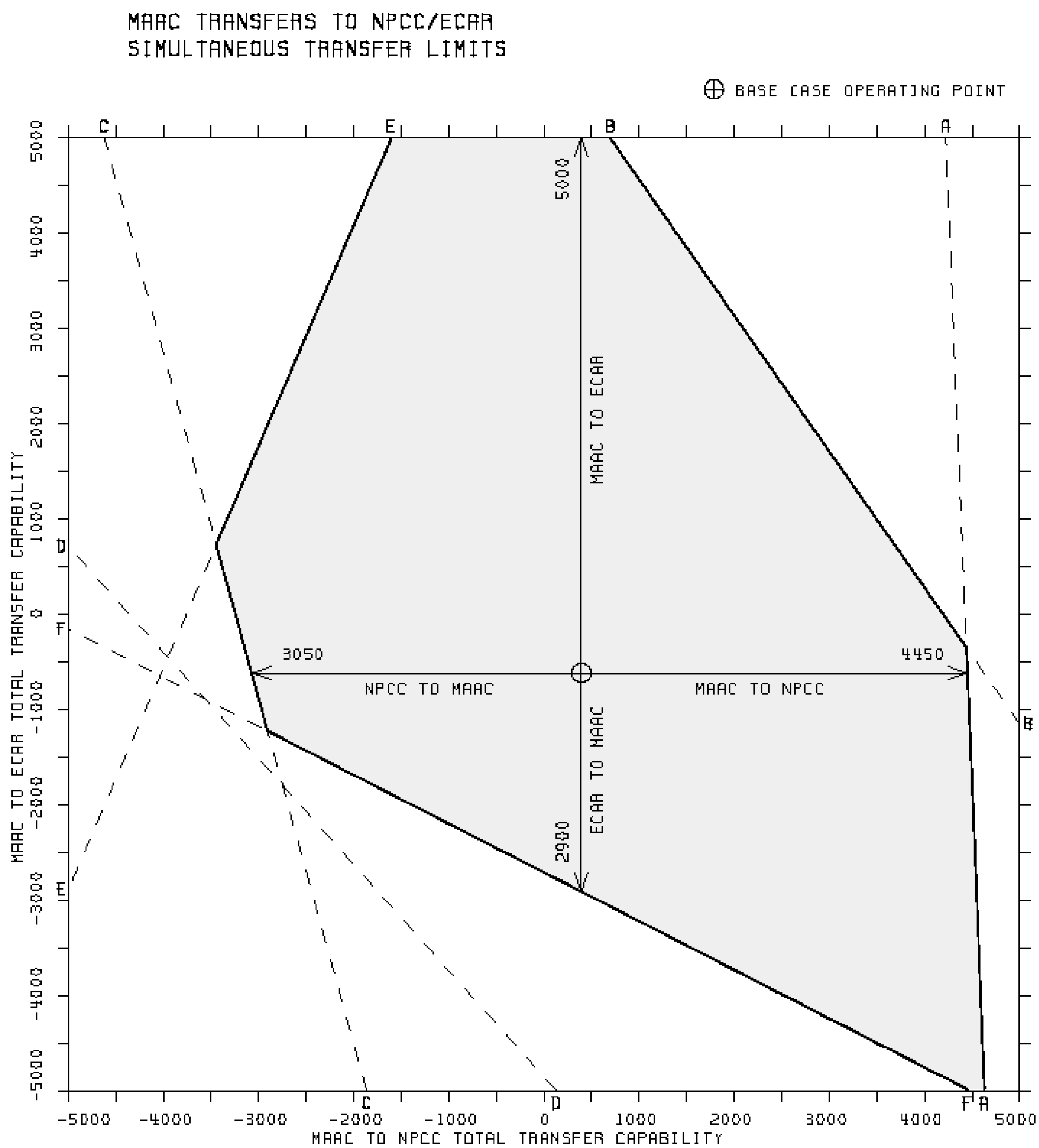
D. TLR Discussion

The NERC Transmission Loading Relief (TLR) procedure has been implemented as an interconnection-wide procedure to properly identify the causes of adverse parallel flows and to assist in their relief in the event of thermal, voltage or stability limitations.

TLR has supplemented local coordination procedures between some control areas, one of which is the AP/PJM/VP Reliability Coordination Plan (RCP). The RCP was designed to limit west-to-east economic flows into the Mid-Atlantic region for voltage limitations on the interconnected 500 kV system. The methodology of calculating RCP limits – a voltage proxy applied as thermal limits to transmission lines – has been incorporated into the TLR procedure.

The MEN 2001 Summer study did not identify any limiting facilities that correlate to those that activated 2000 summer TLR procedures. 2000 summer load was relatively mild, with well-diversified peaking among the control areas that comprise the MEN regions, and few, if any, control areas establishing new all-time peak loads.

Figure 1A
Simultaneous Transfer Capability – MAAC to NPCC/ECAR
(see discussion under "Results, Simultaneous Transfer Capability")



A: SCOTT - BUCHANAN N22W 220 KV — L/O SCOTT - BUCHANAN N21W 220 KV
B: NORTH MESHOPPEN 230/115 KV — NO CONTINGENCY
C: HOMER CITY 345/230 KV #2 — L/O HOMER CITY 345/230 KV #1
D: GLADE - GLADE TAP 230 KV — NO CONTINGENCY
E: HOMER CITY - SHELOCTA 230 KV — L/O ERIE WEST - WAYNE 345 KV
F: VOLTAGE LIMIT: HATFIELD-BLACK OAK 500 KV — L/O PRUNTYTOWN - MT. STORM 500 KV

Figure 1B
Simultaneous Transfer Capability – <u>ECAR to MAAC/NPCC</u>
(see discussion under “Results, Simultaneous Transfer Capability”)

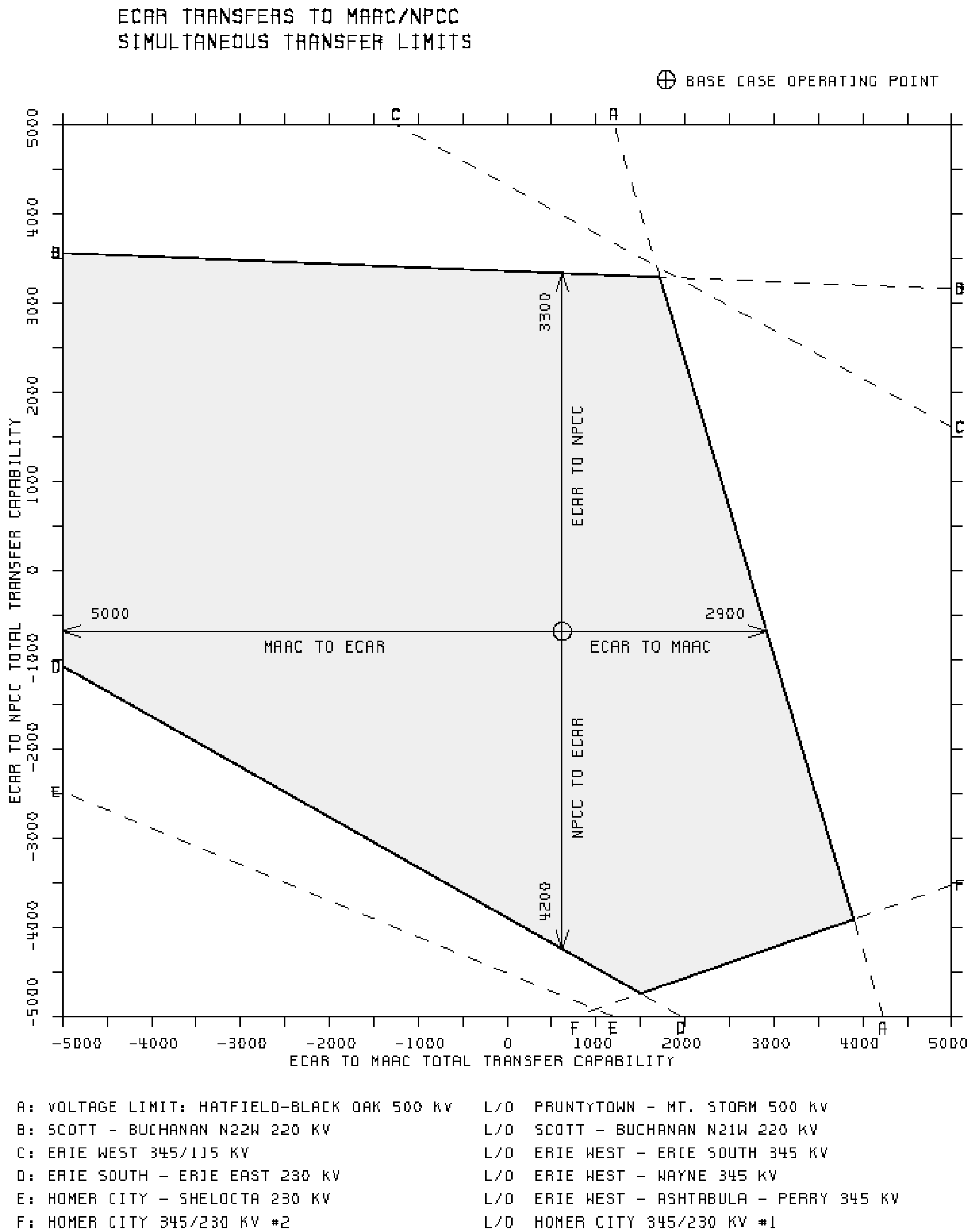


Figure 1C
Simultaneous Transfer Capability – NPCC to MAAC/ECAR
(see discussion under "Results, Simultaneous Transfer Capability")

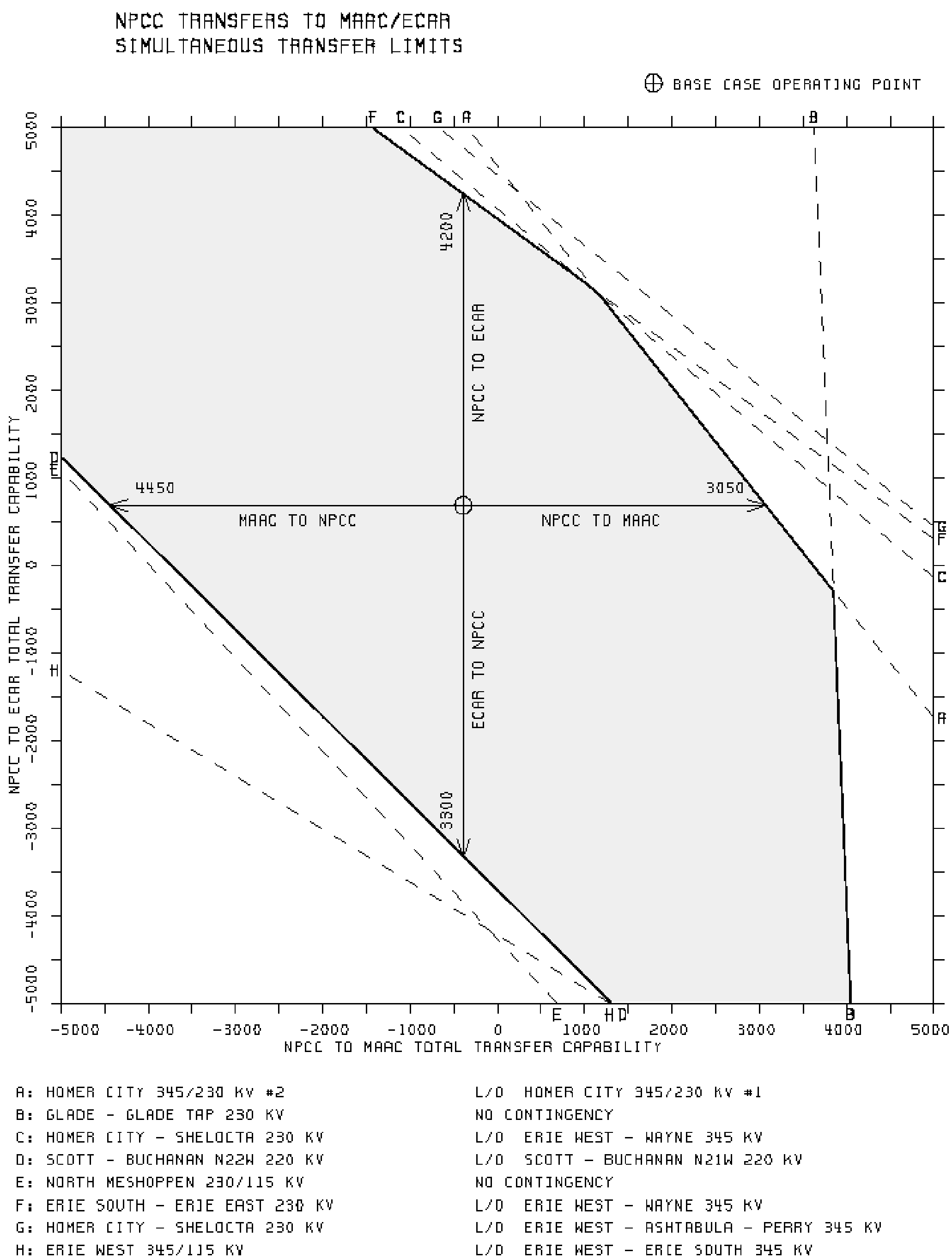


Figure 2A
2000 Summer Study Simultaneous FCTTC
and Actual Scheduled Interchange ('+')
<u>MAAC to NPCC/ECAR</u>

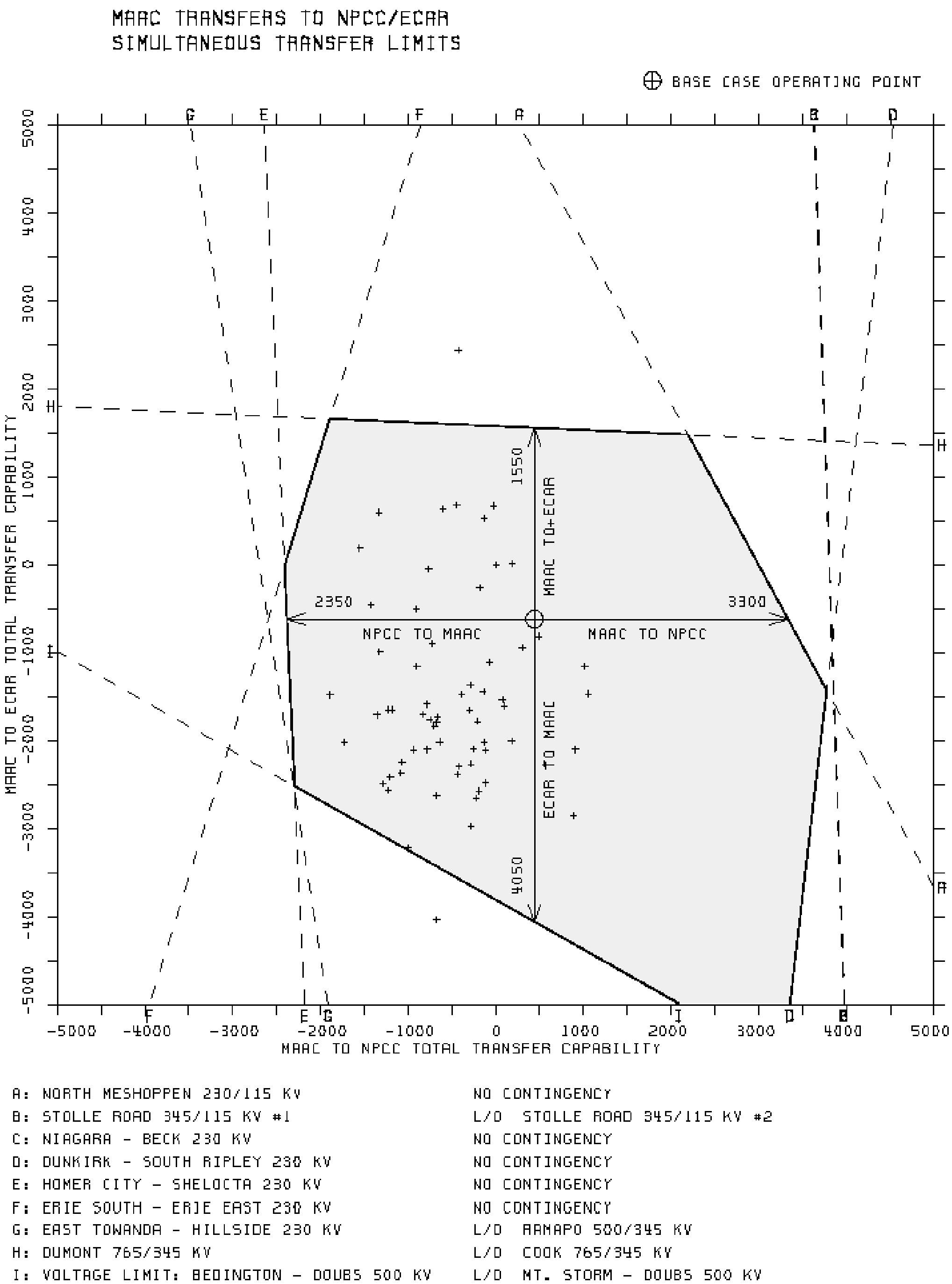


Figure 2B
2000 Summer Study Simultaneous FCTTC
and Actual Scheduled Interchange ('+')
ECAR to MAAC/ NPCC

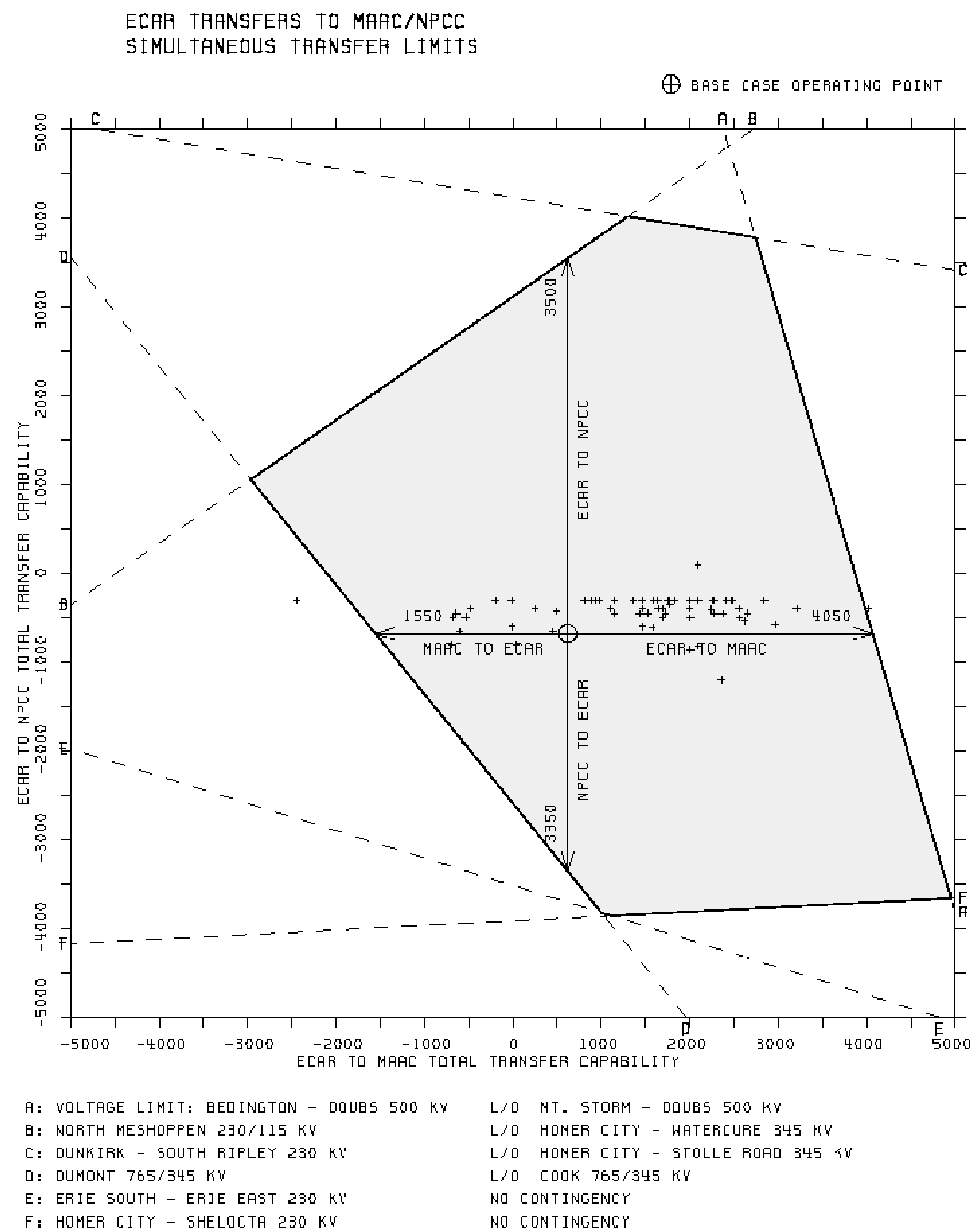
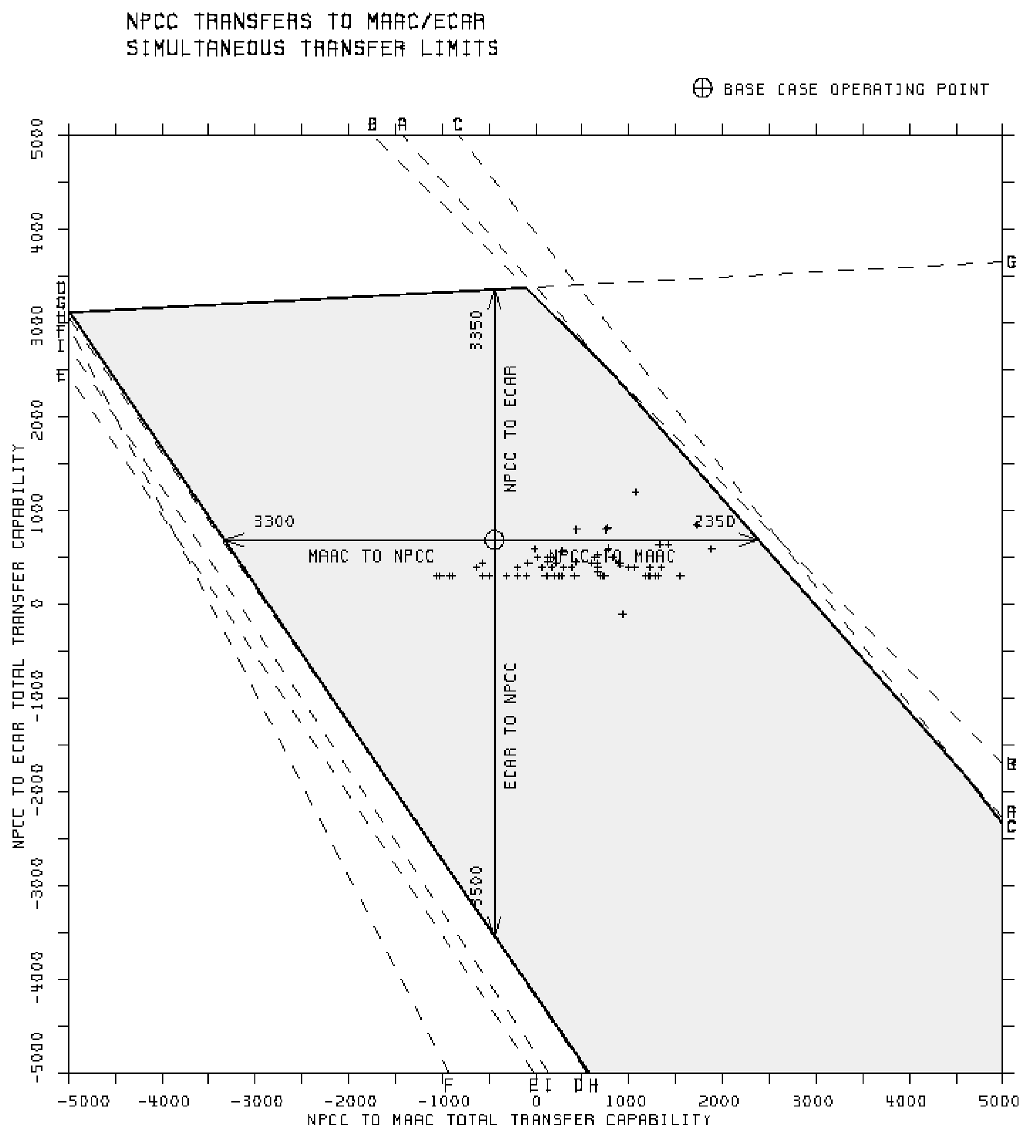
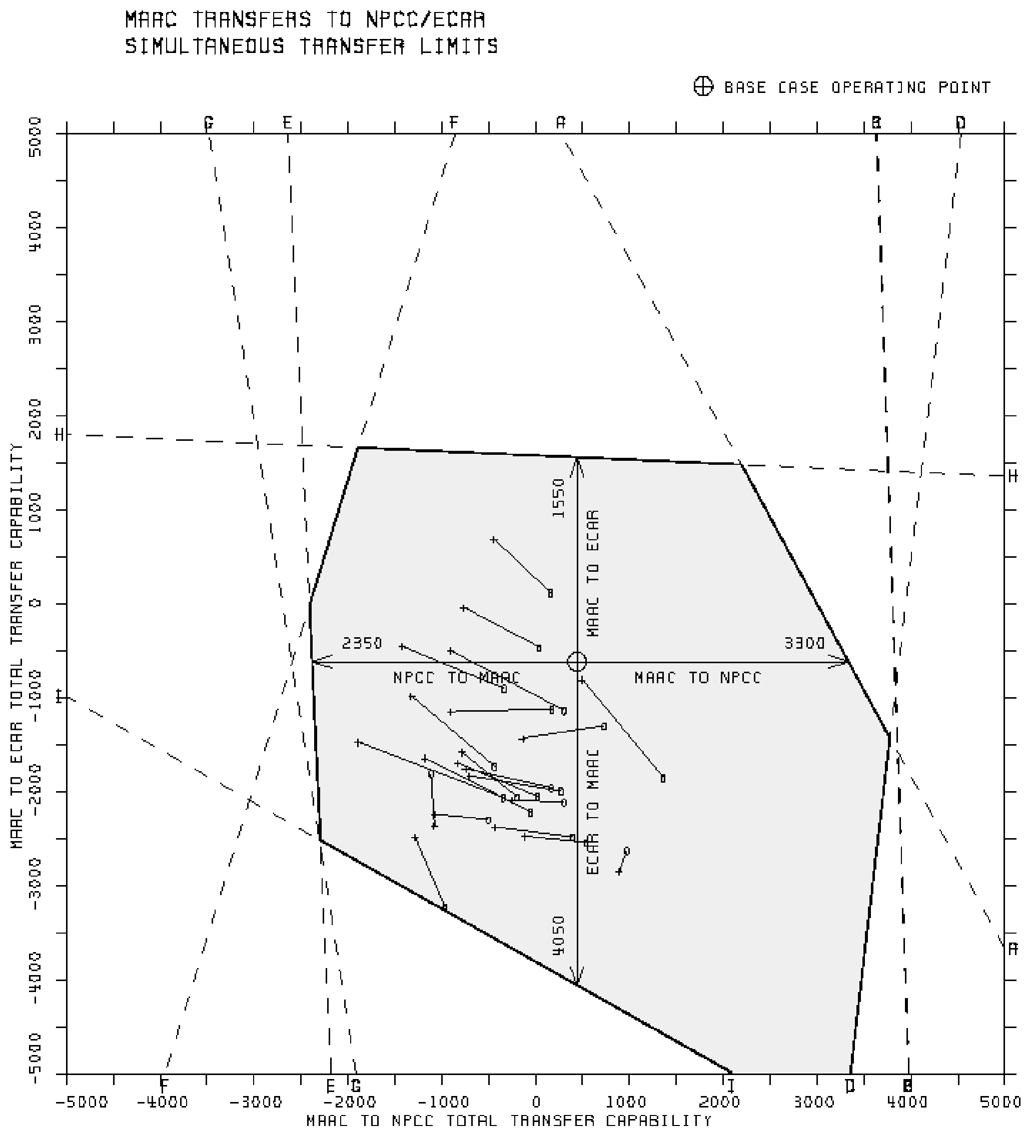


Figure 2C
2000 Summer Study Simultaneous FCTTC and Actual Scheduled Interchange ('+')
<u>NPCC to MAAC/ECAR</u>



A:	HOMER CITY - SHELOCTA 230 KV	NO CONTINGENCY
B:	ERIE SOUTH - ERIE EAST 230 KV	NO CONTINGENCY
C:	EAST TOWANDA - HILLSIDE 230 KV	L/O RAMAPO 500/345 KV
D:	NORTH MESHOPPEN 230/115 KV	NO CONTINGENCY
E:	STOLLE ROAD 345/115 KV #1	L/O STOLLE ROAD 345/115 KV #2
F:	NIAGARA - BECK 230 KV	NO CONTINGENCY
G:	DUMONT 765/345 KV	L/O COOK 765/345 KV
H:	NORTH MESHOPPEN 230/115 KV	L/O HOMER CITY - WATERCURE 345 KV
I:	DUNKIRK - SOUTH RIPLEY 230 KV	L/O HOMER CITY - STOLLE ROAD 345 KV

Figure 2D
2000 Summer Study Simultaneous FCTTC
with Actual Scheduled Interchange ('+') and Tie Flow ('0')
MAAC to NPCC/ECAR



A: NORTH MESHOPPEN 230/115 KV	NO CONTINGENCY
B: STOLLE ROAD 345/115 KV #1	L/O STOLLE ROAD 345/115 KV #2
C: NIAGARA - BECK 230 KV	NO CONTINGENCY
D: DUNKIRK - SOUTH RIPLEY 230 KV	NO CONTINGENCY
E: HOMER CITY - SHELOCTA 230 KV	NO CONTINGENCY
F: ERIE SOUTH - ERIE EAST 230 KV	NO CONTINGENCY
G: EAST TOWANDA - HILLSIDE 230 KV	L/O RAMAPO 500/345 KV
H: DUMONT 765/345 KV	L/O COOK 765/345 KV
I: VOLTAGE LIMIT: BEDINGTON - DOUBS 500 KV	L/O MT. STORM - DOUBS 500 KV

Figure 2E
2000 Summer Study Simultaneous FCTTC
with Actual Scheduled Interchange ('+') and Tie Flow (‘0’)
<u>ECAR to MAAC/NPCC</u>

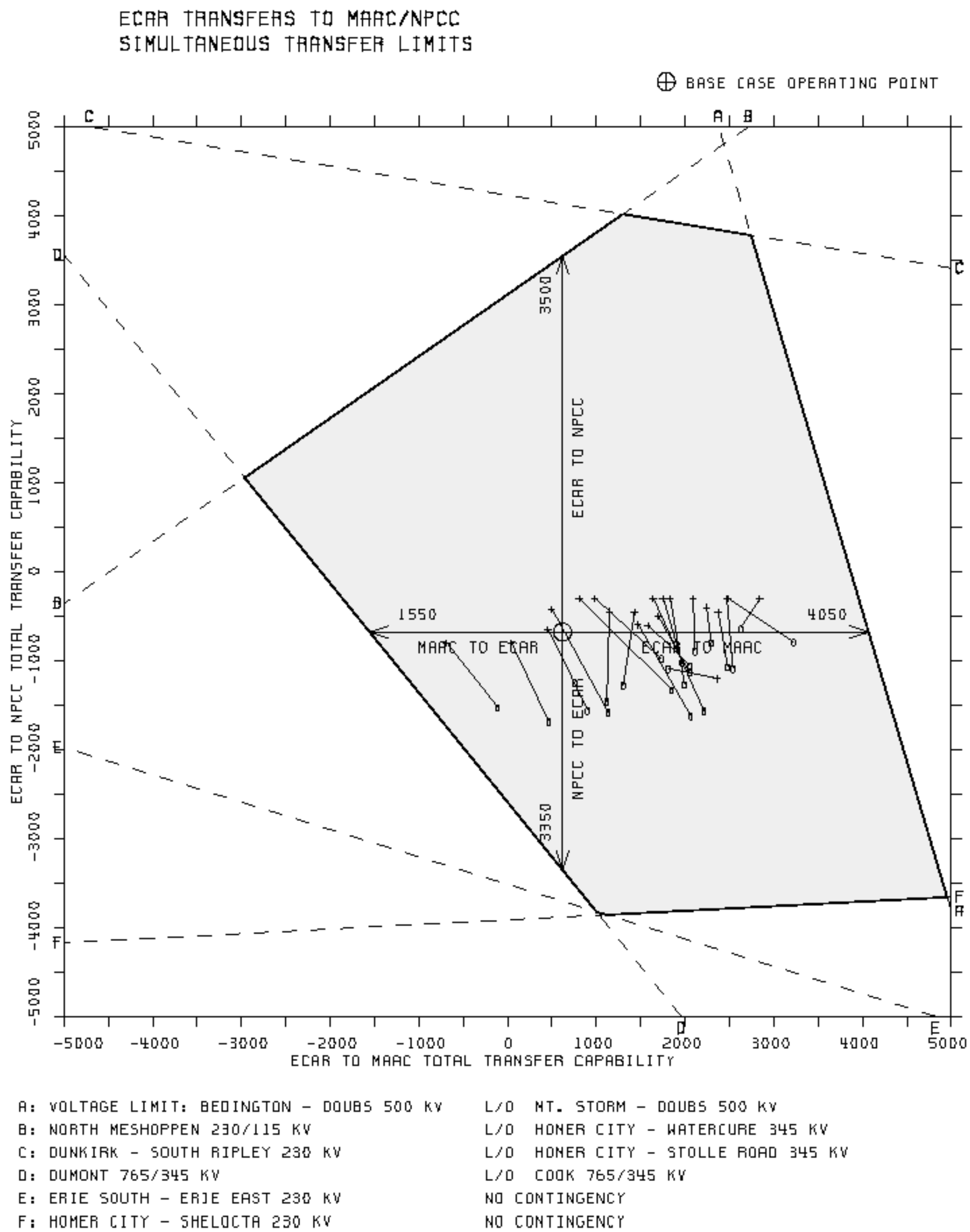


Figure 2F
2000 Summer Study Simultaneous FCTTC
with Actual Scheduled Interchange ('+') and Tie Flow ('0')
<u>NPCC to MAAC/ECAR</u>

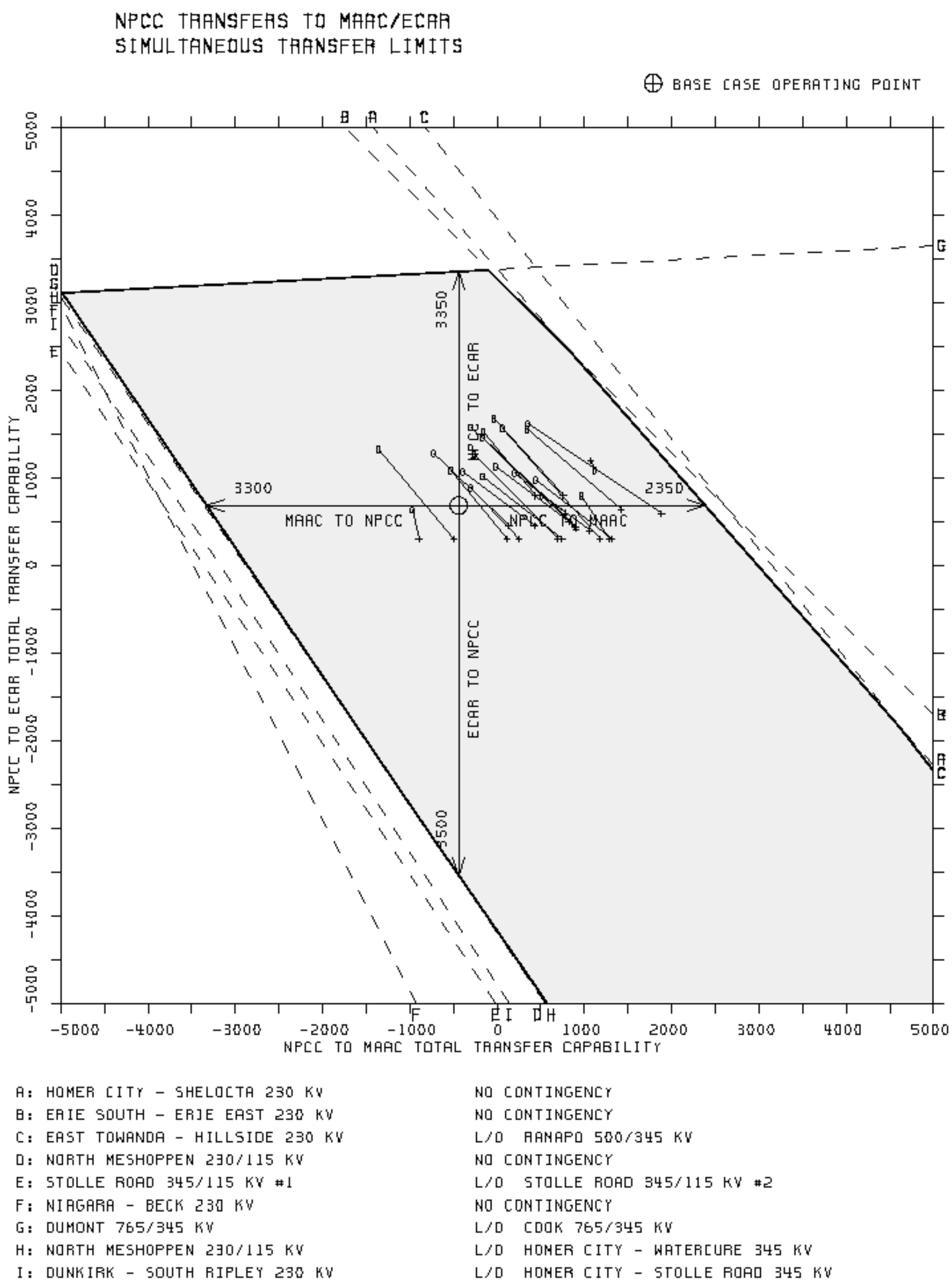
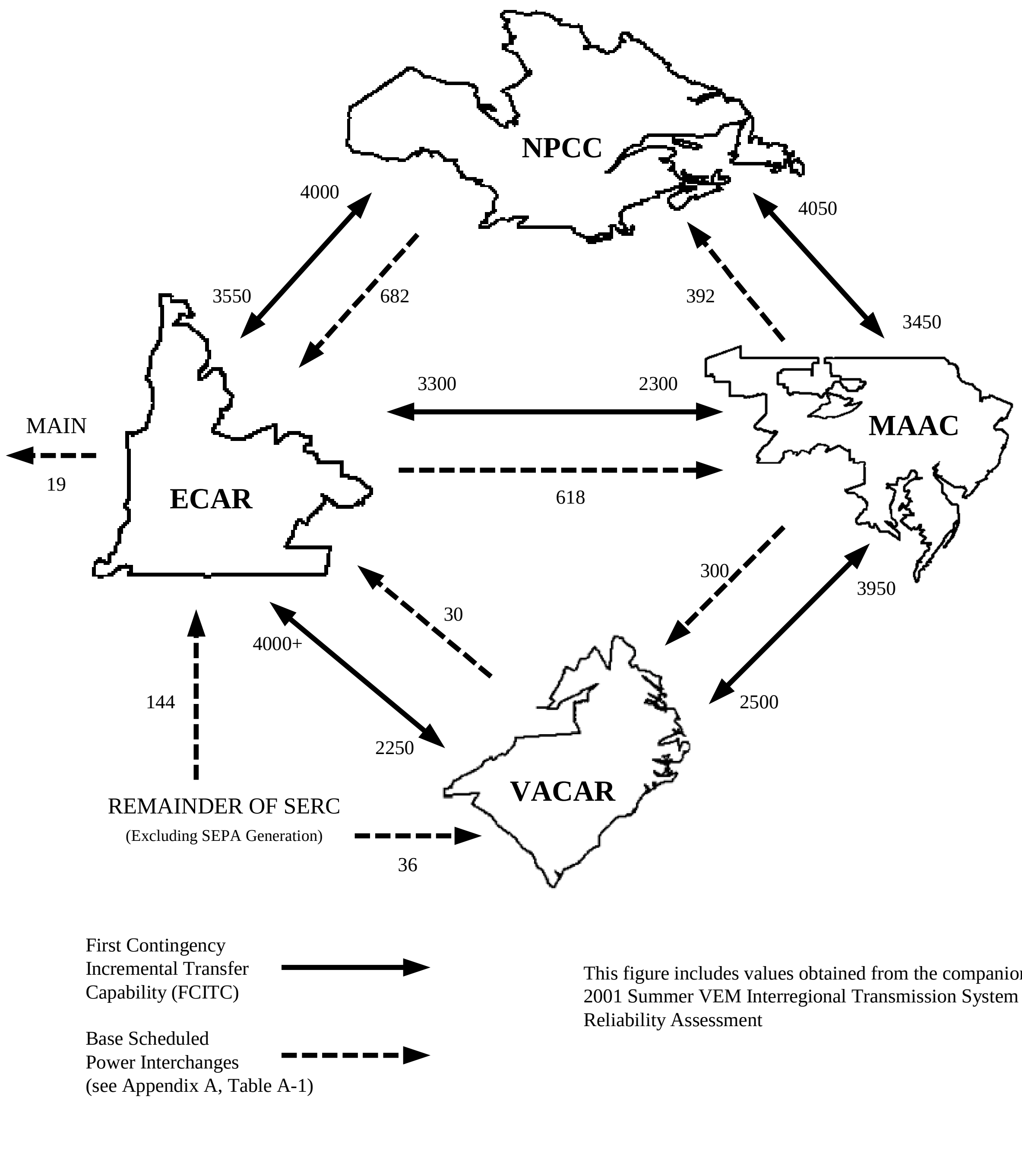


Figure 3
Non-simultaneous Interregional Transfer Capability



This figure includes values obtained from the companion 2001 Summer VEM Interregional Transmission System Reliability Assessment

Table 1
Comparison of Results (FCITC and FCTTC) with Previous Years

Transfer	FCITC	FCTTC	Limiting Facility	Contingency
NPCC - MAAC				
2001 Summer	3450	3050	Homer City 345/230 kV #2 (GPU)	Homer City 345/230 kV #1 (GPU)
2000 Summer	2800	2350	[1]Homer City – Shelocta 230 kV (GPU)	Base Case – No Contingency
1999 Summer	3150	2250	[1]Homer City 345/230 kV #2 (GPU)	Homer City 345/230 kV #1 (GPU)
NPCC - ECAR				
2001 Summer	3550	4200	[2]Erie South – Erie East 230 kV (GPU)	Erie West – Wayne 345 kV (GPU)
2000 Summer	2650	3300	[3]Dumont 765/345 kV (AEP)	Cook 765/345 kV (AEP)
1999 Summer	4050	4700	[1]Lambton – St. Clair L51D 345 kV (IMO/MECS)	Base Case – No Contingency
MAAC – NPCC				
2001 Summer	4050	4400	[4]Scott – Buchanan N22W 220 kV (IMO)	Scott – Buchanan N21W 220 kV (IMO)
2000 Summer	2850	3300	[5]North Meshoppen 230/115 kV (GPU)	Base Case – No Contingency
1999 Summer	2600	3500	[5]North Meshoppen 230/115 kV (GPU)	Homer City – Watercure 345 kV (GPU/NYSEG)
ECAR – NPCC				
2001 Summer	4000	3300	[4]Scott – Buchanan N22W 220 kV (IMO)	Scott – Buchanan N21W 220 kV (IMO)
2000 Summer	4200	3500	[5]North Meshoppen 230/115 kV (GPU)	Homer City – Watercure 345 kV (GPU/NYSEG)
1999 Summer	2800	2100	[5]North Meshoppen 230/115 kV (GPU)	Homer City – Watercure 345 kV (GPU/NYSEG)

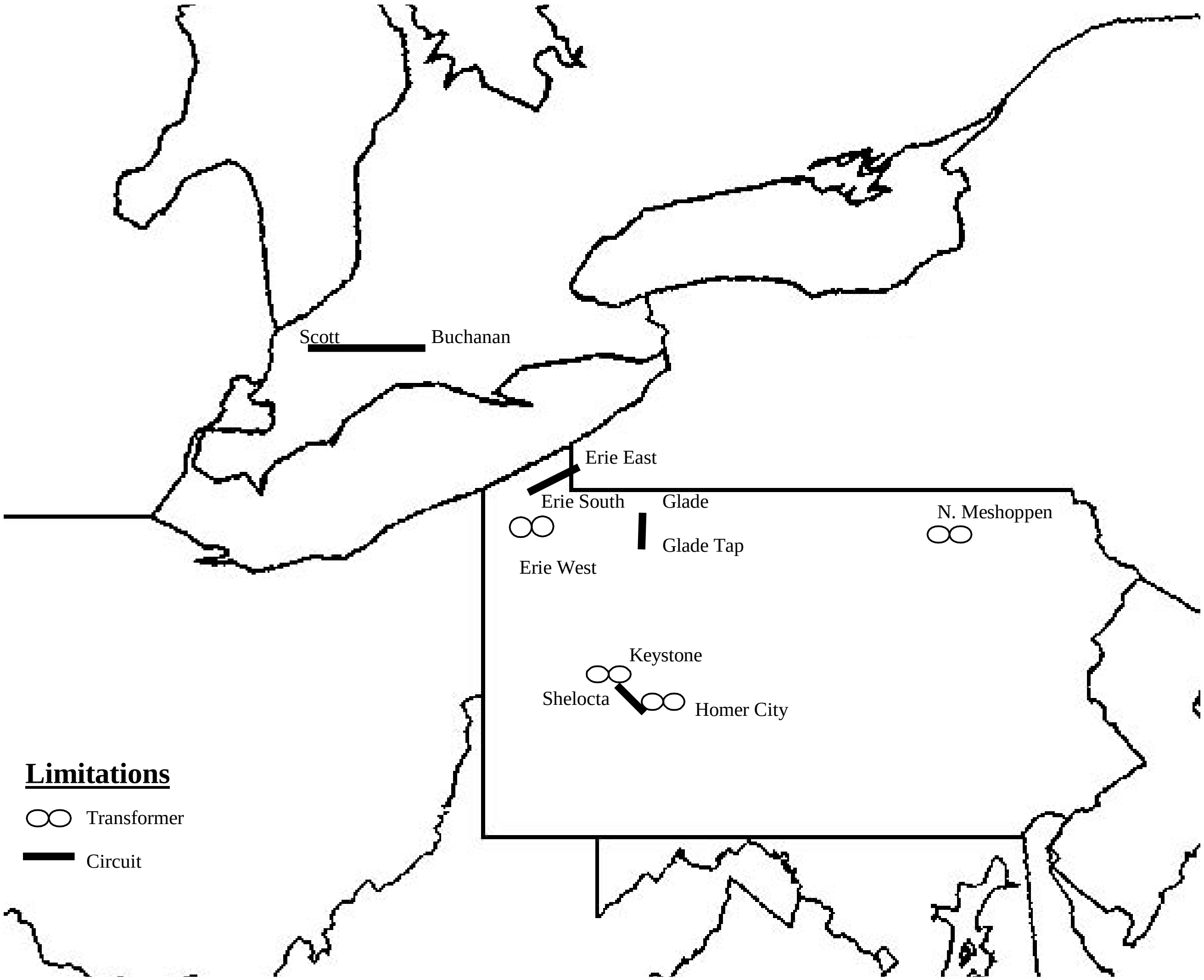
1. Blairsville – Social Hall, East Sayre – North Waverly and Laurel Lake – Goudey circuits opened.
2. Blairsville – Social Hall circuit opened.
3. Blairsville – Social Hall and East Sayre – North Waverly circuits opened.
4. Warren – Falconer and East Sayre – North Waverly circuits opened.
5. Warren – Falconer circuit opened.

Table 2
First Contingency Incremental Transfer Capability (FCITC)

4000 MW Transfer Level Unless Otherwise Noted	FCITC	Limiting Facility / Contingency	Rating (MVA)	TDF %	ODF %	OTF %
NPCC – MAAC	3450	[1]Homer City 345/230 kV #2 (GPU) / Homer City 345/230 kV #1 (GPU)	699	9.8 10.1	81.9	18.1
	4200	[2]Glade – Glade Tap 230 kV (GPU) / No Contingency	492	5.2	---	---
	4400	[2]Homer City – Shelocta 230 kV (GPU) / Erie West – Wayne 345 kV (GPU)	854	13.5 1.4	30.5	13.6
NPCC – ECAR	3550	[3]Erie South – Erie East 230 kV (GPU) / Erie West – Wayne 345 kV (GPU)	554	11.0 5.6	12.0	11.9
	4050	[3]Homer City – Shelocta 230 kV (GPU) / Erie West – Ashtabula – Perry 345 kV (GPU/FE)	854	9.9 19.2	29.3	15.5
	4350	[3]Homer City 345/230 kV #2 (GPU) / Homer City 345/230 kV #1 (GPU)	699	6.1 6.2	82.2	11.1
MAAC – NPCC	4050	[4]Scott – Buchanan N22W 220 kV (IMO) / Scott – Buchanan N21W 220 kV (IMO)	550	5.8 5.8	43.2	8.3
	4200	[4]North Meshoppen 230/115 kV (GPU) / No Contingency	136	4.4	---	---
ECAR – NPCC	4000	[4]Scott – Buchanan N22W 220 kV (IMO) / Scott – Buchanan N21W 220 kV (IMO)	550	7.3 7.3	43.0	10.4
	4650	[4]Erie West 345/115 kV (GPU) / Erie West – Erie South 345 kV (GPU)	285	1.3 10.2	32.1	4.6

1. 3000 MW Transfer Level.
2. East Sayre – North Waverly and Laurel Lake – Goudey circuits opened.
3. Blairsville – Social Hall circuit opened.
4. Warren – Falconer and East Sayre – North Waverly circuits opened.

Figure 4
Location of Limiting Facilities



3. Background Information

Information regarding the basis for the analysis, the simulated test scenarios and the study procedure are discussed in this section in order to help the reader understand how the limitations were calculated in this assessment and to properly interpret the results presented in this report.

A. Base Case Development

The 2001 Summer Assessment base case was developed from the NERC/MMWG 2001 Summer peak load base case, which generally modeled firm, capacity backed transfers. This case was updated with the most recent transmission system status information and projected transfers. Appendix A provides information regarding the expected 2001 summer system conditions. Table A-1 lists the transfers modeled in this summer assessment as compared to those modeled in the 2000 Summer assessment. The appendix includes a diagram of interregional and subregional ties, interregional and subregional tie flows, regional flow diagrams, major EHV generation and transmission additions, and phase angle regulator test settings.

B. Study Procedure

To examine the ability of the MEN network to support transfers between the member regions, 4000 MW test transfer cases were developed for each of the four transfers studied. In addition, a 3000 MW test transfer case was developed to establish NPCC to MAAC transfer capability. Each test transfer case was created by imposing the test transfer on the base case and making the necessary system adjustments required to support the transfer. Linear analysis, which utilizes linear transfer response and outage response factors, was used to screen the transmission system modeled in the test transfer base cases. For the first transfer limit stated for each transfer analyzed, the value reported was further verified by conventional AC load flow analysis. Once determined, no attempts were made to optimize transfers between regions by changing dispatches and/or phase angle regulator settings.

Ratings used in the determination of transfer capabilities include the following:

- The thermal facility ratings and bus voltages that are actually used in system operations.
- Aggregate interface or line flows used to monitor stability or voltage performance.

Phase Angle Regulator (PAR) control is used on the four 345 kV ties and one 230 kV tie between the Consolidated Edison Company (CON ED) and the Public Service Electric and Gas Company (PSEG) to maintain an alternative transmission path through the northern part of PSEG at Waldwick and into CON ED at Farragut and Goethals. Power flow on the Branchburg (PSEG)-Ramapo (CON ED) 500 kV interconnection is controlled by PARs

B. Study Procedure (cont'd)

at Ramapo in accordance with the PJM/NYPP Unscheduled Transmission Service Agreement between PJM and the New York Power Pool (NYISO). As defined by this agreement, the PARs are adjusted in accordance with appropriate operating agreements and instructions to relieve transmission and/or capacity limitations, which may arise in either PJM or NYISO.

The Ramapo PARs are set to import 1000 MW (from Branchburg) for all NPCC import simulations and to export 1000 MW (to Branchburg) for all NPCC export simulations. In the base case, the Ramapo PAR scheduled flow is 530 MW from Branchburg to Ramapo as compared to 550 MW in the 2000 Summer Assessment. PAR control is also used between Ontario (NPCC) and Michigan (ECAR) to increase transfer capability between NPCC and ECAR and to alleviate limit violations in these areas. In the transfer cases, the Michigan-Ontario PARs are set to import 1000 MW (from Michigan) for all NPCC import simulations and to export 2000 MW (to Michigan) for all NPCC export simulations. Once the transfer base cases are built, the Michigan-Ontario PARs are allowed to spill-over to support the generation shift when determining the FCITCs. In the base case, the Michigan-Ontario PAR scheduled flow is 600 MW from Ontario to Michigan. Table A-5 tabulates the PAR controlled interchange for this summer study and for the 2000 Summer study.

Transfer response factors (see Tables B-1.1 through B-1.5) for selected interfaces and transmission facilities were calculated for various transactions. Line outage distribution factors (see Tables B-1.1 and B-1.2) were also determined for selected transmission facilities. These factors provide a means of investigating the impact of emergency transfers (either alone or in combination with other transfers) or a variation in one of the economy transfers included in the base case.

For both NPCC export and import simulations, the proportion assumed in this study is 50% by NYISO and 50% by IMO.

The MEN Study Committee recognizes that a parallel effort is being pursued by NERC to calculate Power Transfer Distribution Factors (PTDFs) to support the Transmission Line Loading Relief (TLR) procedures. The PTDFs are calculated for a set of defined Flowgates in response to specific source-sink Control Area transfers. Apart from a very small number of the Flowgates, which are essentially the same as some of the interfaces assessed in the MEN appraisal, the majority of the monitored elements are very different. The parallel MEN and NERC efforts are therefore very different in scope, products and users, and as such do not participate in any overlapping effort. The MEN Study Committee thus holds the opinion that the various sets of factors produced in the seasonal appraisal continues to be required as a distinct effort, which provides significant value to the MEN system operation community.

4. Regional Appraisals

A. MAAC Appraisal

The ability of the MEN interconnected network to support transfers into and out of MAAC was assessed for the 2001 summer peak load period. The transfer capabilities between NPCC and MAAC are higher than those reported for the 2000 summer. The increased capability can be attributed, in part, by the increased ability to control pre-contingency flow on bulk power facilities due to the installation of the M/O PARs and a resultant decrease in the Lake Erie circulation pattern.

As a result of the increased ability to control pre-contingency flow on bulk power facilities, fewer base case overloads were encountered during the analysis and fewer operating procedures were invoked as part of the analysis.

The transfer capability between PJM/NYISO east is dependent on the return of the Linden-Goethals 230 kV river crossing and one of the parallel 230/345 kV transformers supplying the Hudson-Farragut river crossing. Import capability into New York City will continue to be restricted until these facilities are returned from current long-term forced outages.

Base Case Conditions-Transfers

This summer, the net tie line flow out of MAAC is 74 MW compared with 124 MW out of MAAC last summer. The net decrease in MAAC imports (50 MW) is due to a decrease in transfers from MAAC to NPCC (-50 MW).

The base transfers from ECAR to MAAC of 950 MW this summer remain unchanged from last summer (See Table A-1). The net ECAR to MAAC transfers of 650 MW also remain unchanged from last summer. The net interchange from MAAC to NPCC decreased by 50 MW to 392 MW. A 450 MW PJM sale to NYISO is assumed with the total Homer City plant output going to MAAC. The MAAC to NPCC transfer is a combination of extraterritorial generation (36 MW) and extraterritorial load (-94 MW) plus a 450 MW transaction to NYSEG. Net MAAC to VACAR transfers of 300 MW are scheduled this summer, which is the same as last summer.

Generation

As is typical for the MAAC region, discrete generation was forced out to model typical unit maintenance and Effective Forced Outage Rates (EFOR).

Approximately 2500 MW of additional generation capacity is expected to be placed in service prior to the summer peak, 2000 MW of which consists of new generation facilities.

A. MAAC Appraisal (cont'd)

Load

Load levels this summer are expected to approximate the load experienced during the 1999 summer heat wave. On July 6, 1999, the PJM Temperature Humidity Index (THI) was 85.3 (the actual high temperature recorded was 98 in Philadelphia and 102 in Washington, D.C.). A THI this high is extremely unusual and is estimated to occur only once every 25 years. As a result of the accompanying heat wave, a new peak load of 51,600 MW was reached (with all load management programs and a 5% voltage reduction in effect). This new peak load exceeded the 1999 50/50 probability forecast peak load of 47,570 MW (with interruptible load removed) by almost 4,000 MW. The 5% voltage reduction is estimated to provide approximately 800 MW to 1,000 MW of load relief, which resulted in the July 6th load being closer to 5,000 MW above forecast levels.

With a return to more typical weather conditions, the load expected to be served at the time of the summer PJM peak is 51,311 MW. This is the 50/50-load forecast with the load management programs in effect and direct control load management interrupted. The unrestricted PJM peak load is forecasted to be 52,930 MW.

Operating Procedures

Operating procedures can be employed in the course of study analysis to increase transfer capabilities among the three regions. MAAC operating procedures exist which allow system operators to open selected 115 kV and 138 kV tie lines with surrounding Regions to relieve overloads under emergency transfer conditions. Instances where these procedures have been employed are noted in Tables 1 and 2.

Coordinated operation with NYISO allows for readjustment of the Ramapo PAR schedule, as well as the PS – Con Ed wheel PARs, to alleviate PJM system limits. For the 2001 Summer peak load case, the Ramapo PARs were set to control the flow on the Branchburg-Ramapo 500 kV line to 530 MW. This flow includes an additional 288 MW over and above the normally scheduled flows, to compensate for an imbalance in the PS-CON ED wheel.

B. ECAR Appraisal

The 2001 Summer Assessment included an evaluation of the ECAR region's ability to support transfers into or out of the NPCC region. For the 2001 Summer conditions modeled, the ECAR region exhibits thermal limitations to regional transfers as shown in Table 1.

The Erie East - Erie South 230 kV line for an outage of the Wayne - Erie West 345 kV line limits incremental and total transfer capabilities for the NPCC to ECAR path. These transfer capabilities are 900 MW higher as compared to that reported for the 2000 Summer assessment. The increase is attributable primarily to the return to service of Cook Unit 1, which reduced the loading on the Dumont 765/345 kV transformer.

Incremental and total transfer capabilities for the ECAR to NPCC path are limited by the Scott - Buchanan 220 kV line (N22W) for the outage of the parallel 220 kV circuit (N21W). These transfer capabilities are 200 MW lower as compared to that reported for the 2000 Summer assessment. The decrease is attributable primarily to increased Lambton generation which increases the Scott to Buchanan flow.

Generation

The principal generation changes since Summer 2000 modeled in this study are:

- Over 4500 MW of additional generation within ECAR
- Return of Cook Unit 1

Refer to Table A-4 for a detailed listing of generator additions.

AEP's Cook Unit 1 (1000 MW connected at 345 kV) returned to service in January 2001. The return to service of this unit reduces loadings on the Dumont and Cook 765/345 kV transformers (AEP), thus increasing transfer capability to the north and west.

The 2001 Summer reliability assessment base case was developed from the NERC/MMWG 2001 Summer peak load base case, and while this case was updated with the most recent transmission system status information and projected transfers, five FirstEnergy (FE) W. Lorain generators expected to be in-service by Summer 2001 were omitted from the case. The five 85 MW CT generators should have been modeled at the FE '02Beaver 345' bus. The ECAR - NPCC path was thought to be most likely to exhibit any potential export/import transfer capability impacts associated with these units in-service. Therefore, a sensitivity analysis on the transfer capabilities between ECAR and NPCC was performed after appropriately dispatching the five generators. The sensitivity findings indicate that there were no significant changes in transfer limits (FCITC) for ECAR exports to NPCC. There were no differences in the limiting facilities/contingencies comparing results with versus without the W. Lorain CTs. Likewise, for NPCC exports to ECAR, there were no

B. ECAR Appraisal (cont'd)

differences in the limiting facilities/contingencies although there were minor increases in some FCITC limits with the W. Lorain generators. In summary, the W. Lorain generators had no significant impact on the transfer limits found in Table 2.

Load

The projected load plus losses for ECAR modeled in this study is about 103,200 MW, which is approximately 1,100 MW greater than the load modeled for Summer 2000, an increase of 1.1%.

Transmission Facilities

Major transmission facility changes since Summer 2000 are:

- Orange 765/138 kV transformer in central Ohio
- 40 mile Foster - Bath 345 kV line between Cinergy and DPL

These and other ECAR facility additions are indicated in Table A-3.

The Michigan - Ontario interface and the Queenston Flow West (QFW) interface in Ontario have been susceptible to large parallel flows and Transmission Loading Relief (TLR) curtailments. The last of three new Phase Angle Regulating (PAR) transformers, Lambton PS4, on the Michigan - Ontario Interface is scheduled to be in operation by mid-August, 2001. DOE permitting must also be received before the B3N PAR becomes operational. The PARs, one on each of the four interconnections, will mitigate problems on the QFW by being normally operated to reduce unscheduled flows from Ontario into Michigan. This operating mode, however, increases loading on other critical ECAR facilities, such as the Dumont and Cook 765/345 kV transformers, by redirecting flows which would otherwise flow around the north end of Lake Erie into Michigan. This may reduce transfer capability to the north and west.

The Lake Erie Emergency Re-dispatch (LEER) procedure will facilitate emergency re-dispatch among participating control areas surrounding Lake Erie (AEP, AP, FE, MECS, NYISO, IMO and PJM) to avoid the shedding of firm load. Lake Erie Security Coordinators and Control Areas will provide emergency aid in the form of re-dispatch, re-configuration of the transmission system, and/or adjustment of phase angle regulating transformers to maintain Firm Load service when possible.

Base Transfers

Base imports to ECAR in this study are approximately 100 MW lower than the 2000 Summer Study with approximately 50 MW less from VACAR. The base transfer levels

B. ECAR Appraisal (cont'd)

from NPCC to ECAR and ECAR to MAAC are unchanged. Refer to Tables A-1 and A-2 for a detailed comparison of transfers in the 2001 vs. 2000 Summer Study.

Operating Procedures

As identified in Appendix C, various ECAR operating procedures are available at the discretion of system operators. The Blairsville - Social Hall 138 kV (AP) operating procedure was invoked to obtain several of the transfer limits reported in this study.

C. NPCC Appraisal

The 2001 Summer MEN Reliability Assessment presents an evaluation of NPCC's ability to support exports to and imports from the MAAC and ECAR Regions. The incremental and total transfer capabilities determined in this assessment are discussed in Section 2, Results.

Base Transfers

NPCC's base transfers include a net export of 682 MW to ECAR (unchanged from 2000 summer) and a net import of 392 MW from MAAC, a decrease of 50 MW as compared to that scheduled in the 2000 summer case. In addition, as in last summer's base case, NPCC imports 200 MW from MAPP, scheduled from Manitoba Hydro to Ontario. The net NPCC export is 90 MW in the 2001 summer case compared to a 40 MW export in the 2000 summer case. Table A-1 in Appendix A compares the individual transfers in the 2000 and 2001 summer base cases.

Transmission System Performance

Transmission capabilities are expected to be adequate to meet this summer's expected conditions. The NPCC to MAAC, NPCC to ECAR and MAAC to NPCC transfer capabilities are significantly higher than in 2000 summer with much of the increase due to the addition of the Michigan-Ontario phase angle regulators. These regulators provide some degree of control over Lake Erie power circulation and divert some power flows away from facilities that would otherwise be limiting.
The existing Ontario operating procedures to relieve potential Buchanan Longwood Input limitations (BLIP) and Ontario-Michigan interface limitations are identified in Appendix C. These operating procedures will still be available at the discretion of system operators as will the NYISO Security Constrained Dispatch procedure.

NPCC Area Appraisals

The NPCC region encompasses the five control areas of Ontario, New York, New England, Quebec and the Maritimes. Individual appraisals are presented for all areas except the Maritime Area, which, due to its location, has a minimal impact on the determination of the MEN interregional transfer capabilities.

Ontario

For this study, an Ontario demand of 23,500 MW was modeled. Generation resources and purchases will be adequate to meet this demand. Summer and winter peak demands have been comparable for the past several years.

C. NPCC Appraisal (cont'd)

The tower contingencies that limit transfers during normal operation are outside the MEN study scope. Ontario can deliver about 2000 MW to New York over the

Niagara ties in the summer. Ontario can receive about 1000 MW from New York at Niagara before circuits associated with the Queenston Flow West (QFW) interface will become limiting. Another 400 MW can be transferred between Ontario and New York at the eastern end of Lake Ontario over the phase angle regulator controlled St. Lawrence-Moses 230 kV circuits L33P and L34P.

The in service date for the phase angle regulator in the Lambton-St. Clair 230 kV circuit L4D has been delayed to August 2001. The flow on the Michigan-Ontario (M-O) interface will be controlled to reduce parallel flows during normal operation, but they will allow parallel flows during emergencies. With four Lambton units in service, Ontario will be able to deliver about 2400 MW to Michigan and receive about 1000 MW from Michigan. More power can be imported from Michigan when Lambton generation is reduced.

The Scott to Buchanan circuits appear as the limiting elements for NPCC imports for the following reasons:

- Lambton generation is higher than modeled in previous studies,
- the M-O phase angle regulators are assisting transfers pre-contingency, and
- the M-O phase angle regulators are not blocking generation shifts post-contingency.

New York

The forecast peak for the New York Control Area (NYCA) is 30,620 MW. This forecast is 1.0% higher than the all time peak of 30,311MW that occurred on July 6, 1999. For peak load normalization, the NYISO uses a temperature/humidity index value of 82.6. At current load levels, each degree increase in the THI will result in approximately 500 MW additional load.

The NYISO conducts an annual and monthly supplementary ICAP auctions. Based on the forecast load, the installed capacity requirement is 36,132 MW based on the 18% planning reserve margin requirement. When allowances are taken for unplanned outages (based on historical performance of 13.5% unavailable capacity), the net available resources will be 31,254 MW, which will not be sufficient to meet the NYCA load and operating reserve requirement during the peak load hours. A negative reserve margin of approximately 1,166 MW is expected at peak conditions.

C. NPCC Appraisal (cont'd)

The New York Power Authority plans eleven new units totaling 484 MW of natural gas fired combustion turbines in the New York City metropolitan area. These units were announced at the end of the summer 2000 and are on a very compressed development schedule. Of the generation changes expected in the New York City load zone, Astoria #2 (175 MW) has been completed, 204 MW are "likely" and 362 MW are considered "possible" by June 1, 2001.

Phase I of the Marcy Flexible AC Transmission System (FACTS) Demonstration Project is scheduled for commercial operation in April 2001. This phase of the project is a 200 MVAR shunt static compensator (STATCOM) that can dynamically regulate the transmission system voltage during a system disturbance. In conjunction with the STATCOM**,** a new 135 MVAR switched shunt capacitor bank has been placed in service at the Oakdale 345 kV station. These additions increase the Central East and Total East transfer capabilities (as limited by voltage) by approximately 60 MW and 120 MW, respectively.

A new 345/138 kV transformer near Middletown, NY, in the Orange and Rockland service area will be connected to one of the Coopers Corners – Rock Tavern 345 kV circuits. While this facility will not impact the overall bulk power system transfer capability, it will enhance the reliability in the lower Hudson Valley region of New York.

New England

The New England 2001 summer forecast peak demand (Net Internal Demand) is 23,650 MW. This projected peak demand is 1,731 MW (7.9%) higher than last year's actual summer peak of 21,919 MW, which occurred on June 27, and it is 1,106 MW

higher (4.9%) than the all time peak of 22,544 MW, which occurred on July 6th, 1999. The summer 2001 peak forecast is 400 MW (1.7%) greater than the summer 2000 peak forecast of 23,250 MW. It should be noted that the summer of 2000 was, overall, a cooler summer than normal. However, during May, New England, as well as many other Control Areas in the Northeast, experienced record breaking temperatures that resulted in extremely high loads for spring. The high loads coupled with the large number of generators out-of-service as part of spring maintenance, required the implementation of emergency operating procedures to mitigate the negative capacity margin within New England at that time.

It is anticipated that ISO New England will have sufficient capacity to meet the projected peak for the summer 2001 and the shoulder months. Net Operable Capacity resources are 25,955 MW (August) and include 1,682 MW from new generation. In 2000, three of the new generators that were expected to be on-line for that summer period were delayed into late fall. Since the in-service date of these new units will

C. NPCC Appraisal (cont'd)

impact the summer capacity situation, ISO New England closely monitors the construction and commissioning progress of these new generators. The forecast of average monthly summer external capacity/energy purchases is approximately 1,116 MW, which includes 667 MW from Hydro-Québec, 324 MW from New Brunswick, and 125 MW from New York.

ISO New England projects that there may be instances during summer 2001 when New England will have insufficient operable capacity within the control area to meet the region's anticipated peak demands and operating reserve requirements. Consequently, ISO New England expects to invoke operating procedures to mitigate any short-term capacity deficiency.

ISO New England has in place Operating Procedure No. 4 (OP-4) that includes purchasing emergency energy from the interconnected grid, interrupting interruptible load customers, and implementing voltage reductions in the event of a capacity shortage. This procedure provides load relief measures varying between 2,614 MW to 3,614 MW, depending on system conditions at the time, and used by system operators as part of "normal" operations to mitigate capacity shortages.

In addition to OP-4 the ISO has implemented a Load Response Program for New England that is target to commence June 1, 2001 and will continue indefinitely. The objective of this interruptible load program is to contract an additional 300 to 500 MW of price-responsive load that will curtail demand when OP-4 is implemented.

There are no critical transmission circuits scheduled to be out-of-service during the summer 2001 period. Also, the Phase Angle Regulating (PAR) transformer on the Plattsburgh-Sandbar 115 kV PV-20 tie between New York and New England which was out of service last summer has been returned to service in early February 2001

allowing "normal" transfer capabilities between New York to New England. Furthermore, additional transmission resources are expected to become available for the summer of 2001. These additions include:

- Two new 345kV substations; ANP Bellingham (Rhode Island) and Lake Road (Connecticut), as part of the interconnection of two new generators:
- Shunt Static Compensator (STATCOM) devices to be installed at the Burlington, VT substation that will increase transfer capabilities within Vermont approximately 100 MVAR; and
- Two new breakers in the Long Mountain substation which will increase the New York – New England transfer capability approximately 100 MW and within southwest Connecticut by approximately 200 MW.

C. NPCC Appraisal (cont'd)

Quebec

The forecast Hydro-Québec internal summer peak demand is 19800 MW. The actual internal load for the summer 2000 period was 20598 MW, which occurred in September of that year.

The net operable Hydro-Québec capacity is forecast to be 28500 MW. Firm capacity sales are projected to be 900 MW which results in a net Capacity Margin of 9800 MW. For the purpose of this study, other non-capacity exports to neighboring utilities have been simulated. The total exports simulated are 4067 MW. Total load is therefore expected to be in the order of 23900 MW. All reserves (spinning, standby, etc.) are expected to be well within limits.

No significant additions of generation or transmission capacity to the Hydro-Québec system are projected for summer 2001. The Sainte-Marguerite-3 G.S. (800 MW Hydro) is scheduled to be online for the 2001-2002 winter peak period and commissioning will begin this summer. It is not considered in this study.

The following facilities are expected to be out of service during summer 2001:

- a synchronous condenser at Manicouagan.
- a synchronous condenser at Duvernay.
- a static var system at Laurentides.
- a static var system at Albanel.

Normal maintenance of system equipment such as generators, lines, breakers, reactors and capacitor banks, is scheduled for the summer. Maintenance of major equipment having an effect on capacity margins and transmission margins is scheduled so as not to compromise these margins, with regards to internal demand and firm capacity sales.

All existing interconnections with neighboring systems are expected to be in service and at full summer capacity for the 2001 summer period.

C. NPCC Appraisal (cont'd)

Transfer Capabilities Without Michigan-Ontario Interface Phase Angle Regulators (PARs) Controlling Flows

The affects on interregional transfer capabilities for conditions when the Michigan-Ontario phase angle regulators are not controlling power flows are discussed below.

In March, 2001 the final PAR to be installed in the Michigan-Ontario (M-O) interface failed a factory test. In April, 2001 the in-service circuit L51D phase shifter was automatically removed from service for an internal fault. These failures make it unlikely that the M-O PARs will be able to provide significant inter-regional emergency assistance before the end of the 2001 summer period. The following discussion describes the sensitivity of the inter-regional transfer capability to an unregulated Michigan-Ontario interface.

The table below shows M-O PAR angles and targets for the four 4000 MW transfer cases reported in Table 2. In all four transfers, the PARs are pulling flow towards Ontario (i.e., all of the net angles are positive).

	ECAR to NPCC	MAAC to NPCC	NPCC to ECAR	NPCC to MAAC
M-O Target	1000 to Ont	1000 to Ont	2000 to Mich	2000 to Mich
B3N +o (max 47)	14.4°	47.0°	39.4°	7.1°
L4D +m (max 47)	-3.5°	-38.8°	-35.8°	-1.9°
L51D +m (max 47)	-2.9°	-38.2°	-36.6°	-2.8°
J5D +o (max 40)	-10.6°	23.6°	26.9°	-6.9°
net +o (max 181)	10.3°	147°	139°	4.9°

+o positive shift angle tends to make flow towards Ontario
+m positive shift angle tends to make flow towards Michigan

The small net angle for ECAR to NPCC and NPCC to MAAC transfers indicates these transfer capabilities would not materially change for an unregulated MO interface.

Repeating the linear analysis with the M-O PARs not controlling flow for the MAAC to NPCC transfer shows the continuous rating of the North Meshoppen transformer

C. NPCC Appraisal (cont'd)

limits FCITC to 4000 MW. The corresponding FCITC indicated in Table 2 with the PARs providing emergency assistance is 4050 MW. It is logical that a facility near the NPCC-MAAC border becomes more limiting because the M-O PARs are no longer pulling flow into Ontario. For this analysis the flow on the Keith-Waterman 230 kV circuit J5D is 250 MW into Ontario to follow past practice.

Repeating the linear analysis for the NPCC to ECAR transfer shows the Scott-Bunce Creek 230 kV circuit B3N limits the FCITC to 3650 MW for the loss of the Lambton-St. Clair 345 kV circuit L4D and a Lambton unit rejection. The corresponding FCITC indicated in Table 2 with the PARs providing emergency assistance is 3550 MW. It is expected that a facility nearer the NPCC-ECAR border would become limiting because the M-O PARs are no longer pulling flow into Ontario. For this analysis the flow on J5D is 350 MW into Michigan to follow past practice.

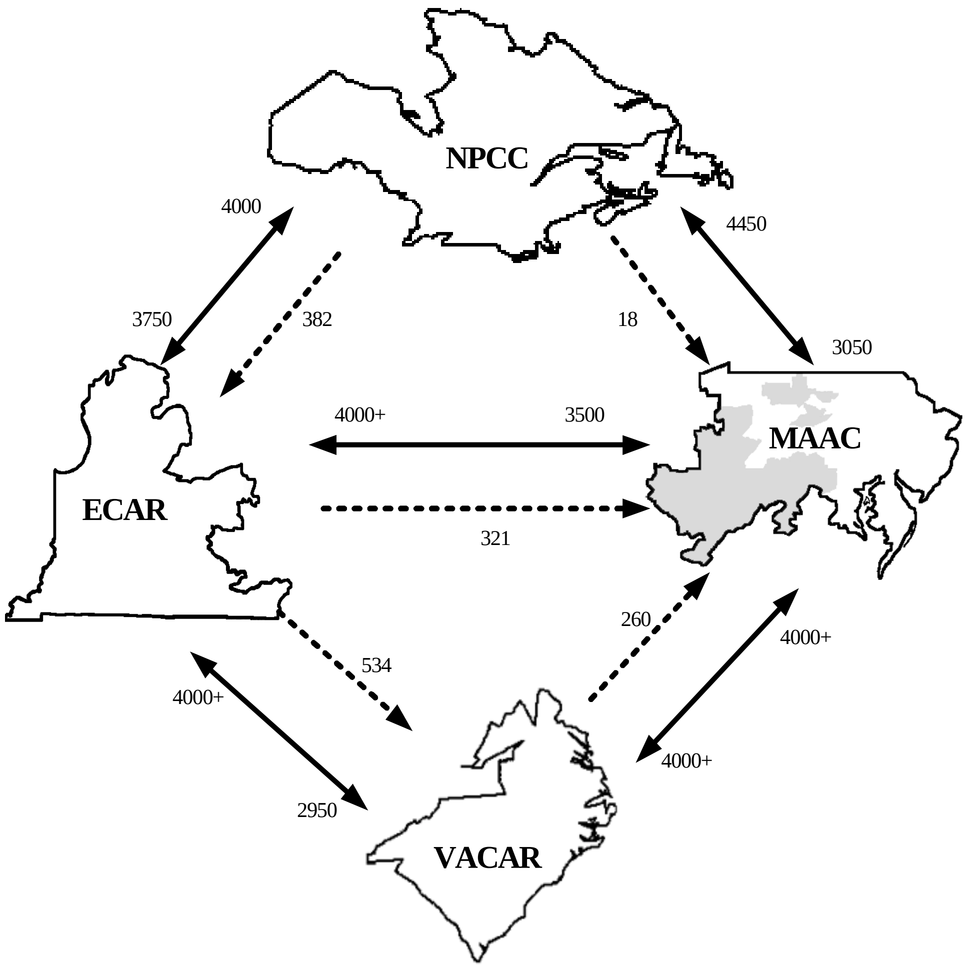
In summary, the delayed implementation of phase shifter control on the Michigan-Ontario interface will not materially change the size of the inter-regional transfer capabilities reported in Table 2. The delay will change the location of the most limiting element for MAAC to NPCC and NPCC to ECAR transfers.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-16

MAAC-ECAR-NPCC
Study Committee

2002 Summer
MEN Interregional Transmission System
Reliability Assessment

May 2002



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Report on the MAAC-ECAR-NPCC
2002 Summer Interregional Transmission System Reliability Assessment

1. Introduction

The MAAC - ECAR - NPCC (MEN) Working Group, under the direction of the MEN Study Committee, has conducted an appraisal of the interregional transmission system performance among the MEN regions for the conditions expected in the 2002 Summer period. The purpose of this study is to provide:

- An analysis of First Contingency Incremental Transfer Capabilities (FCITC) for selected transfers that may occur simultaneously among, or through, the MEN regions.
- First Contingency Incremental Transfer Capabilities (FCITC) and First Contingency Total Transfer Capabilities (FCTTC), as defined in Appendix D, for non-simultaneous emergency transfers between ECAR and NPCC and between MAAC and NPCC. Once determined, no attempts have been made to optimize transfers between regions by changing dispatches and/or phase angle regulator settings.
- A sensitivity analysis of study results.
- An appraisal for MAAC, ECAR, and NPCC regions.

The FCITCs and FCTTCs reported in this assessment reflect evolving market alliances and system operations that do not mirror NERC reliability regions. In early March a portion of the Rockland Electric Company load located in New Jersey was integrated into the MAAC region. Allegheny Power (AP) was successfully integrated in the PJM energy market on April 1, 2002. Other operational changes are discussed in the individual regional assessments.

The reported FCITC and FCTTC values are based on predictions of many factors that could change in daily operation of the power system. Among these variable factors are:

- Load forecasts and generation availability
- Geographic distribution of load and generation
- Transmission system configuration
- Simultaneous inter-system power transfers
- Operation based on regional requirements to respect additional contingencies
- Control settings of Phase Angle Regulators (PARs)

Distribution factors for several NERC Flowgates in the MEN Regions that have a significant response to regional transfers are included in this report to aid system operators in the daily operation of the interconnected network.

An appraisal of the interregional system performance among the VACAR-ECAR-MAAC (VEM) regions is presented in the companion VEM Study Committee Report: 2002 VEM Summer Interregional Transmission System Reliability Assessment dated May 2002.

1. Introduction (cont'd)

Available Transfer Capability vs. MEN Seasonal Study Incremental Transfer Capability (ITC)

FERC Order 889 mandated that each US transmission provider calculate Available Transfer Capability (ATC) and post such values to an Open Access Same Time Information System (OASIS). FERC deferred the development of ATC methodology to NERC, which has developed a series of technical references, including *Available Transfer Capability Definitions and Determination*, which describes the methodology of calculating ATC/TTC and the application of Transmission Reliability Margin (TRM) and the Capacity Benefit Margin (CBM). The underlying concepts for both the ATC methodology and the methodology used to perform MEN seasonal studies are found in the *Transmission Transfer Capability* document published by NERC in 1995. These concepts include the First Contingency Incremental Transfer Capability (FCITC) and First Contingency Total Transfer Capability (FCTTC).

Thus, the methodology of ATC as calculated by transmission providers and the regional transfer capabilities developed by MEN are similar. Both calculate incremental and total transfer capabilities on a contingency basis, with the magnitude of transfer capability based on increasing transfer levels until transmission limits are incurred.

The primary differences between ATC calculations and the MEN study are:

- **Scope**: ATC is calculated by transmission providers, which generally corresponds to the control area level; MEN studies are calculated at the NERC regional level.
- **Coordination:** ATC is calculated by transmission providers using system representations and procedures they deem appropriate. Transfer capacity is calculated by MEN using the most up-to-date NERC system representation and procedures established by all three regions.
- **Margins**: ATC determination uses margins (TRM/CBM) to provide for variation in system operating conditions; MEN reports FCITCs without applying margins.
- **Tie Capacity**: ATC between adjacent control areas is limited by scheduling limits based on the tie capacity between control areas; MEN reports inter-regional network transfer capabilities regardless of scheduling limits between individual control areas.
- **Timeframe**: ATC is calculated hourly, daily, weekly, and monthly; MEN studies are conducted semi-annually based on a snapshot of anticipated conditions.
- **Publishing**: ATC is posted to an OASIS for use by the commercial markets; MEN study results are published for use as an interregional reliability assessment.

2. Results

A. Executive Summary

The following conclusions and observations can be made based on the results of the 2002 Summer Assessment:

1. Assuming all transmission facilities are in service, power flows on the MAAC, ECAR, and NPCC bulk power transmission systems are within acceptable limits for the base case power transfers (Table A-1). Also, assuming all operating procedures are appropriately employed, no single contingency on the bulk power transmission system will overload the remaining facilities, which are significantly affected by the transfers reported in this study. After a single contingency, voltage levels can be maintained within acceptable limits.

2. Compared to the 2001 Summer Operating Study, changes in base conditions have occurred and the net effect of these changes impact to varying degrees the loading on critical interfaces and facilities. Section 2.C, as well as Tables 1, A-1 and A-5, provide some year-to-year comparisons. Major changes in Base Case modeling from the 2001 Summer Transmission Assessment to the 2002 Summer Base Case include:

   Additions:
   - Michigan-Ontario Interface PAR status
     - Due to manufacturing problems, the phase shifter for the Lambton – St. Clair L4D circuit will not be in service until after the 2002 summer study period.
     - Ontario and Michigan have not yet been able to reach an agreement regarding the deployment of the new phase shifters installed in the Lambton-St. Clair L51D and Scott – Bunce Creek B3N Circuits.
     - For these reasons, only the phase shifter in Keith – Waterman J5D is used to assist interregional transfers as per past practice.
   - Approximately 9350 MW of new generation within ECAR
   - Approximately 4100 MW of new generation within MAAC
   - Approximately 4700 MW of new generation within NPCC

   Net Interchanges:
   - ECAR to MAAC is 300 MW lower
   - NPCC to ECAR is 300 MW lower
   - MAAC to NPCC is 410 MW lower
   - ECAR to VACAR is 560 MW lower

   Transfer Simulations
   - The integration of PJM West into the PJM energy market operation for import and export simulations

3. Figures 1A, 1B and 1C are plots of the FCTTC limits between MAAC, ECAR and NPCC during simultaneous transfers. Table 1 presents the first reported FCITCs, and the corresponding FCTTCs between MAAC and NPCC and between ECAR and NPCC, as well as direct comparisons between the FCTTCs obtained in this study to those determined in previous summer assessments. Table 2 details the 2002 Summer FCITCs between MAAC and NPCC and between ECAR and NPCC. All transfer limits presented in this report have AP and DLCO generation incorporated into the PJM energy market and has been rounded down to the nearest 50 MW. The following facilities may be thermal limits for regional transfers:

Homer City 345/230 kV	Oxbow – Lackawanna 230 kV
East Towanda – Hillside 230 kV	Scott - Buchanan 220 kV N22W
Homer City-Shelocta 230 kV	Beck – Middleport 230 kV Q30M
Keystone 500/230 kV	Scott – Bunce Creek 230 kV B3N
Erie West 345/115 kV	Erie South-Erie East 230kV

4. Based on the analysis documented in this study, transfer limits changed as follows:

Transfer Path	FCTTC Change from 2001 Summer
NPCC to MAAC	unchanged
NPCC to ECAR	50 MW lower
MAAC to NPCC	50 MW higher
ECAR to NPCC	300 MW higher

The FCTTC's reported in this study are approximately the same as 2001 summer. Specifics affecting transfer limits that may be encountered this summer are contained in the individual regional appraisals.

5. As evolution of the interconnected network continues Allegheny Power was integrated into PJM's energy market operations on April 1st, 2002. The AP/PJM/VP Reliability Coordination Plan (RCP) will no longer be used to determine voltage limits along the ECAR, MAAC and VACAR interface. A more detailed discussion of reactive limits is contained in the companion VEM Study Committee Report: 2002 VEM Summer Interregional Transmission System Reliability Assessment dated May 2002.

6. Close coordination will be necessary to maintain adequate transmission reliability among MEN systems.

Dynamic Security

As part of its ongoing responsibility, the MEN Study Committee has reviewed the results of dynamic security assessments that have been recently conducted. These assessments include the MEN 1998 Summer Peak Load Dynamic Study and the dynamic assessment conducted as part of the Michigan-Ontario PAR analysis by OHSC for NPCC. Based on this review the Study Committee concludes that the MEN interconnected network is expected to be dynamically secure at the steady state transfer limits in year 2002.

B. Simultaneous Transfer Capability

The simultaneous transfer capability plots (Figures 1A, 1B and 1C) graphically portray the anticipated effect on transfer capability when one system is simultaneously transferring power to or from two separate systems. They reveal how the sensitivity of a particular system limit to one transfer differs from the same limit's sensitivity to the other transfer. These results are based on linear analysis, while actual system performance is influenced by a number of nonlinear factors.

The results of this analysis stress the continued need for close coordination and communication among the users of the interconnected systems in order to maximize the utilization of the network without jeopardizing its reliability.

Figure 1A shows the simultaneous transfers between MAAC and its opposing systems NPCC and ECAR. Figure 1B shows the simultaneous transfers between ECAR and its opposing systems MAAC and NPCC. Figure 1C shows the simultaneous transfers between NPCC and its opposing systems MAAC and ECAR.

In the simultaneous transfer plots; the cross-hair symbol represents the base case level of transfers between the study system and each of the two opposing systems. The shaded region represents different combinations of simultaneous transfers between the study system and each of the opposing systems, at which the system can be operated reliably without encountering any pre-contingency or post-contingency overloads. The dark solid lines represent points at which the first limit to transfers would be expected to be encountered as transfers increase from the base case levels. The dashed lines represent points at which a pre-contingency or post-contingency overload would be expected to occur at levels of transfers beyond the first limit.

Simultaneous schedules within the shaded area of the respective Simultaneous Transfer Capability plots will not overload any of the limiting facilities in the study model.

Retrospective on Summer 2001 FCTTC vs. Actual Scheduled Interchange

Figures 2A, 2B and 2C compare MEN 2001 Summer study results to the actual interregional transfer schedules by superimposing the schedules on the Simultaneous Transfer Capability results from the study. These plots validate the limits being identified by the study and verify the selection of the base case operating point. Each data point represents one day, and is the hourly-integrated, aggregate regional scheduled interchange for hour ending 1700 on weekdays from 6/1/01 to 8/31/01.

Figures 2A, 2B and 2C show a pattern of NPCC to MAAC, ECAR to MAAC and ECAR to NPCC schedules during summer peak conditions.

B. Simultaneous Transfer Capabilities (cont'd)

As the vast majority of data points lie within the shaded boundaries, the thermal and voltage limits identified by the study have valid correspondence with actual scheduling activity, which is coupled to the availability of transmission service. The points outside of the shaded area on Figures 2A (MAAC to ECAR/NPCC) and 2B (ECAR to MAAC/NPCC) and the boundary occur for the region bounded by a reactive constraint: the Hatfield-Black Oak 500 kV for L/O Pruntytown-Mt. Storm 500 kV. This illustrates the volatility of reactive limits to system conditions. The voltage limit depicted on these plots is highly dependent on the availability of units in western MAAC and eastern ECAR, and the particular unit availability on those days provided sufficient reactive support to facilitate these simultaneous transfers.

Retrospective on Summer 2001 Circulation

Figures 3A, 3B and 3C compare scheduled interregional transfers to actual interregional tie flow, superimposed on the Simultaneous Transfer Capability results from the MEN 2001 Summer study. By incorporating actual interregional tie flow, these plots further the goals of Figures 2A, 2B and 2C by providing a means of visually portraying the circulating, or loop, flows that occur among the MEN and neighboring regions, as well as verification of the Interregional Transfer Distribution Factors portrayed in Tables B-1.1 and B-1.2. Each data pair joined by a connecting line represents one day - the "plus-signs" being the hourly-integrated, aggregate regional scheduled interchange, the "zeros" being the hourly-integrated, aggregate regional tie flow - for hour ending 1700 on weekdays from 7/1/01 to 7/31/01.

The actual circulating flows experienced by the MEN systems last July generally consisted of the following elements:

- Counter-clockwise Lake Erie flow throughout the MEN systems
- SERC to MAAC transfers utilizing ECAR systems

The MAAC region generally experienced flows higher than scheduled imports from ECAR and exports to NPCC. Using Figure 3A, this places the actual interregional tie flow ('0') down and to the right of the schedule ('+'). The counter-clockwise Lake Erie circulation adds to the already increased ECAR to MAAC flows, and also increases the MAAC to NPCC flow above schedule. Flow higher than scheduled imports from ECAR to MAAC are composed primarily of SERC to MAAC transfers utilizing the ties between ECAR and MAAC for a sizable portion of their transfers. On the other hand, NPCC to MAAC flows were generally less than scheduled.

ECAR (Figure 3B) experienced higher flows than scheduled imports from NPCC and higher export flows than scheduled to MAAC, the majority of which consisted of Lake Erie circulation utilizing the NPCC to ECAR and then the MAAC to NPCC paths. SERC to MAAC transfers also utilized the ties between ECAR and MAAC for a sizable portion

B. Simultaneous Transfer Capabilities (cont'd)

of their transfers.

The NPCC plot (Figure3C) is purely composed of the Lake Erie circulation: higher flows than scheduled exports from NPCC to ECAR and flow higher than scheduled imports from MAAC to NPCC. The counter clockwise circulation, which ranged from several hundred to 1,200 MW, will be mitigated by the Phase Angle Regulating transformers being added on the Michigan-Ontario interface

C. Discussion of Results

The FCTTCs and FCITCs calculated were determined for peak load conditions as presently forecasted and with mainly firm, capacity backed transfers. It should be noted that the FCTTCs and FCITCs are used only as indicators of the relative strength of the interconnected system. They cannot be used as absolute indices of operating capability of the system because they are determined for the one set of specific conditions represented in this study. Any changes to the system condition, such as variations in generation dispatch or simultaneous transfers that are not modeled in this study, can significantly affect transfer capabilities.

As noted earlier, the FCITCs and FCTTCs represent a possible method to compare and measure the relative strength of the system from one season or appraisal period to the next. Hence, a comparison of the FCTTC values determined for this summer and the corresponding values determined for previous summers are provided in Table 1. The FCITCs and FCTTCs reported in this study are based on simulated system operation with PJM West fully integrated in the PJM energy market. Comparison of the limits reported in this assessment with those reported in previous assessments must be tempered with the realization that the study results reflect different operations due to different market alliances.

Another difference between the 2001 and 2002 study is the representation of the four Ontario-Michigan Interface circuit phase angle regulators (PARs). In anticipation of their installation, these PARs were represented in service for the summer 2001 analysis and were utilized to assist the MEN regional power transfers. However, because of failures of some of the PARs and delays in restoring them to service, only the Keith-Waterman 230 kV J5D interconnection PAR is represented in the 2002 analysis.

Due to the integrated nature of the bulk supply network, power transfers between areas can result in incremental power flows throughout all three MEN regions. In some cases, the resulting power flow through a part of the region not involved in the transfer can be significant.

When considered independently, these transfers may not appear to pose a problem within the maximum permissible transfer value. But for certain combinations of simultaneous power transfers, portions of the interconnected network could experience significant power flow increases when the response to the transfer is in the same direction.

Conversely, a transaction may also decrease the prevailing flow and allow for increased transfers. The responsiveness of selected elements within the MEN network to multiple transfers can be evaluated by use of the transfer response factors given in Appendix B. Using superposition, these tables enable the calculation of the power flows on facilities and interfaces for combinations of simultaneous transfers. These response characteristics demonstrate the possibility for strong interaction among certain transfers.

C. Discussion of Results (cont.)

Comparison of 2002 Summer Results with 2001 Summer Results

The following discussion of differences between the 2001 Summer and 2002 Summer FCTTCs is based principally on the results presented in Table 1.

The use of the FCTTC values to compare results from one time period to another, as opposed to using the FCITCs, is deemed more appropriate to capture the effect of variation in base case transfers. The FCTTC values used in the comparison are the algebraic sums of the FCITC values and the appropriate total interregional base case transfers.

NPCC Export Limits

NPCC (NYISO) to MAAC

The NPCC to MAAC transfer capability is unchanged from the results of the 2001 summer study.

NPCC (NYISO) to ECAR

The NPCC to ECAR transfer capability is essentially the same (50 MW decrease) as reported in the 2001 Summer MEN Study. The limiting contingency is the same as 2001 Summer (Erie West-Wayne 345 kV).

NPCC Import Limits

MAAC to NPCC (NYISO/IMO)

The MAAC to NPCC transfer capability remained approximately the same as the results of the 2001 summer study. The change in the location of the limiting facility is due to the difference in the PAR representation.

ECAR to NPCC (NYISO/IMO)

The transfer capability from ECAR to NPCC is 300MW higher than was reported in the 2001 summer study. The limiting facility and contingency have shifted to northwestern Pennsylvania, while the 2001 summer study limiting facility and contingency were located in western Ontario. The Ontario-Michigan Interface PAR settings used in the 2001 study contributed to the difference in results.

D. TLR Discussion

The NERC Transmission Loading Relief (TLR) procedure has been implemented as an interconnection-wide procedure to properly identify the causes of adverse parallel flows and to assist in their relief in the event of thermal, voltage or stability limitations.

The use of the TLR procedures by MEN participants has been decreasing. TLR facilities identified as limits to transfers in the past will be less restrictive than the FCITCs reported in Table 1 for this upcoming summer period. Transfer distribution factors for all MEN Region NERC ISN Flowgates that exhibit significant response to MEN Region transfers are included in Table B-1.1. The facilities in this Table include those identified in this and past MEN studies as limits to inter-regional transfers plus many of the facilities involved in TLR actions during actual system operation (e.g. IMO-Michigan path, 500 kV and 345 kV in eastern Ohio-western Pennsylvania). Financial congestion management rather than TLR actions are typically used to alleviate congestion problems in several MEN area market systems (NYISO, PJM and IMO).

This decreasing trend is expected to continue due in part, to the integration of PJM West into PJM's energy market operation and the Phase Angle Regulating transformers on the Michigan-Ontario interface.

Figure 1A
Simultaneous Transfer Capability – MAAC to NPCC/ECAR
(see discussion under "Results, Simultaneous Transfer Capability")

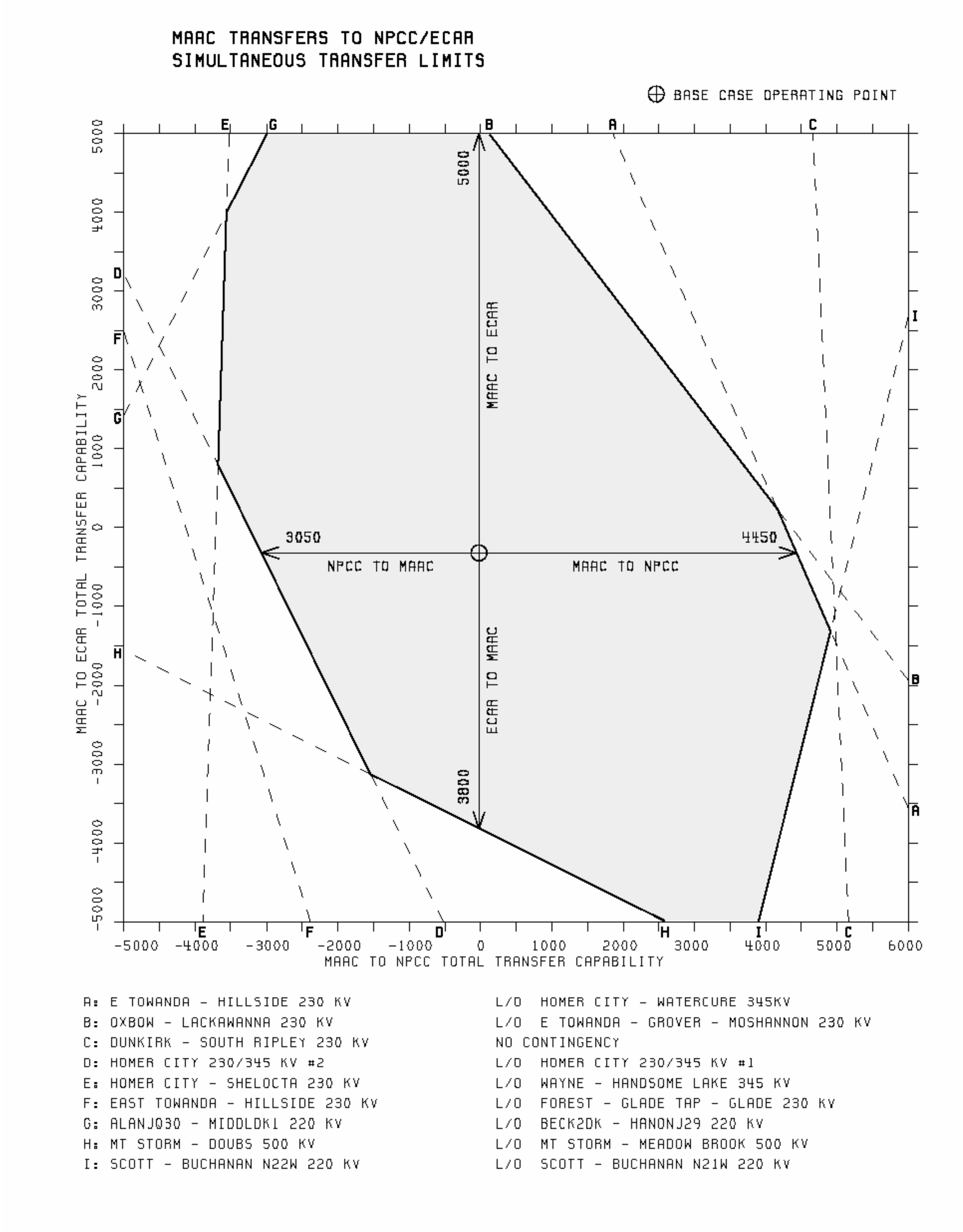


Figure 1B
Simultaneous Transfer Capability – ECAR to MAAC/NPCC
(see discussion under "Results, Simultaneous Transfer Capability")

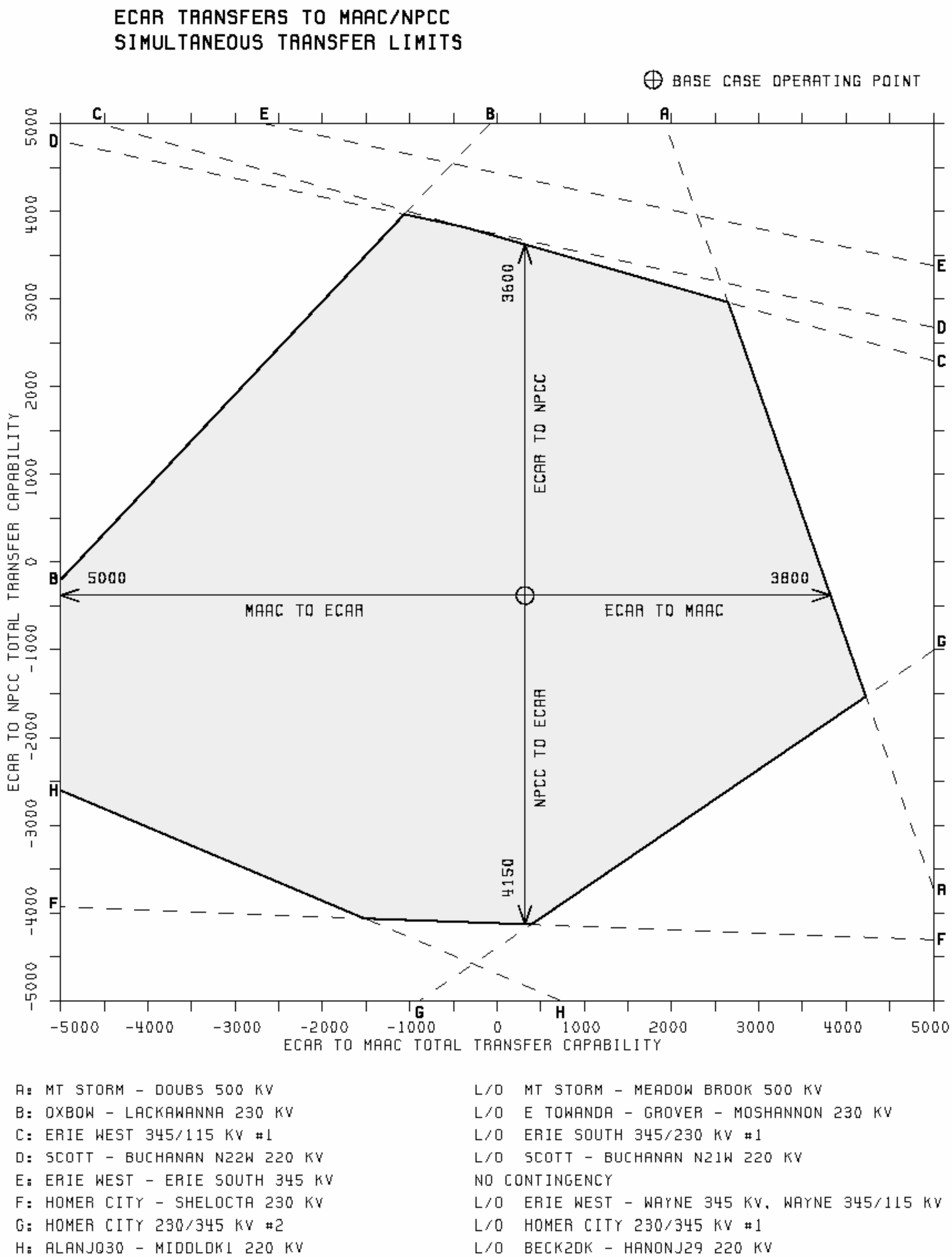


Figure 1C
Simultaneous Transfer Capability – NPCC to MAAC/ECAR
(see discussion under "Results, Simultaneous Transfer Capability")

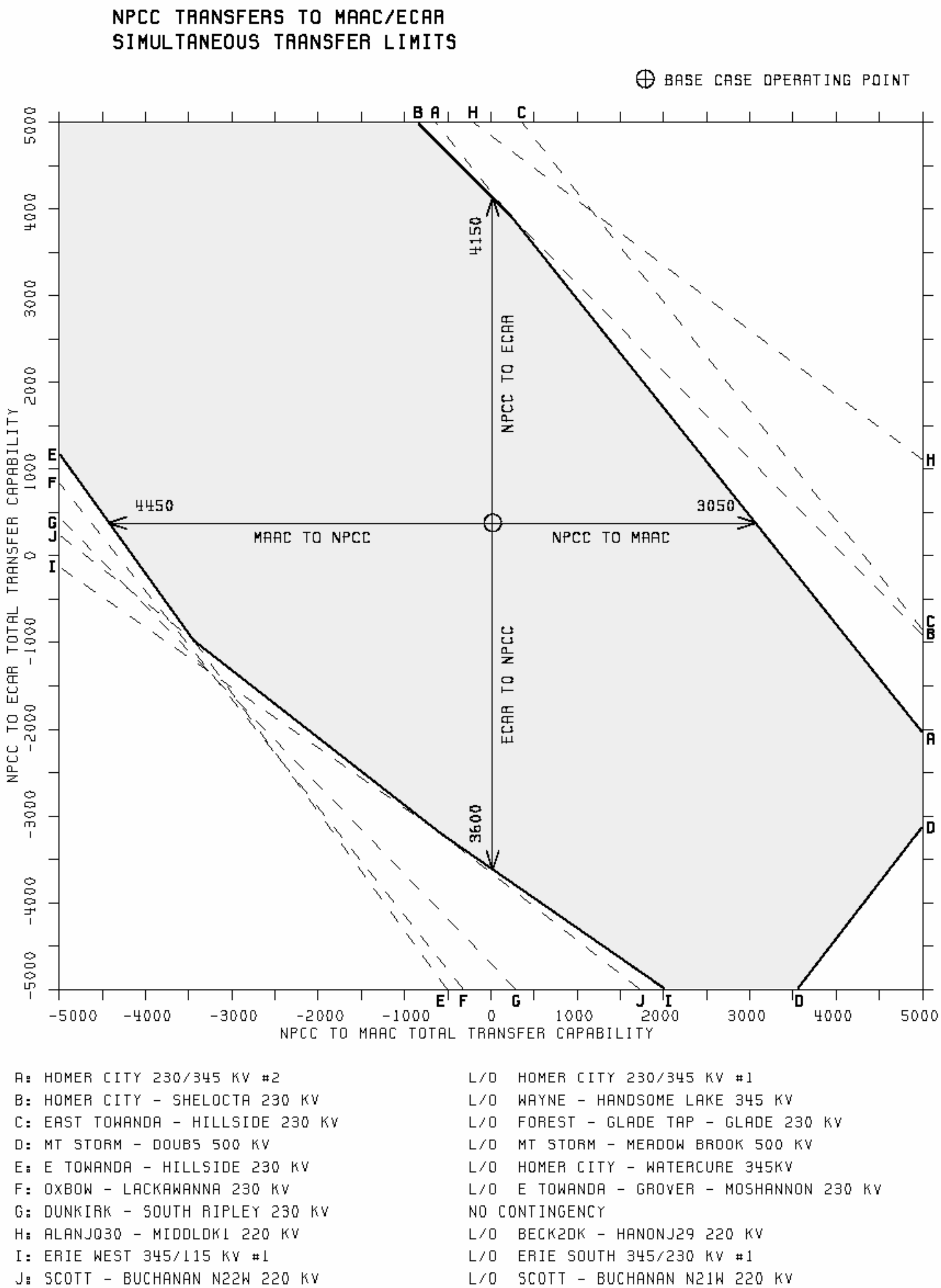


Figure 2A
2001 Summer Study Simultaneous FCTTC
and Scheduled Interchange ('+')
MAAC to NPCC/ECAR

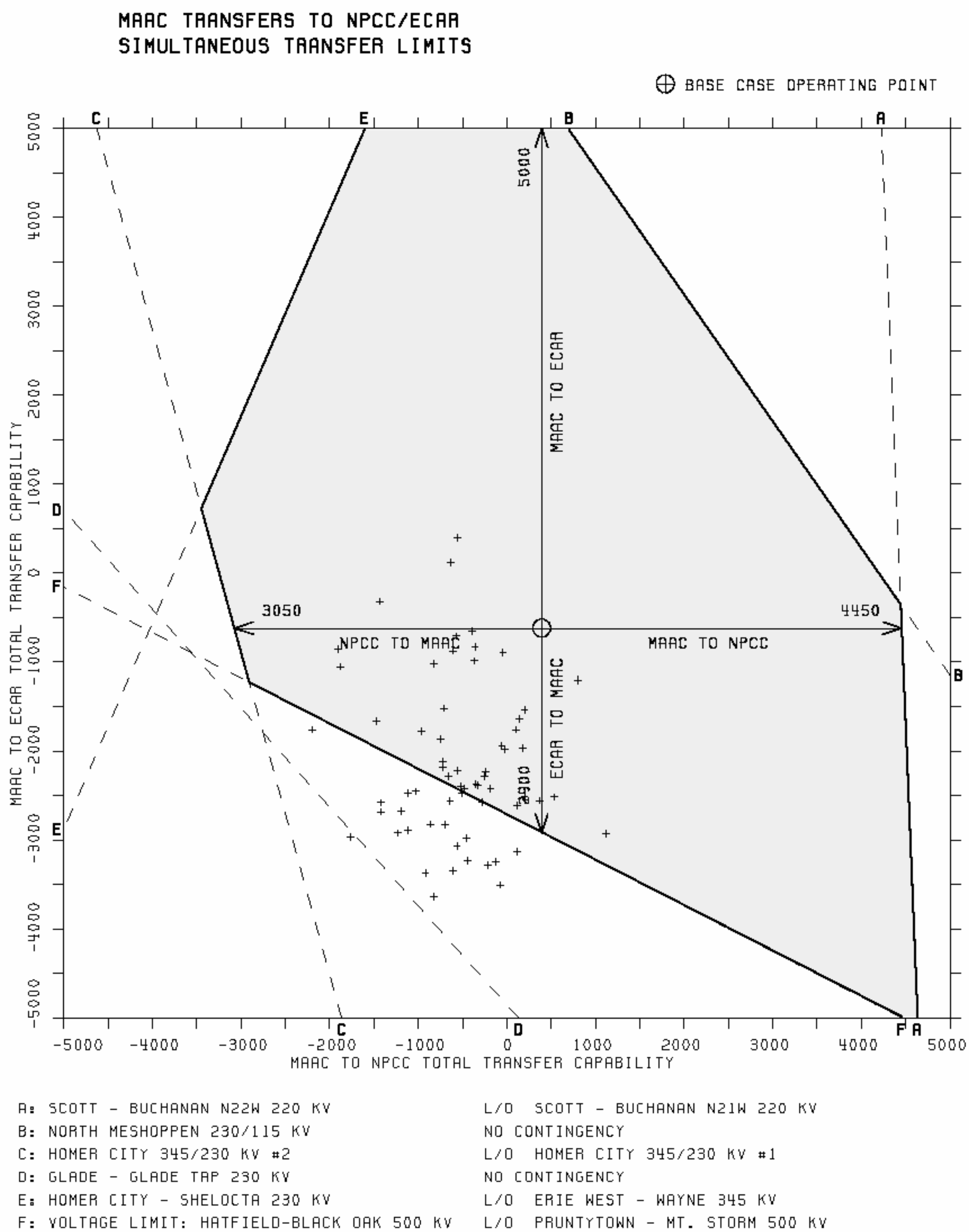


Figure 2B
2001 Summer Study Simultaneous FCTTC
and Scheduled Interchange ('+')
<u>ECAR to MAAC/ NPCC</u>

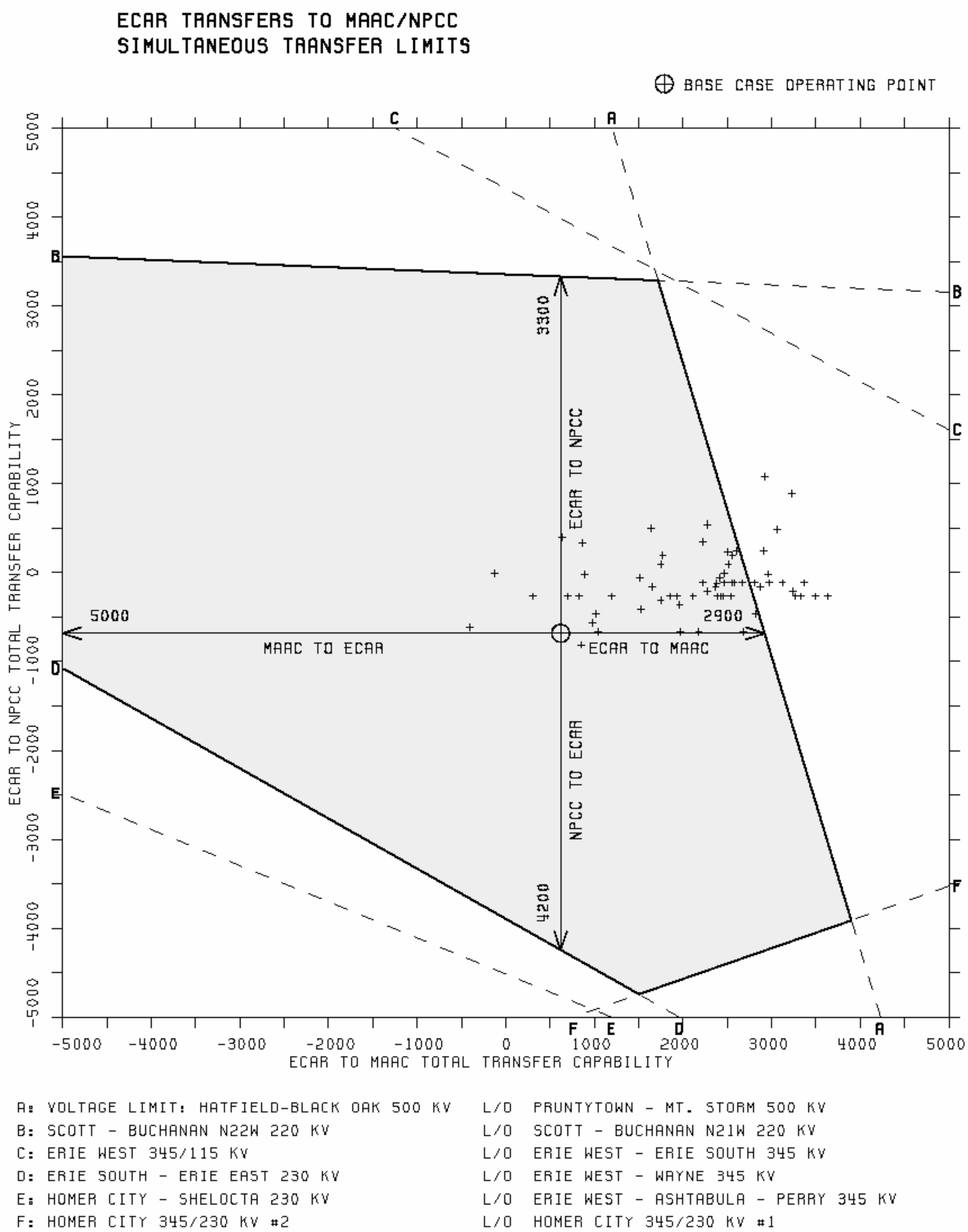
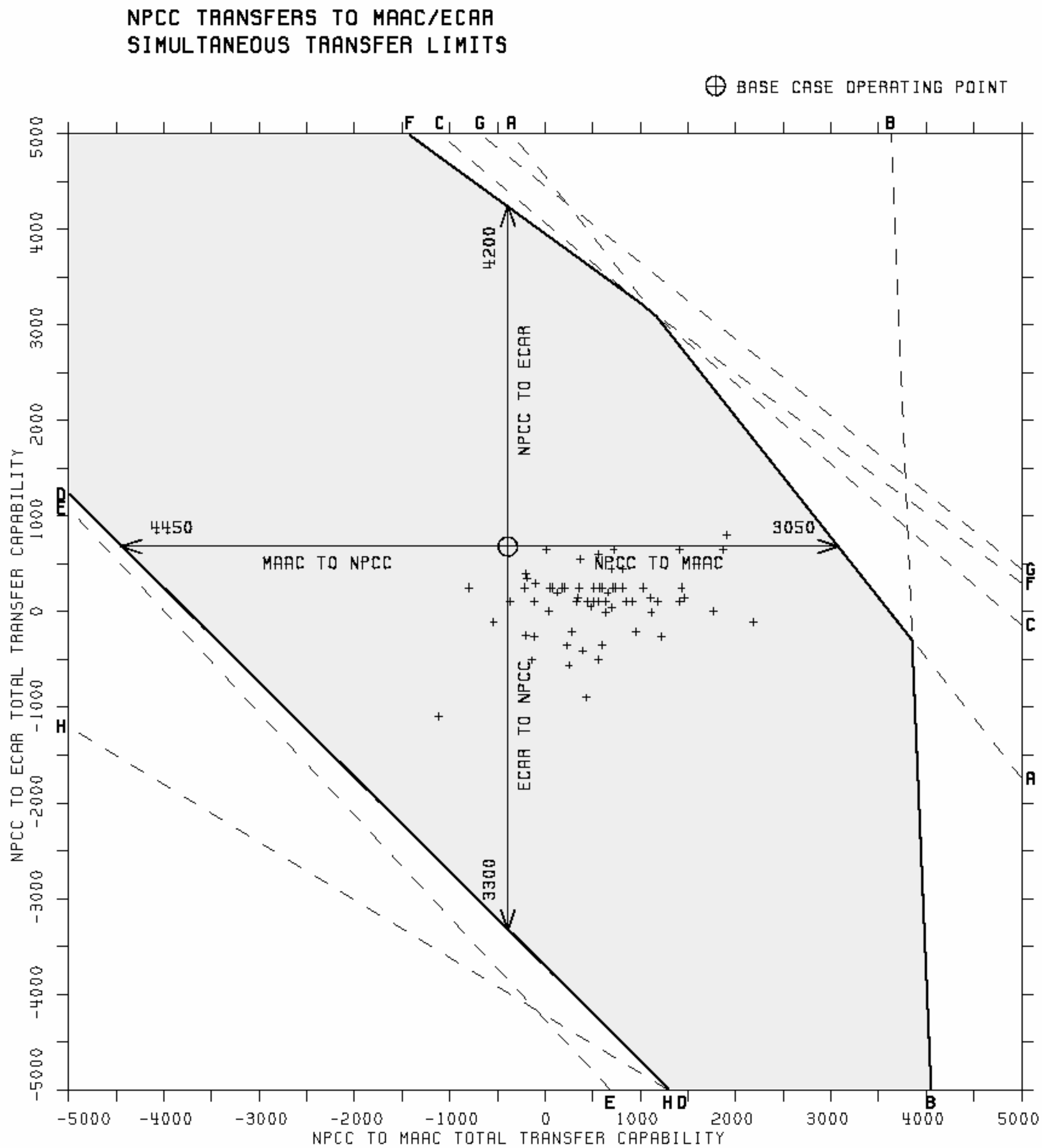
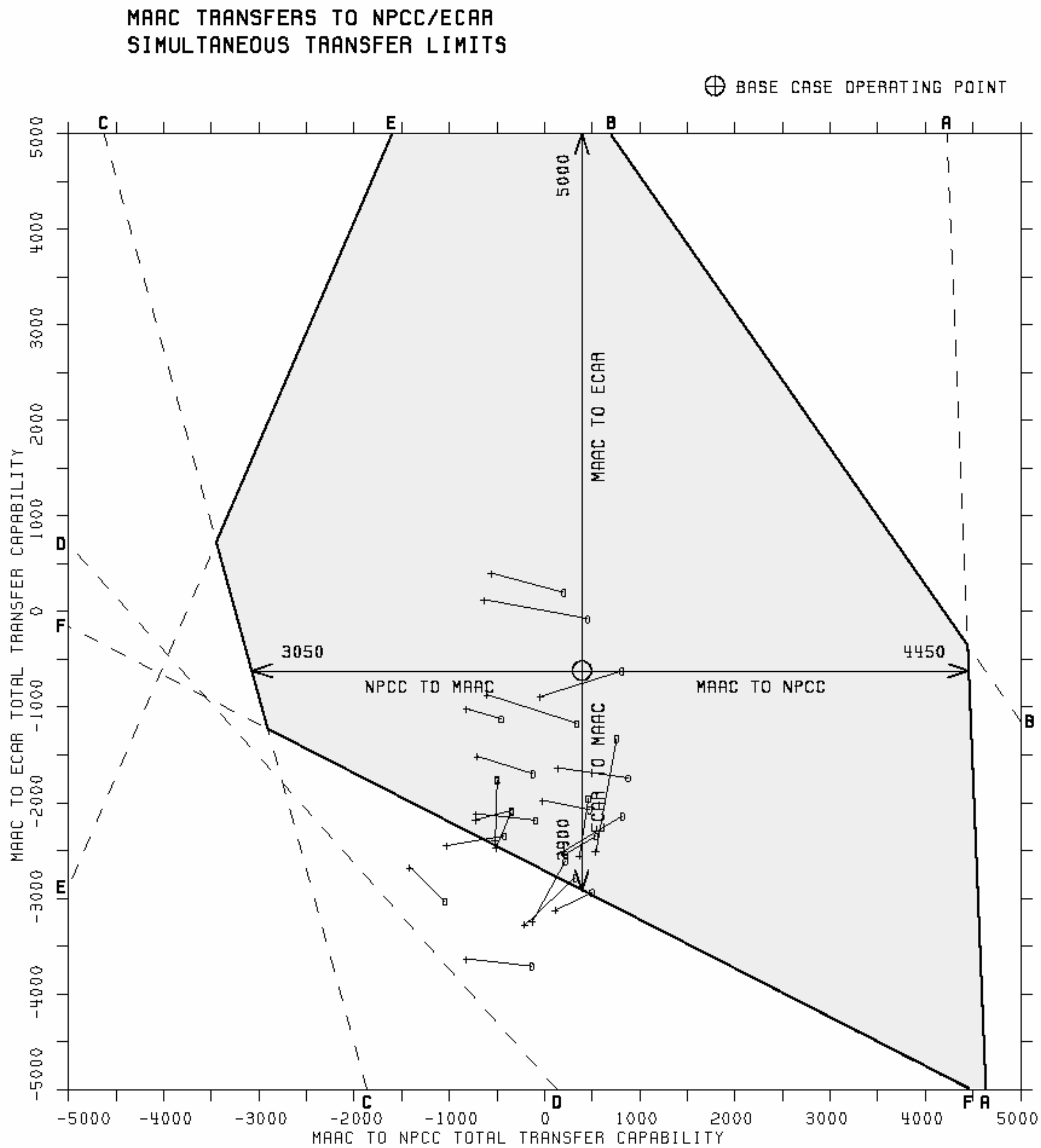


Figure 2C
2001 Summer Study Simultaneous FCTTC
and Scheduled Interchange ('+')
<u>NPCC to MAAC/ECAR</u>



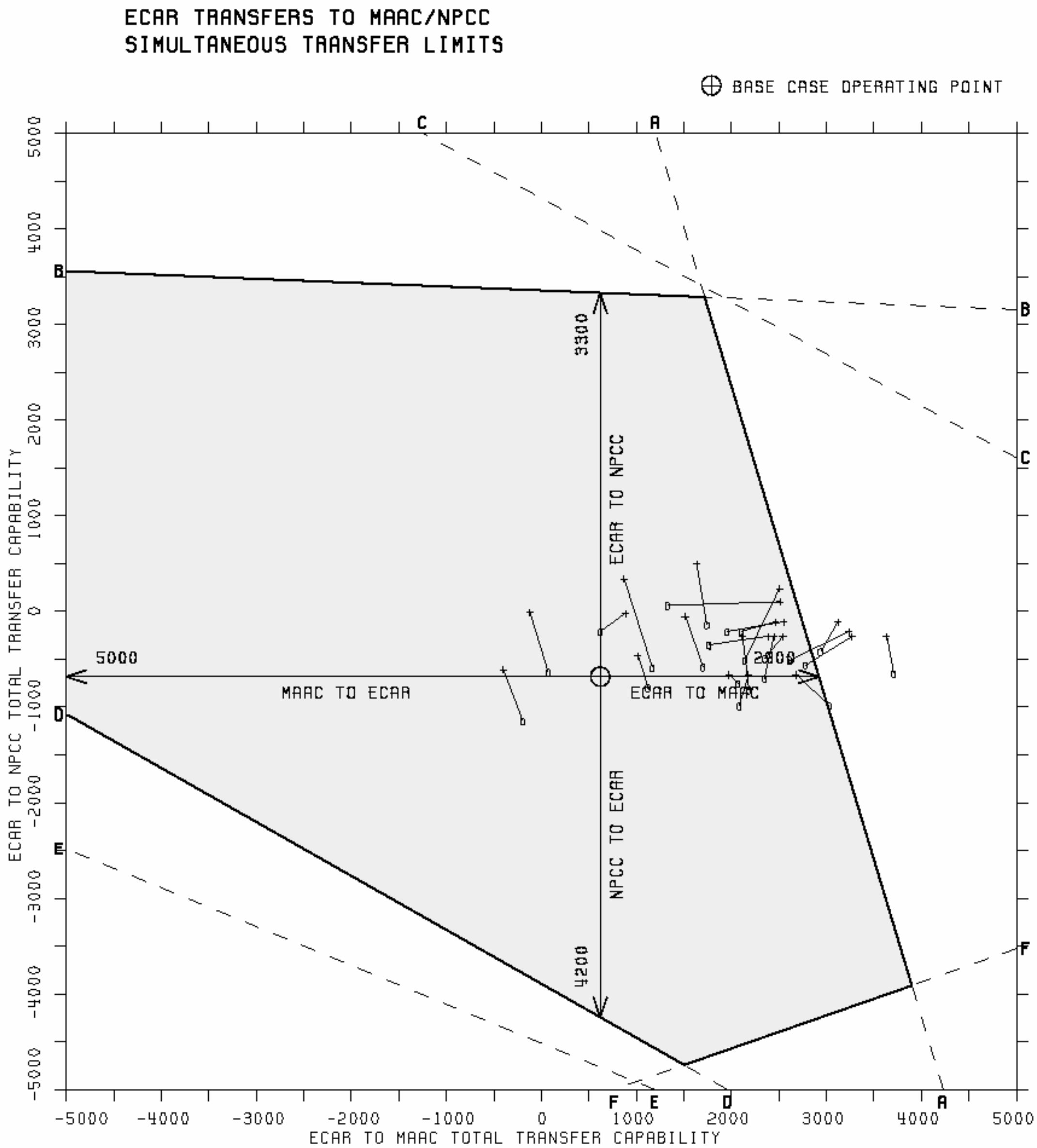
A: HOMER CITY 345/230 KV #2 — L/O HOMER CITY 345/230 KV #1
B: GLADE - GLADE TAP 230 KV — NO CONTINGENCY
C: HOMER CITY - SHELOCTA 230 KV — L/O ERIE WEST - WAYNE 345 KV
D: SCOTT - BUCHANAN N22W 220 KV — L/O SCOTT - BUCHANAN N21W 220 KV
E: NORTH MESHOPPEN 230/115 KV — NO CONTINGENCY
F: ERIE SOUTH - ERIE EAST 230 KV — L/O ERIE WEST - WAYNE 345 KV
G: HOMER CITY - SHELOCTA 230 KV — L/O ERIE WEST - ASHTABULA - PERRY 345 KV
H: ERIE WEST 345/115 KV — L/O ERIE WEST - ERIE SOUTH 345 KV

Figure 3A
2001 Summer Study Simultaneous FCTTC
with Scheduled Interchange ('+') and Actual Tie Flow (‘0’)
MAAC to NPCC/ECAR



A: SCOTT - BUCHANAN N22W 220 KV — L/O SCOTT - BUCHANAN N21W 220 KV
B: NORTH MESHOPPEN 230/115 KV — NO CONTINGENCY
C: HOMER CITY 345/230 KV #2 — L/O HOMER CITY 345/230 KV #1
D: GLADE - GLADE TAP 230 KV — NO CONTINGENCY
E: HOMER CITY - SHELOCTA 230 KV — L/O ERIE WEST - WAYNE 345 KV
F: VOLTAGE LIMIT: HATFIELD-BLACK OAK 500 KV — L/O PRUNTYTOWN - MT. STORM 500 KV

Figure 3B
2001 Summer Study Simultaneous FCTTC
with Scheduled Interchange ('+') and Actual Tie Flow (‘0’)
<u>ECAR to MAAC/NPCC</u>



A: VOLTAGE LIMIT: HATFIELD-BLACK OAK 500 KV L/O PRUNTYTOWN - MT. STORM 500 KV
B: SCOTT - BUCHANAN N22W 220 KV L/O SCOTT - BUCHANAN N21W 220 KV
C: ERIE WEST 345/115 KV L/O ERIE WEST - ERIE SOUTH 345 KV
D: ERIE SOUTH - ERIE EAST 230 KV L/O ERIE WEST - WAYNE 345 KV
E: HOMER CITY - SHELOCTA 230 KV L/O ERIE WEST - ASHTABULA - PERRY 345 KV
F: HOMER CITY 345/230 KV #2 L/O HOMER CITY 345/230 KV #1

Figure 3C
2001 Summer Study Simultaneous FCTTC
with Scheduled Interchange ('+') and Actual Tie Flow ('0')
NPCC to MAAC/ECAR

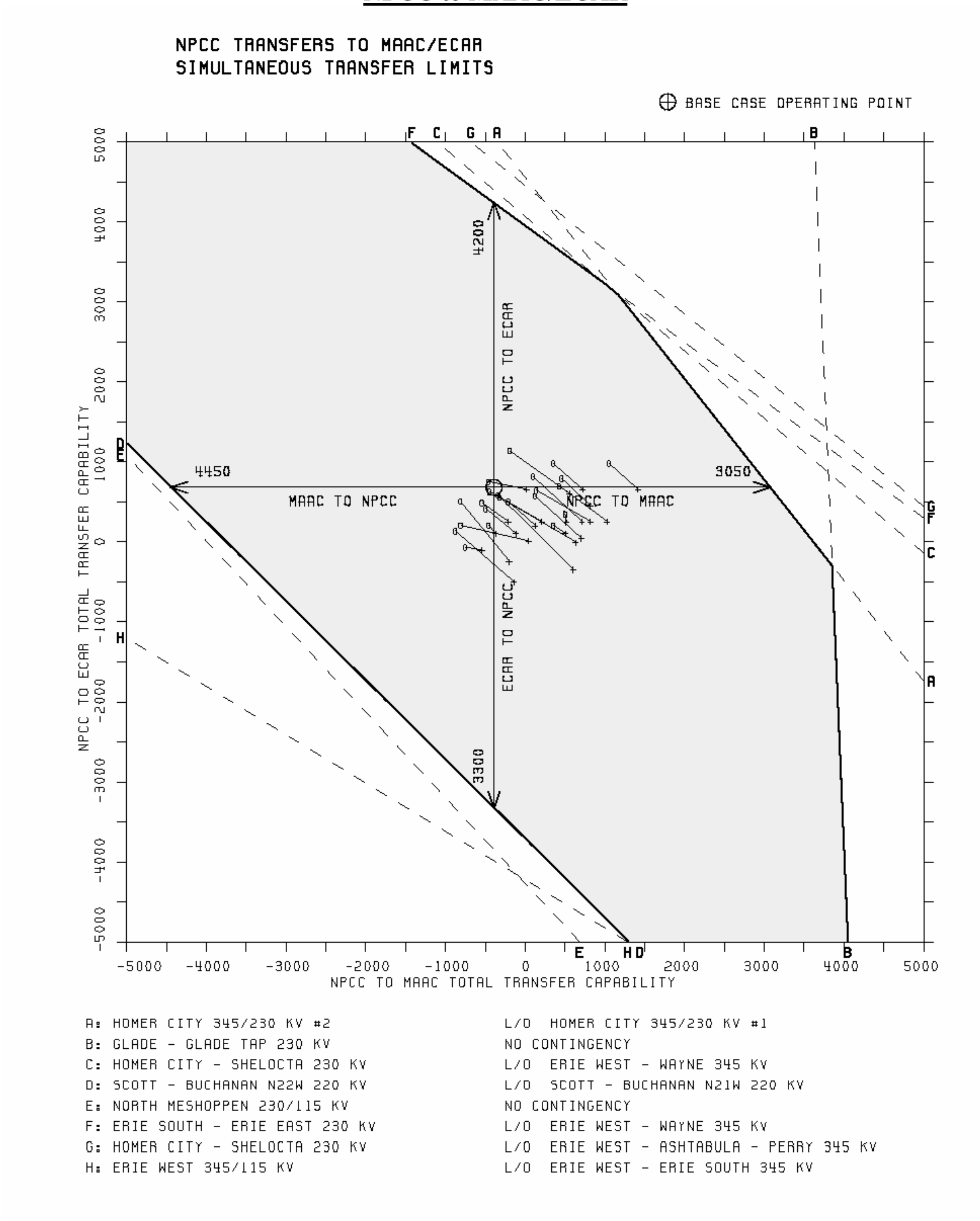
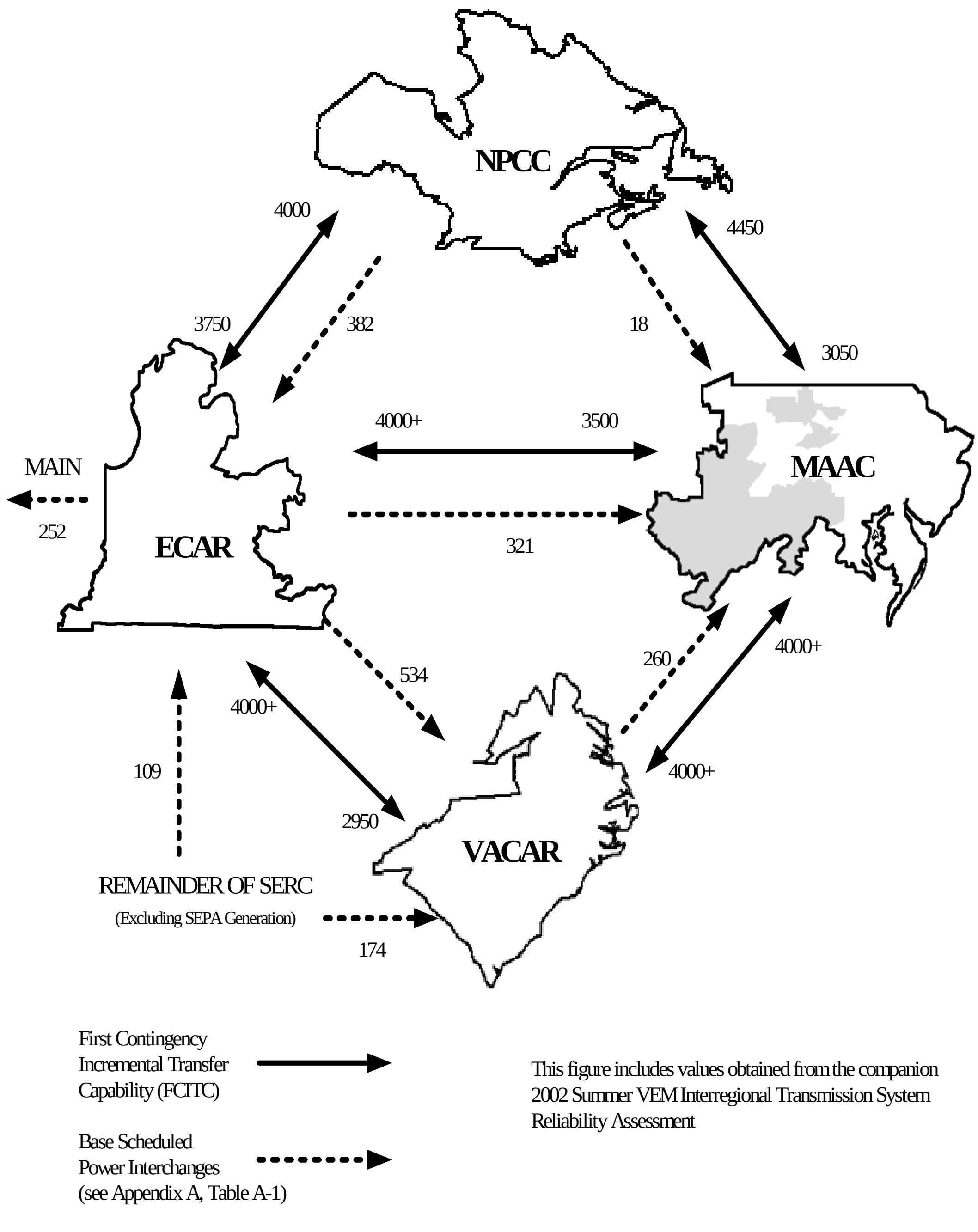


Figure 4
Non-simultaneous Interregional Transfer Capability



This figure includes values obtained from the companion 2002 Summer VEM Interregional Transmission System Reliability Assessment

Table 1
Comparison of Results (FCITC and FCTTC) with Previous Years

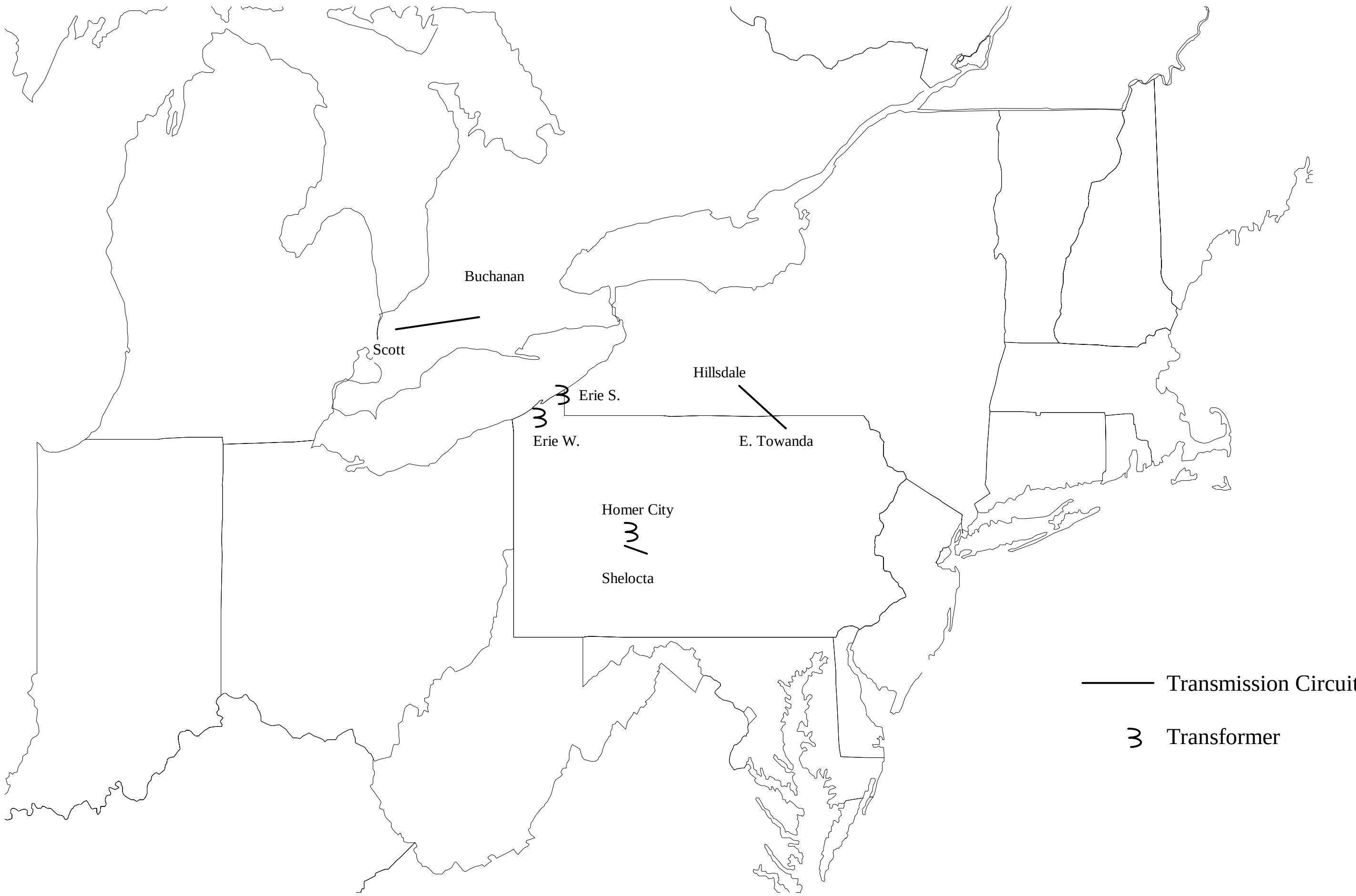
Transfer	FCITC	FCTTC	Limiting Facility	Contingency
NPCC – MAAC				
2002 Summer	3050	3050	Homer City 345/230 kV #2 (FE)	Homer City 345/230 kV #1 (FE)
2001 Summer	3450	3050	Homer City 345/230 kV #2 (FE)	Homer City 345/230 kV #1 (FE)
2000 Summer	2800	2350	Homer City –Shelocta 230 kV (FE)	Base Case-No Contingency
NPCC – ECAR				
2002 Summer	3750	4150	Homer City-Shelocta 230 kV #1 (FE)	Erie W – Wayne 345 kV (FE)
2001 Summer	3550	4200	Erie South-Erie East 230 kV (FE)	Erie West-Wayne 345 kV (FE)
2000 Summer	2650	3300	Dumont 765/345 kV (AEP)	Cook 765/345 kV (AEP)
MAAC – NPCC				
2002 Summer	4450	4450	East Towanda-Hillside 230 kV (FE – NYSEG)	Homer City-Watercure 345 kV (FE – NYSEG)
2001 Summer	4050	4400	Scott-Buchanan N22W 220 kV (IMO)	Scott – Buchanan 220 kV N21W (IMO)
2000 Summer	2850	3300	North Meshoppen 230/115 kV (FE)	Base Case-No Contingency
ECAR – NPCC				
2002 Summer	4000	3600	Erie West 345/115 kV #1 (FE)	Erie South 345/230 kV #1 (FE)
2001 Summer	4000	3300	Scott – Buchanan 220 kV N22W (IMO)	Scott – Buchanan 220 kV N21W (IMO)
2000 Summer	4200	3500	North Meshoppen 230/115 kV (FE)	Homer City - Watercure 345 kV (FE – NYSEG)

Table 2

Transfer Level – 3000 MW & 4000 MW	***FCITC***	**Limiting Facility / Contingency**	**Rating (MVA)**	**TDF %**	**ODF %**	**OTF %**
NPCC (NYISO) – MAAC	3050	[1, 2] Homer City 345/230 kV #2 (FE) / Homer City 345/230 kV #1 (FE)	699	12.9 13.2	81.8	23.7
	3700	[2] Homer City –Shelocta 230 kV #1 (FE) / Wayne-Handsome Lake 345 kV #1 (FE)	854	17.4 1.5	46.0	18.1
NPCC (NYISO) – ECAR	3750	[3] Homer City-Shelocta 230 kV (FE) / Erie West-Wayne 230 kV #1 (FE)	854	13.4 6.7	57.5	16.7
	3800	[3] Homer City 345/230 kV #2 (FE) / Homer City 345/230 kV #1 (FE)	699	8.6 3.1	79.9	11.2
MAAC-NPCC (NYISO-50%/IMO-50%)	4450	[4] East Towanda– Hillside 230 kV (FE – NYSEG) / Homer City – Watercure 345 kV (FE – NYSEG)	531	19.7 12.5	23.4	22.6
	4550	[4] Erie SE 230/115 #3 (FE)/ Erie So- Erie SE 230 kV #1 (FE)	276	1.5 13.0	74.5	11.3
ECAR-NPCC (NYISO-50%/IMO-50%)	4000	[2] Erie West 345/115 kV #1 (FE)/ Erie South 345/230 kV #1 (FE)	285	1.2 10.3	31.4	4.4
	4050	[2] Scott – Buchanan 220 kV N22W (IMO) / Scott – Buchanan 220 kV N21W (IMO)	556	7.5 7.6	42.2	9.7

1) 3000 MW Transfer Level.
2) Warren-Falconer circuit opened.
3) East Sayre-North Waverly circuit opened.
4) Warren-Falconer and East Sayre-North Waverly circuits opened.

Figure 5
Location of Limiting Facilities



3. Background Information

Information regarding the basis for the analysis, the simulated test scenarios and the study procedure are discussed in this section in order to help the reader understand how the limitations were calculated in this assessment and to properly interpret the results presented in this report.

A. Base Case Development

The 2002 Summer Assessment base case was developed from the NERC/MMWG 2002 Summer peak load base case, which modeled firm, capacity backed transfers. This case was updated with the most recent transmission system status information and projected transfers. Appendix A provides information regarding the expected 2002 summer system conditions. Table A-1 lists the transfers modeled in this summer assessment as compared to those modeled in the 2001 Summer assessment. The appendix includes a geographical map of interregional and subregional ties, interregional and subregional tie flows, regional flow diagrams, major EHV generation and transmission additions, and modeled phase angle regulator settings.

B. Study Procedure

To examine the ability of the MEN network to support transfers between the member regions, 3000 MW and 4000 MW test transfer cases were developed for each of the four transfers studied. Each test transfer case was created by imposing the test transfer on the base case and making the necessary system adjustments required to support the transfer. Linear analysis, which utilizes linear transfer response and outage response factors, was used to screen the transmission system modeled in the test transfer base cases. For the first transfer limit stated for each transfer analyzed, the value reported was further verified by conventional AC load flow analysis. Once determined, no attempts were made to optimize transfers between regions by changing dispatches and/or phase angle regulator settings.

Ratings used in the determination of transfer capabilities include the following:

- The thermal facility ratings which are actually used in system operations
- Bus voltage limits
- Aggregate interface or line flows used to monitor stability or voltage performance

Phase Angle Regulator (PAR) control is used on the four 345 kV ties and one 230 kV tie between the Consolidated Edison Company (CON ED) and the Public Service Electric and Gas Company (PSEG) to maintain an alternative transmission path through the northern part of PSEG at Waldwick and into CON ED at Farragut and Goethals. Power flow on the Branchburg (PSEG)-Ramapo (CON ED) 500 kV interconnection is controlled by PARs at Ramapo in accordance with the PJM/NYPP

B. Study Procedure (cont'd)

Unscheduled Transmission Service Agreement between PJM and the New York Power Pool (NYISO). As defined by this agreement, the PARs are adjusted in accordance with appropriate operating agreements and instructions to relieve transmission and/or capacity limitations, which may arise in either PJM or NYISO.

The Ramapo PARs are set to import 1000 MW (from Branchburg) for all NPCC import simulations and to export 1000 MW (to Branchburg) for all NPCC export simulations. In the base case, the Ramapo PAR scheduled flow is 386 MW from Branchburg to Ramapo as compared to 530 MW in the 2001 Summer Assessment. PAR control is also used on the 230 kV tie J5D (Keith to Waterman) between Ontario (NPCC) and Michigan (ECAR) to increase transfer capability between NPCC and ECAR and to alleviate limit violations in these areas. The transfer capabilities have been calculated with favorable J5D PAR settings. Table A-5 tabulates the PARs controlled interchange for this summer study and for the 2001 Summer study.

Transfer response factors (see Tables B-1.2) for selected interfaces and transmission facilities were calculated for various transactions. Line outage distribution factors (see Tables B-2.1 through B-2.8) were also determined for selected transmission facilities. These factors provide a means of investigating the impact of emergency transfers (either alone or in combination with other transfers) or a variation in one of the economy transfers included in the base case. Also, a number of generation bus shift response factors (see Tables B-3.1 through B-3.6) were calculated for the same selected interfaces and transmission facilities noted above. These factors provide a means of determining the impact of the loss of generating capacity at any of the several major power plants within the MEN systems.

For NPCC import simulations, the proportion assumed in this study is 50% by the NYISO and 50% by IMO. For NPCC export simulations, the proportion assumed in this study is 100% by the NYISO.

The MEN Study Committee recognizes the parallel effort by the NERC Interchange Distribution Calculator Working Group (IDCWG) to calculate Power Transfer Distribution Factors (PTDFs) to support the Transmission Line Loading Relief (TLR) procedures. The PTDFs are calculated for a set of defined Flowgates in response to specific source-sink Control Area transfers. Apart from a very small number of the Flowgates, which are essentially the same as some of the interfaces assessed in the MEN appraisal, the majority of the monitored elements are very different. The parallel MEN effort and the IDCWG effort are therefore very different in scope, products and users, and as such do not participate in an overlapping effort. The MEN Study Committee thus holds the opinion that the various sets of factors produced in the seasonal appraisal continues to be required as a distinct effort, which provides significant value to the MEN system operation community.

4. Regional Appraisals

A. MAAC Appraisal

The ability of the MEN interconnected network to support transfers into and out of MAAC was assessed for the 2002 summer peak load period. On April 1st, 2002 Allegheny Power was fully integrated as part of PJM's energy market operations and became PJM West. Duquesne Light Company is expected to join PJM West on September 1, 2002. In addition, in early March, a portion of Orange and Rockland Utilities Inc. load located in New Jersey was incorporated into PJM's pool operations and MAAC.

Comparison of the limits reported in this assessment with those reported in previous assessments must be tempered with the realization that this summer's assessment reflects the evolving market alliances and integrated operations that do not mirror NERC reliability regions. The limits reported for transfer capabilities involving MAAC are comparable to those reported for the 2001 Summer assessment

Base Conditions

This summer, the net tie line flow into MAAC is 599 MW compared with 74 MW out of MAAC last summer.

The net ECAR to MAAC transfers decreased this summer to 321 MW from 618 MW last summer. The net interchange from NPCC to MAAC of 18 MW reflects the Orange and Rockland Utilities Inc. load located in New Jersey that was incorporated into PJM's pool operations and MAAC. As was the case last summer, there are no MAAC to VACAR transfers represented.

Generation

As is typical for the MAAC region, discrete generation was forced out to model typical unit maintenance and Effective Forced Outage Rates (EFOR). Table A-5 provides a complete listing of major generator outages. An aggregate of 4100 MW of new generation is expected to be placed in service prior to the summer peak.

Transmission

A coordinated operation with NYISO allows for readjustment of the Ramapo PAR schedule, as well as the PSEG – CON ED wheel PARs, to alleviate PJM system limits.

A. MAAC Appraisal (cont'd)

MAAC Operating Procedures

Operating procedures can be employed in the course of study analysis to increase transfer capabilities among the three regions. MAAC operating procedures exist which allow system operators to open selected 115 kV and 138 kV tie lines with surrounding Regions to relieve overloads under emergency transfer conditions. Instances where these procedures have been employed are noted in Table 1.

B. ECAR Appraisal

The 2002 Summer Assessment included an evaluation of the ECAR region's ability to support transfers into or out of the NPCC region. For the 2002 Summer conditions modeled, the ECAR region exhibits thermal limitations to regional transfers as shown in Table 1. Functional control and operation of the Allegheny Power and the Duquesne Light transmission systems will be performed by PJM this summer. Therefore, the transfer capability analysis included AP and DLCO as part of the MAAC dispatch for the 2002 Summer Assessment. For all other purposes AP and DLCO are still represented as part of ECAR.

Incremental and total transfer capabilities for the NPCC to ECAR path are limited to 3750 MW and 4100 MW respectively by the Homer City - Shelocta 230 kV (FE) line for an outage of the Erie West - Wayne 345 kV (FE) line. These transfer capabilities are 200 MW higher and 100 MW lower as compared to the respective limits reported for the 2001 Summer assessment. The decrease in FCTTC can be attributed primarily to lower ECAR to MAAC base transfers.

Incremental and total transfer capabilities for the ECAR to NPCC path are limited to 4000 MW and 3600 MW respectively by the Erie West 345/115 kV Transformer #1 for an outage of the Erie South 345/230 kV Transformer 1. While the incremental transfer limit was unchanged, the total transfer capability increased by 300 MW as compared to the respective limit reported for the 2001 Summer assessment. The increase in the FCTTC can be attributed primarily to lower ECAR to MAAC base transfers.

The 2002 Summer reliability assessment base case was developed from the NERC/MMWG 2002 Summer peak load base case and was updated with the most recent Michigan to Ontario PAR transmission system status information and projected transfers.

Generation

Since Summer 2001 over 9,200 MW of additional generation has been modeled within ECAR. Refer to Table A-4 for a detailed listing of generator additions.

Load

The 2002 Summer ECAR load plus losses, including AP and DLCO, is about 105,000 MW, an increase of approximately 1,800 MW or 1.7% compared with that of the 2001 Summer model.

ECAR Appraisal (cont'd)

Transmission Facilities

Major transmission facility changes since Summer 2001 are:

- A second Dumont 765/345 kV transformer.
- Generation connection facilities.

These and other ECAR facility additions are indicated in Table A-3.

Installation of a second 765/345 kV, 1,500 MVA transformer at the Dumont station in Northern Indiana is currently under way, with an in-service date of June 1st, 2002. The addition of this transformer will reduce contingency loadings on the existing Cook and Dumont 765/345 kV (AEP) transformers, resulting in increased transfer capability to the north and west.

The Michigan - Ontario interface and the Queenston Flow West (QFW) interface in Ontario have been susceptible to large parallel flows and Transmission Loading Relief (TLR) curtailments. Delays have prevented the three new Phase Angle Regulating (PAR) transformers on the Michigan – Ontario Interface from becoming operational. Transformer testing failures have impacted the Lambton PARs, L51D and L4D, and operating agreements have impeded the B3N PAR from becoming operational. The J5D PAR is the only operating unit modeled in the 2002 Summer base case.

Base Transfers

ECAR's base imports in this study are 53 MW higher than the 2001 Summer Study with imports from VACAR essentially remaining the same. The 2002 Summer base transfer levels from NPCC to ECAR are 300 MW less and the ECAR to MAAC transfers are 500 MW less than the 2001 Summer Study.

Refer to Tables A-1 and A-2 for a detailed comparison of transfers in the 2002 vs. 2001 Summer Study.

Operating Procedures

As identified in Appendix C, various ECAR operating procedures are available at the discretion of system operators.

The Warren – Falconer and East Sayre – North Waverly operating procedures were invoked to obtain the ECAR export/import transfer limits in this study.

C. NPCC Appraisal

The 2002 Summer MEN Reliability Assessment presents an evaluation of NPCC's ability to support exports to and imports from the MAAC and ECAR Regions. The incremental and total transfer capabilities determined in this assessment are discussed in Section 2, Results.

Base Transfers

NPCC's base transfers include a net export of 382 MW to ECAR, a decrease of 300 MW from the 2001 Summer schedule, and a net import of 392 MW from MAAC, unchanged from 2001 summer. Also, as in last summer's base case, NPCC imports 200 MW from MAPP, scheduled from Manitoba Hydro to Ontario. The net NPCC export is –210 MW compared to a net export of 90 MW in the 2001 summer case. Table A-1 compares the individual transfers for the 2001 and 2002 summer base cases.

Transmission System Performance

Incremental and total transfer capabilities for NPCC to ECAR and MAAC to NPCC show an increase compared to the 2001 summer study results, while those for NPCC to MAAC show a decrease and ECAR to NPCC remains unchanged. Transmission limits for all of these transfers are in the in the New York-Pennsylvania or Ontario-Michigan Interface paths.

Refer to Figure 1C for simultaneous transfer capability information for NPCC-ECAR and NPCC-MAAC transfers. The detailed incremental and total transfer capabilities determined in this assessment are discussed in Section 2, Results. Of the Michigan-Ontario Interface phase angle regulators (PARs) only the Keith-Waterman (J5D) PAR is set to control MW flow in the 2002 summer Study. The return to service of the Lambton-St. Clair circuit L4D PAR has been delayed past the expected summer peak. The Scott-Bunce Creek B3N and Lambton-St. Clair L51D PARs are in service but are operated on neutral tap.

The existing Ontario operating procedures to relieve potential Buchanan Longwood Input limitations (BLIP) and Ontario-Michigan interface limitations are identified in Appendix C. These operating procedures will still be available at the discretion of system operators as will the NYISO Security Constrained Dispatch procedure.

NPCC Region Appraisal

The NPCC region encompasses the five control areas of Ontario, New York, New England, Quebec and the Maritimes. Analyses of conditions in each of the NPCC Areas are discussed except the Maritime Area. Because of its location, The

Maritimes does not have significant impact on the determination of the MEN interregional transfer capabilities.

Analysis of Load and Generation Resources

A total NPCC Region demand of over 102,000 MW was modeled in the 2002 Summer MEN studies. Overall, sufficient resources are expected to be available to meet reserve requirements.

An Ontario demand of 23,100 MW was modelled for the MEN 2002 Summer case. The Transfer capabilities reported are not strongly influenced by Ontario's peak demand. Generation resources and purchases will be adequate to meet this demand.

The tower contingencies that limit transfers during normal operation are outside the MEN study scope. Ontario can deliver about 2000 MW to New York over the Niagara ties in the summer. Ontario can receive about 1000 MW from New York at Niagara before circuits associated with the Queenston Flow West (QFW) interface will become limiting. Another 400 MW can be transferred between Ontario and New York at the eastern end of Lake Ontario over the phase shifter controlled circuits L33P and L34P.

For the summer of 2002, the Michigan-Ontario phase shifters are not expected to materially reduce parallel flows. The phase shifters installed in B3N and L51D are expected to remain on neutral tap. The L4D phase shifter shall be in service at the end of 2002. With three Lambton units in service, Ontario will be able to deliver about 2000 MW to Michigan and receive about 1300 MW from Michigan. More power can be imported from Michigan when Lambton generation is reduced. Changing practices have made it no longer possible to exploit the short time ratings of the tie circuits on a day-to-day basis. Using the STE ratings would boost transfer by about 100 MW towards Michigan and 200 MW to Ontario.

The Summer 2002 forecast peak for the New York Control Area is 30,475 MW, which is 145 MW lower than the Summer 2001 forecast of 30,620 MW. This forecast is 1.6% lower than the all time peak of 30,983MW that occurred on August 9, 2001. For peak load normalization, the NYISO uses a Temperature-Humidity Index (THI) value of 82.2. At forecast load levels, a one-degree increase in the THI will result in approximately 500 MW of additional load. The forecast reflects the transfer of the Rockland Electric Co. load (approximately 430 MW) from the NY control area to the PJM control area.

The NYISO conducts semi-annual and monthly Installed Capability (ICAP) auctions. Based on the forecast load for 2002, the ICAP requirement is 35,961 MW based on the 18% installed reserve margin requirement. When allowances are taken for unplanned outages (based on historical performance of 10.8% unavailable capacity), the net available resources will be 31,908 MW, which will not be sufficient to meet the New York Control Area (NYCA) load and operating reserve requirement during the peak load hours. A negative reserve margin of approximately 367 MW is expected at peak conditions. NYISO expects approximately 1,100 MW of load relief from emergency procedures that include internal load curtailment by the transmission owners, public appeals and 5% system wide voltage reductions, and up to 400 MW relief available from the Emergency Demand Response Program and Special Case Resources participants.

Prior to the summer 2002 peak load period, NYISO expects up to 576 MW of capacity additions and enhancements. Of these capacity additions 140 MW is located in the New York City (NYC) load zone and 436 MW in the Long Island (LI) load zone.

During the second half of 2001 and continuing into 2002, precipitation over much of the NPCC Areas was below average and is approaching drought conditions. Snowpack in the watershed areas continues well below normal through mid-winter 2002. Should water use restrictions arise; there are concerns about the impact on generating capacity.

In addition to the traditional concern about the impact of drought conditions on generating capacity, water-use restrictions may also impact the availability of combustion turbine generators that use water for inlet air cooling (power recovery) or for NOx control. NYISO is evaluating the potential impact of this particular scenario.

The New England 2002 summer peak demand (Net Internal Demand) is 24,200 MW. This projected peak demand is 767 MW (3.2%) lower than last year's actual summer peak of 24,967 MW, which occurred on August 9th, and it is 2,423 MW higher (10.7%) than the previous all time peak of 22,544 MW, which occurred on July 6th, 1999. New England set new all time peak loads on five separate occasions during the summer of 2001. The record load levels were the result of unusually high heat and humidity throughout New England.

New England is forecasting sufficient capacity to meet the projected peak for the summer 2002 and the shoulder months. However, there are concerns that some sub-regions within New England that have a greater loss of load expectation as a result of load increasing faster than supply and internal transmission constraints. These sub-regions include: southwest Connecticut; Norwalk, Connecticut; and Boston, Massachusetts.

Net Operable Capacity resources from NEPOOL Participant and Non-Participant sources of 27,032 MW (August) include 2,988 MW from new generation internal to NEPOOL. Since the in-service date of these new units will impact the summer capacity situation, ISO New England closely monitors the construction and commissioning progress of these new generators. The known of average monthly summer external capacity purchases are approximately 537 MW, which includes 310 MW of NEPOOL Participant Entitlement Contracts from Hydro-Québec, 100 MW from New Brunswick, and 127 MW from New York. It is expected that additional capacity backed contracts for the summer period will be initiated before June 1.

The forecast Hydro-Québec internal demand for the summer of 2002 is 21,064 MW, expected to occur in May. The forecast for the September 2002 monthly peak is 19,830 MW. The actual peak demand for the 2001 summer was 19,725 MW, which occurred in August.

In September, the total capacity (including Churchill-Falls) sums up to 36,528 MW, of which 6,924 MW are inoperable. The net operable capacity is therefore 29,604 MW. With purchases, other than Churchill-Falls, of 300 MW and full responsibility sales expected to be 1225 MW the available capacity margin is evaluated at 8,849 MW for September. A minimum capacity margin of 7,777 MW is expected in August.

Transmission System Analysis

Phase angle regulators (PARs) were installed on the Ontario-Michigan tie lines L51D and B3N, to complement the PAR capability already installed on tie line J5D. The B3N PAR is by-passed, while the L51D PAR is on neutral tap. A new PAR will be installed on tie line L4D. Its projected in-service date is beyond the summer of 2002. When operational, the four PARs will allow the Ontario-Michigan flows to be maintained closer to schedule. The transfer capability between Ontario-Michigan will also improve once the PARs are in-service and operated as intended.

Construction of the TransAlta – Sarnia Regional Cogeneration Plant (SRCP) project in Sarnia is currently underway and full commercial operation is scheduled beyond the summer of 2002. This project is to be incorporated into Scott Transformer Station (TS) via 230 kV radial circuits N6S and N7S. Circuits N7S and N6S are composed of two sections. The first section of circuit N6S, from Scott TS to Imperial Oil Complex is an existing one and is already in service. The first section of circuit N7S, between Scott TS and the Imperial Oil Complex, went into service March 19, 2002. The remaining sections of circuit N7S and N6S, from the Imperial Oil Complex to TransAlta - SRCP are expected to come into service May 2002.

Interregional transmission transfer capability studies have been conducted to determine levels of external assistance that can be imported into Ontario during the forecast 2002-summer peak demand. The study results are reflected in the FCITCs.

In New York there are no major transmission line additions scheduled for the bulk power system for the summer 2002 period.

Phase II of the Marcy Flexible AC Transmission System (FACTS) Demonstration Project is scheduled to be available for operation during the Summer 2002. This first step in the Phase II of this project expands the FACTS Convertible Static Compensator (CSC) device to allow operation as a series synchronous static compensator (SSSC) that can dynamically regulate the transmission system power flows on either the Marcy – Coopers Corners or Marcy – New Scotland 345kV circuits. Additional work to be performed later in the 3rd and 4th quarters of 2002 will increase the total number of operating configurations of the CSC to eleven modes. In addition to the CSC enhancements, the project also includes the addition of a 200 MVar shunt capacitor bank at the Edic 345 kV station.

A second 345/115 kV transformer will be placed in service at Central Hudson's Rock Tavern station. While this facility will not impact the overall power transfer capability, it will enhance the reliability in the lower Hudson Valley region of New York.

Transmission work associated with the Athens Generation project is expected to be completed prior to the summer peak load period. The existing Leeds – Pleasant Valley 345 kV circuit #91 will be reconfigured as the Leeds – Athens circuit #95 and Athens – Pleasant Valley circuit #91. This transmission change will not have any significant impact on system power flows during the peak load period.

In New England no critical transmission circuits are scheduled to be out-of-service during the summer 2002 period. Additional transmission resources are expected to become available for the summer of 2002.

These additions include:

- Boston Area transmission upgrades which include a new 345 kV line: between Mystic and North Cambridge substations for the interconnection of the new Mystic generator.
- South Agawam Substation reconfiguration such that the Berkshire Power Plant could serve load in both western Massachusetts and Connecticut.
- Construction of a new 345 kV substation and replacement of terminal equipment at the Card Street substation for the interconnection of the new Lake Road generators in eastern Connecticut.
- Capacitor additions for voltage support in Southwest Connecticut and New Hampshire.
- Cross Sound Cable Project, construction of a 330 MW HVdc line and HVdc Converter Facilities between East Shore Substation in New Haven, Connecticut and the Shoreham Substation on Long Island, New York.

No significant upgrade by TransÉnergie of the high voltage transmission system is planned for 2002 and no significant addition of capacity resources by Hydro-Québec is expected.

Interregional transmission transfer capability studies have been conducted to determine levels of external assistance that can be imported during the forecast 2002-summer peak demand. The study results are reflected in the FCITCs.

All existing interconnections with neighboring utilities are expected to be available for the summer period. No significant generation capacity has been added to the system this year. No significant transmission facilities have been added either.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-17

Northeast Power Coordinating Council
Reliability Assessment
For
Summer 2003

Approved by the Task Force on Coordination of Operation
May 2003

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Information provided in this report has been provided by the Operations Planning Working Group of the NPCC Task Force on Coordination of Operation with additional information from Reliability Councils adjacent to NPCC.

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Scott Hodgdon	ISO New England (ISO-NE)
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Al Miller	Independent Electricity Market Operator (IMO)
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<u>Additional support by</u>:

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1. Executive Summary

This report focuses on the assessment of reliability within NPCC for the summer of 2003. Portions of this report are built on work previously done for the NPCC Reliability Assessment for Summer 2002.

The Summer 2003 Operations Planning Working Group worked closely with the representatives of the NPCC CP-8 Working Group to ensure results are based on consistent data and modeling assumptions between the two studies.

Those aspects that the Summer Operations Planning Working Group have examined to determine the reliability and adequacy for NPCC for the summer of 2003 are discussed in detail in the specific report sections. The following Summary of Findings address the significant points of the report discussion. These findings are based on forecasted projections of: load requirements, resource configurations and transmission configurations. This report evaluates NPCC and the associated Area's ability to deal with the differing resources and transmission configurations and recommends several actions to reasonably ensure that NPCC and the associated Areas are prepared to deal with possible uncertainties identified in this report.

Summary of Findings

- The following assessment of the forecasted capacity outlook was made for the week with the lowest overall NPCC margin (week beginning June 22, 2003)[1]. The lower NPCC net margin is influenced by lower net margins in New York and Ontario. These lower margins can primarily be attributed to slightly higher planned and/or unplanned generation outages than during the projected peak load week. The overall resource adequacy for the NPCC region during this week indicates that there will be approximately 8,100 MW of operable spare capacity. However, during this week over half of this spare capacity is in the Quebec and Maritimes Areas. The transfer capability between the Quebec and Maritimes Control Areas to the remainder of NPCC will not permit the usage of all the declared spare capacity. In addition, transmission constraints may limit the ability to transmit the New Brunswick and southeastern New England capacity to other NPCC Areas. Therefore, it is estimated that the net margins for NPCC are reduced by approximately 2,800 MW over this week (June 22, 2003) to account for this bottled capacity. As a result of this bottling, the spare capacity available to the remainder of NPCC is approximately 5,300 MW over this week. While New York and Ontario are projecting some relatively low margins during portions of the report period, after accounting for bottled resources, there should be sufficient resources to meet the forecasted load projections and operating reserve requirements within NPCC.

[1] Load and Capacity Forecast Summaries for NPCC, IMO, ISO-NE, NY-ISO, HQ and the Maritime's are included in Appendix 1.

- The projected spare capacity available to the remainder of NPCC during the peak load week (week beginning July 6, 2003) is about 7,300 MW. This is projected to occur two weeks following the week with the lowest overall NPCC margin (week beginning June 22, 2003). By comparison the projected spare capacity, after accounting for bottled in capacity, for the 2002 Summer peak load week was about 3,400 MW.

- New England and New York have market-based demand response programs in place that are expected to provide load relief measures that are in addition to measures available under emergency conditions. In addition, to address reliability concerns in southwest Connecticut, an area of New England where demand may exceed supply plus total transmission import limits, a Request For Proposal (RFP) has been issued by Connecticut Light and Power Company in order to acquire new peaking generation and load relief within that area. Ontario had a pilot Emergency Demand Response Program in place for the summer of 2002. The pilot program was to end on April 30, 2003. Work is in progress to extend the program through the summer of 2003.

- NPCC generation capacity additions for the 2003 Summer are anticipated to total 7,144 MW, including 2,900 MW in New England, 1,179 MW in New York, 2,565 MW in Ontario, 450 MW in Quebec and 50 MW in the Maritimes. It should be noted that the Ontario addition includes the return to service of two Bruce units (770 MW each) and a Pickering unit (515 MW). Even though NPCC as a whole shows adequate resources through the report period, there remain load pockets within the New England control area, specifically southwest Connecticut that may be at greater risk of being capacity deficient.

- The Areas of New England, New York and Ontario will also have adequacy concerns under conditions of extreme weather-driven-demands or higher than projected generating unit outages without assistance from outside their respective Control Areas. The capability to assist adjoining NPCC Control Areas is exacerbated by the lack of load diversity between Control Areas.

- The shoulder months indicate that overall NPCC has significant margins of spare generating capacity. Furthermore, measures are being taken to ensure these margins are maintained to protect against maintenance over runs.

- Any delays to the in-service date of new capacity in New England, New York and Ontario will impact the overall capacity for these Areas. Similarly, removal of existing generation in critical areas, may adversely affect capacity margins.

- The working group has determined that each NPCC Area is reasonably prepared or is reviewing the necessary strategies and procedures to deal with operational problems and emergencies as they develop. However, the Resource and Transmission Assessments are mere snapshots in time and base case studies. Changes to the base case assumptions can alter this report’s findings.

- An analysis of historical periods of high Geomagnetically Induced Currents (GICs) was performed and the results indicate that present procedures for managing them are adequate. As we are now on the downward trend of the 11-year sunspot cycle, the probability of a major GIC event impacting generation or transmission coincident with the occurrence of peak load is decreasing.

- Area environmental constraints, specifically state, provincial and local emission regulations may have some impact at various times through the summer 2003 period.

- Since 2002, precipitation levels have restored most water reservoirs to near normal levels. Hydroelectric generation output may still be impacted in some isolated locations.

- Under specific conditions, some Control Areas have identified difficulties controlling high or low voltages.

2. Introduction

The NPCC Task Force on Coordination of Operation established the Operations Planning Working Group to review the projected 2003 summer[2] conditions and assess the overall reliability of the generation and transmission system in NPCC. The objectives of the working group were to:

- Conduct a post-assessment review of 2002 Summer operating conditions.

- Examine historical summer operational experiences and assess their applicability for the summer 2003 period.

- Assess the extent to which emergency operating procedures may be implemented by the NPCC Areas during the summer of 2003.

- Study potential sensitivities that may impact resource adequacy, including temperature variations, merchant plant delays, load forecast uncertainties, evolving load response measures, solar magnetic activity and system voltage and generator reactive capability limits.

- Ensure that timely and efficient communications with participants in all regional markets will be in place in order to maximize reliance on the marketplace for emergency support.

- Review the operational readiness of the NPCC Areas and recommend actions to mitigate potential problems.

[2] Summer 2003 is defined as the months of May to September inclusive.

- Assess the implications of strategies adopted for the summer period on the adequacy of supply in the shoulder months.

- Coordinate data and modeling assumptions with NPCC Working Group CP-8, "Resource and Transmission Adequacy." Document the methodology of each Area in its projection of load forecasts; document the methodology of each Area in its projection of unit unavailability rates.

- Provide coordination with the seasonal assessments conducted for the summer of 2003 by the NERC Reliability Assessment Subcommittee and the MAAC-ECAR-NPCC (MEN) Study

3. Demand Forecasts for 2003

The non-coincident forecasted peak demand for NPCC during the summer of 2003 is 104,694 MW (May-September period). This peak demand translates to a coincident peak demand of 103,013 MW and is expected during the week beginning July 6, 2003.

Ambient weather conditions are the single most important variable impacting the demand forecasts during the summer months. As a result, each Area is aware that the summer peak demand could occur during any week of the summer period as a result of these weather variables. It should also be noted that the Maritimes and Quebec experience late Spring loads that are influenced by heating load and occur during the defined summer period.

The impact of extreme ambient weather conditions on load forecasts can be demonstrated by various means. The IMO, Maritimes and TransÉnergie (transmission operations division of Hydro-Quebec) represent the resulting load forecast uncertainty in their respective Areas as a percentage of the base load. NYISO and ISO-NE use a Temperature Humidity Index (THI) as a base and increase the load by a MW factor for each degree above the base value.

As demonstrated in Section 7, historically the peak loads and temperatures between New England and New York can have a high degree of correlation due to the relative locations of their respective load centers. Depending upon the extent of the weather system and duration, there is some potential for the Ontario peak demand to be coincident with New England and New York.

The method each Area uses to determine the peak forecast demand and the associated load forecast uncertainty relating to weather variables is described in greater detail in the Control Area Summary of Forecasts below.

Summary of Area Forecasts

Maritimes

Based on the Maritimes Area 2003 demand forecast, a peak of 3,474 MW is predicted to occur for the June through August period during the week beginning June 1, 2003. This is a less than a 1% increase over the Summer 2002 actual peak of 3,444 MW, which occurred on August 16, 2002. Since the Maritimes Area is a winter-peaking area, forecasted peaks for the months of May and September are normally higher than for the June through August period. For the week beginning April 27, 2003, the predicted peak is 3,813 MW; for the week beginning September 28, 2003, the predicted peak is 3,511 MW.

The load forecast for the Maritimes Area represents the expected load for the Summer 2003 assessment period. It should be noted that the Maritimes Area load is simply the mathematical sum of the forecasted weekly peak loads of the sub-areas (New Brunswick, Nova Scotia, Prince Edward Island, and the area served by the Northern Maine Independent System Administrator). As such, it does not take the effect of load coincidence within the week into account. If the total Maritimes Area load included a coincidence factor, the forecast load would be approximately 1-3% lower.

For New Brunswick Power, the load forecast is based on an End-use Model (sum of forecasted loads by use e.g. water heating, space heating, lighting etc.) for residential loads and an Econometric Model for general service and industrial loads, correlating forecasted economic growth and historical loads. Each of these models is weather adjusted using a 30-year historical average.

For Nova Scotia Power, the load forecast is based on a 30-year historical climate normal for the major load center, along with analyses of sales history, economic indicators, customer surveys, technological and demographic changes in the market, and the price and availability of other energy sources.

Maritimes Electric Company Ltd.'s (Prince Edward Island) load forecast uses average long-term weather for the peak period (typically December) and a time-based regression model to determine the forecasted annual peak. The remaining months are prorated on the previous year.

The Northern Maine Independent System Administrator performs a trend analysis on historic data in order to develop an estimate of future loads.

New England

The New England Control Area's forecasted summer 2003 peak demand is 25,120 MW. This is 360 MW (1.5%) higher than last years forecast for 2003 of 24,760 MW. This reasoning for the increase in forecasted peak loads for 2003 can be summarized by the following:

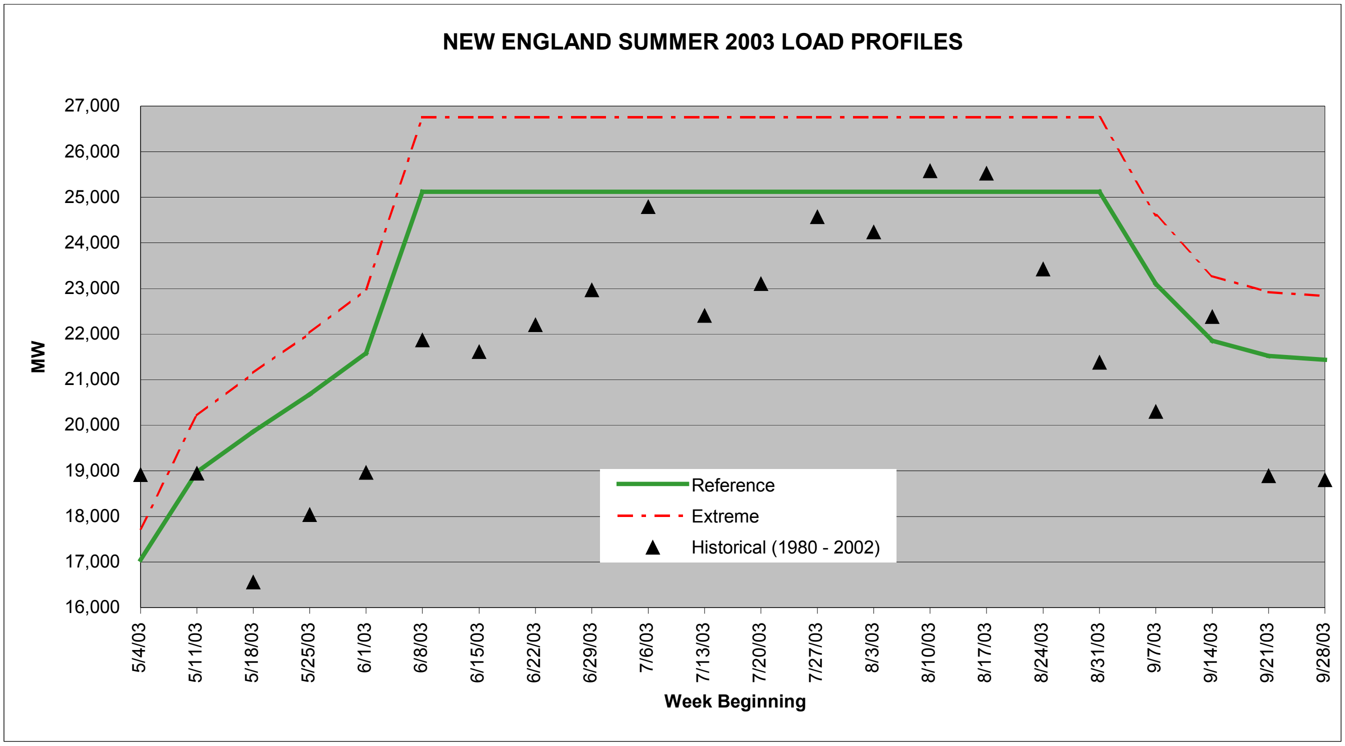
- Using a seasonal regression, weather normalizing the forecasted 2002 summer peak of 24,200 MW to 24,390 MW
- The weather normalizing and forecasting methodology was revised to use a monthly regression, rather than a seasonal regression, for measuring the peak load response to temperature/humidity. The weather normalized peak for 2002 is calculated to be 24,590 MW using the new methodology. This is a 200 MW (0.8%) increase over the seasonal regression normalization of 24,390 MW.
- Using the latest economic and historical data, the forecasted peak growth into 2003 was revised to 2.2%. This 2.2% growth is applied to the 24,590 MW forecast to calculate the 2003 summer peak load forecast of 25,120 MW.

The actual summer peak experienced in 2002 was 25,348 MW. Using the temperature experienced at the time of peak, the forecast would be re-calculated to be 25,125 MW using the monthly regression methodology. This peak of 25,348 MW is the all time record of peak load for New England and surpassed the previous record of 24,967 MW by 381 MW.

The demand forecast for New England is based on weekly weather distributions. The weekly weather distributions were built using 30 years of data for the Temperature Humidity Index (THI) at the time of daily peaks (for non-holiday weekdays). The reference load forecast is based on a 50/50 probability of occurrence. While this temperature sampling is used to project the temperature sensitive loads, a complete process of sampling and econometric models are used to project the aggregate demand. A reasonable approximation for the "normal weather" associated with this projection is 90 degrees Fahrenheit and a dew point of 70 degrees. At these forecasted load levels, a one-degree increase in the THI will result in approximately 700 to 800 MW of additional load. The amount of additional load depends on the total deviation from the "normal weather" approximation.

As mentioned above, the reference case forecast of 25,120 MW has a 50% chance of being exceeded. New England also produces a load forecast that has a 10% chance of being exceeded that would be equivalent to an increase in the load forecast of approximately 1,630 MW.

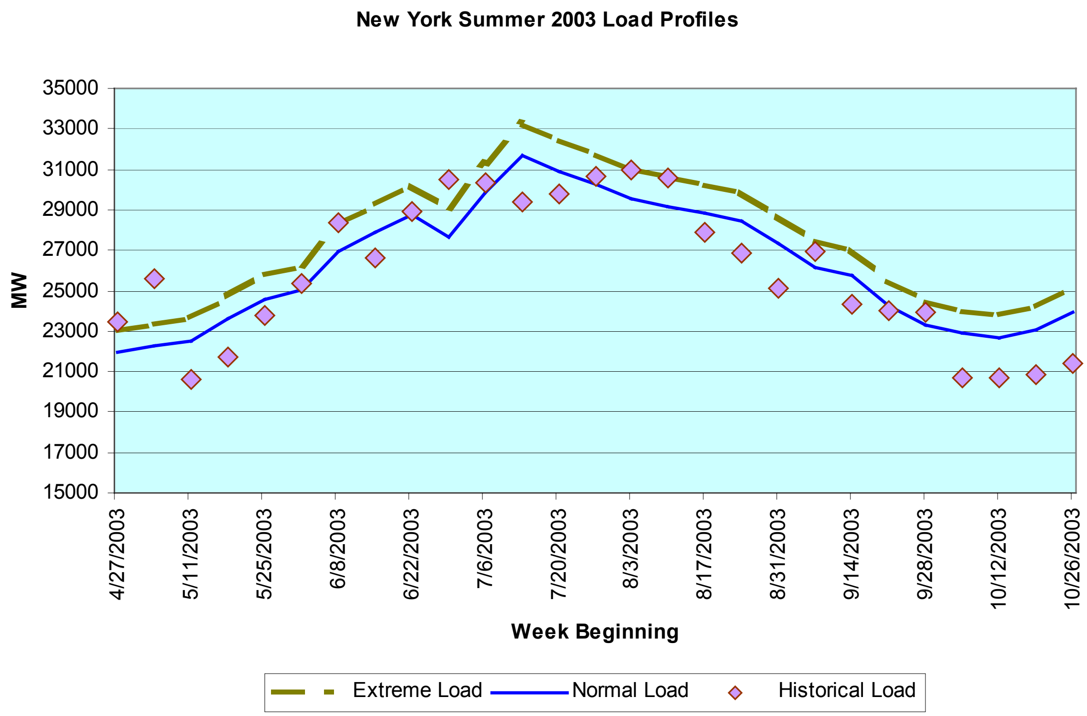
The following graph illustrates the range of potential peak demands that ISO-NE may experience this summer and compares them to historical peaks. It should be noted that the historical peak values illustrated below are the peak loads reconstituted to reflect Operating Procedures that may have been implemented at that time.



New York

The forecast peak for the New York Control Area is 31,430 MW, which is 955 MW higher than last year's forecast of 30,475 MW. This forecast is 1.4% higher than the all time peak of 30,983 MW that occurred on August 9, 2001. The forecast is based on the forecasts for the transmission districts by the Transmission Owners and municipal agencies. For peak load normalization, the NYISO uses a Temperature-Humidity Index (THI) value of 81.31 degrees. At forecast load levels, a one-degree increase in the THI will result in approximately 500 MW additional load.

The following illustration provides the range of potential peak demands that the New York Area may experience this summer.



Ontario

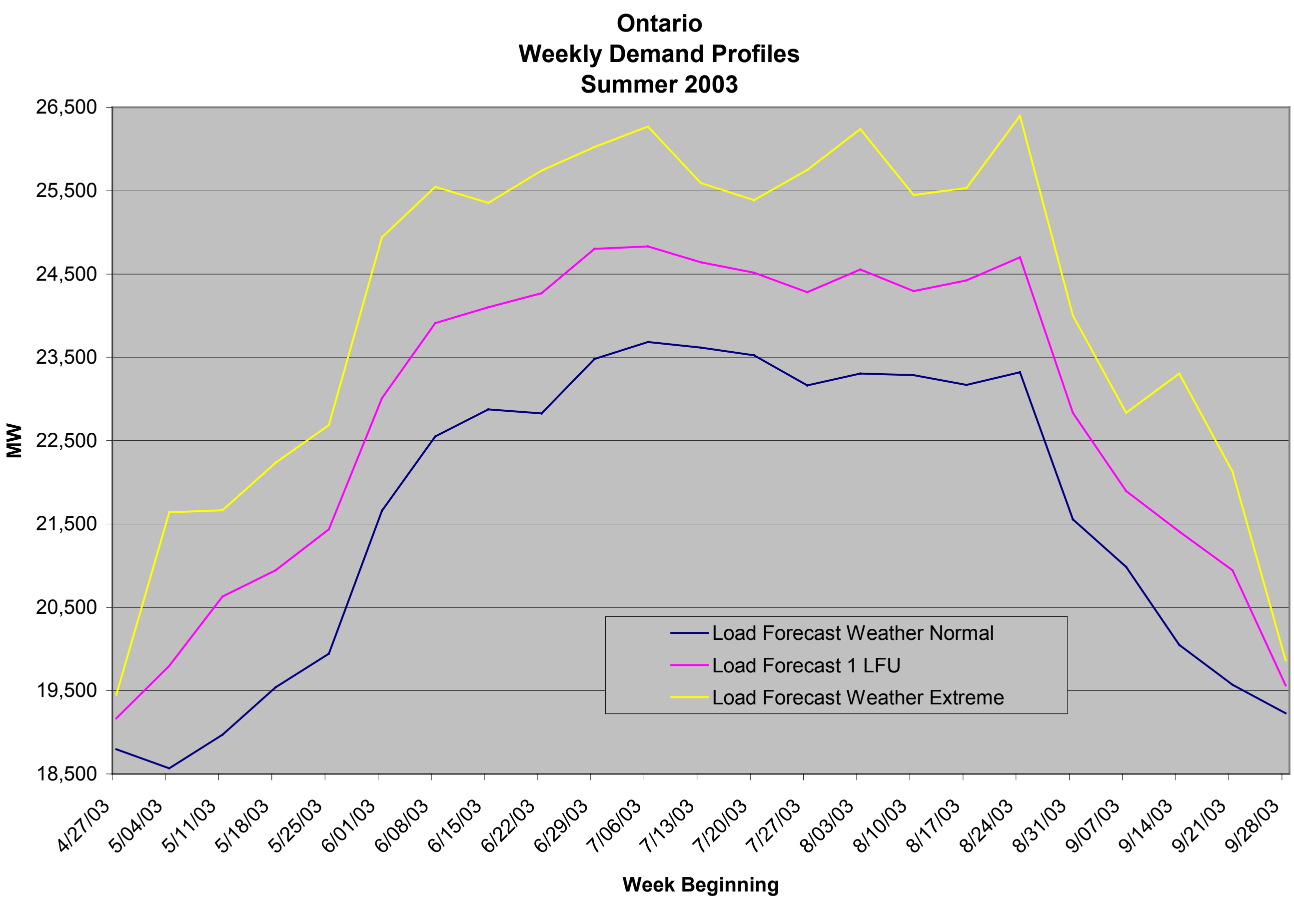
The forecasted weather normal, summer hourly peak demand for 2003 is 23,684 MW. This is forecasted to occur during the week beginning July 6, 2003. The forecast is derived from an analysis of demands using 30 years of historical weather based on a weekly resolution. The normal weather equates to an approximate average daily temperature of 28 degrees Celsius and 65% relative humidity.

As was seen in 2001 and again in 2002, weather extremes can drive the demands significantly higher than the weather normal values. The demand models used to create the 2003 load profiles have been updated to increase the sensitivities to hot weather as a result of experiences during the summer and fall of 2002.

Since peak demands are highly weather sensitive, Load Forecast Uncertainty (LFU) is used to capture, in MW, the impact of the variations from normal weather. Therefore the peak demands can be derived and given a probability of occurring based on the likelihood of observing the normal weather. For this forecast, there is a 50% chance the peak demand in any given week will exceed the weather normal base demands. LFU represents the impact on the peak demand of one standard deviation in the weather elements. The values of LFU associated with this analysis ranges from 4% to 9% of the predicted normal weather demands. The highest values of LFU for Ontario appear during those weeks just prior to and after the traditional summer vacation periods of July and August. For the peak week, LFU equates to a potential increase in demand of about 1,160 MW.

For the summer period the extreme weather demand for any given week is determined by using the hottest day in the past thirty years as the reference point. Depending upon the week in this study period, the values that could be experienced under extreme weather conditions can be 10 –17% higher than the normal weather prediction. For the peak week, this can equate to an increase of approximately 2,600 MW over the normal weather prediction. During the shoulder months of May and September, the impact of extreme weather over normal weather forecasted demand can reach as high as 3,300 MW.

The following graph shows the forecast range of potential demands that the IMO may experience in each week.



Quebec

The forecasted summer peak for the Quebec Control Area in 2003 is 21,257 MW. This is 1,266 MW (5.6%) lower than last summer's peak of 22,523 MW which happened on an unseasonably cold day at the beginning of May, with temperatures around the freezing point all over the province. If we exclude this anomaly, the forecasted summer peak for 2003 is 732 MW (3.5%) above the peak of 20,525 MW reached on September 9th of last year, when temperatures reached 33 degrees Celsius with a high Heat and Humidity Index on the major load centers in the south of the province while regions in the northeast had to resort to residential heating with temperatures around 5 degrees Celsius. The forecast is based on 35 years of historical weather with an offset of ±3 days for every date, which amounts to the equivalent of 245 years of sampling. Being exposed over the year to all kinds of extremes in weather, TransÉnergie uses three different load forecasting models (autumn, winter and spring). For the purpose of this assessment, the spring model is used up to the middle of August and the autumn model is used for the remaining of the period. The boundaries of the parameters of these models are regularly calibrated by comparing the results to the last two years of historical weather to reflect any new tendencies. Finally, TransÉnergie defines load forecast uncertainty (LFU) as a percentage calculated on a monthly resolution. The value for LFU is approximately 3% for the summer months, which represents from 600 to 700 MW. This value is accounted for in the Load and Capacity table provided in this assessment.

4. Resource Adequacy

NPCC Summary for 2003

The following assessment of resource adequacy was made for the week with the lowest overall NPCC margin (week beginning June 22, 2003)[3]. The lower net margin is influenced by lower net margins in New York and Ontario. These lower margins can primarily be attributed to slightly higher known and/or unplanned generation outages than during the projected peak load week. The overall resource adequacy for the NPCC region during this week indicates that there will be approximately 8,100 MW of operable spare capacity. However, during this week over half of this spare capacity is in the Quebec and Maritimes Area. The transfer capability between the Quebec and Maritimes Control Areas to the remainder of NPCC will not permit the usage of all the declared spare capacity. In addition, transmission constraints may limit the ability to transmit the New Brunswick and southeastern New England capacity to other NPCC Areas. Therefore it is estimated that the net margins for NPCC are reduced by approximately 2,800 MW over this week to account for this bottled capacity. As a result of this bottling, the spare capacity available to the remainder of NPCC is approximately 5,300 MW over this week.

[3] Load and Capacity Forecast Summaries for NPCC, Ontario, New England, New York, Quebec and the Maritime's are included in Appendix 1.

The projected spare capacity available to the remainder of NPCC during the peak load week (week beginning July 6, 2003) is about 7,300 MW. By comparison the projected spare capacity for the 2002 Summer peak load week was about 3,400 MW. While New York and Ontario are projecting some relatively low margins during portions of the report period, after accounting for bottled resources, there should be sufficient resources to meet the forecasted load projections and operating reserve requirements within NPCC.

The above assessment was performed on the basis of projected available capacity. Inadequate fuel supply, lower than normal water reservoirs, higher than anticipated forced outages or delays in anticipated new facilities can impact these capacity projections. Based on Control Area assessments there should be little impact to the overall capacity projections from these additional variables.

The following are the Area assessments supporting this overall resource adequacy assessment.

Projected Load and Capacity Analysis by Area

Maritimes

When allowances for unplanned outages (based on a discrete MW value representing a typical forced outage) are considered, the Maritimes Area is projecting more than adequate capacity margins for the Summer 2003 assessment period. Net margins ranging from 20% to 45% are projected over the period May through September 2003.

New England

Operable capacity within New England is forecasted to be sufficient to meet operating reserve requirements during all weeks of the summer peak load period. A positive capacity margin ranging from 1,600 MW to 5,700 MW is anticipated. Available capacity is based on known outages, an approximation of unknown outages, anticipated new generation additions, projected firm purchases, and capacity from Demand Response Programs.

While it is projected that operable capacity is expected to be surplus for the New England region, the southwest Connecticut region may face reliability problems due to transmission constraints into and within that region. To meet critical near-term electric system reliability needs in southwest Connecticut for the summer of 2003, Connecticut Light and Power Company has implemented an emergency plan for the period of June 1, 2003 through September 31, 2003 that includes:

- Issuing of a Request for Proposals (RFP) for the installation of up to 80 MW of temporary generation, seeking the preferred, clean-burning natural gaspowered generation to address reliability needs and other power emergencies this summer;

- Installing voltage stabilization and performance equipment to maximize transmission import capabilities into southwest Connecticut; and
- Aggressively supporting and participating in ISO New England-administered Demand Side Management (DSM) programs that could potentially reduce this summer's peak load by up to 20 MW in southwest Connecticut.

Transmission constraints are also affecting import limits into the Boston Area and Northwest Vermont.

Maine, Southeast Massachusetts, and Rhode Island are areas within New England where supply exceeds native load but the existing transmission system limits the amount of excess energy that can be used to serve the demand in other areas.

In addition to known maintenance, an allowance for unplanned outages is also included. Unknown outages are based on historical trends and are estimated to be between 2,100 MW and 3,400 MW. However, if higher than expected resource unavailability or higher than expected load occurs in New England, then system operators may have to take load curtailment actions if sufficient assistance cannot be obtained from interconnecting areas. If necessary, New England would implement its Operating Procedures, which provide load and capacity relief to balance demand and supply and maintain adequate operating reserves.

New York

The NYISO conducts semi-annual and monthly Installed Capability (ICAP) auctions. Based on the forecast load for 2003, the ICAP requirement is 37,087 MW based on the 18% installed reserve margin requirement. When allowances are taken for unplanned outages (based on historical performance of 10. 2% unavailable capacity), the net available resources will be 33,230 MW, which will be sufficient to meet the New York Control Area (NYCA) load and operating reserve requirement during the peak load hours; a capacity margin of zero MW is expected at peak conditions.

Generation resources which are external to the New York Control Area (NYCA) that provide ICAP to the NY market are included in the ICAP total of the NY Load and Capacity assessment. Resources within the NYCA that provide firm capacity to an entity external to the NYCA are not included in the ICAP total (i.e. this generation cannot participate in the ICAP market).

NYISO expects approximately 1,100 MW of load relief from emergency operating procedures that include internal load curtailment by the transmission owners, public appeals and 5% system wide voltage reductions. Participation in the Emergency Demand Response Program represents an additional 700 MW available through the market.

Ontario

The new TransAlta-Sarnia Cogeneration Project, which provides a net capacity increase of 510 MW, became fully dispatchable to the IMO controlled grid on March 27, 2003.

The return to service of three nuclear units that were laid up in the late 1990's is scheduled to begin in 2003. Bruce A units G4 and G3 are scheduled to be generating electricity April 29 and the end of June respectively. Each unit will provide a net capacity addition of 770 MW to the IMO-controlled grid. Pickering A G4 is scheduled to begin generating electricity by June 2003. This unit will provide a net capacity addition of 515 MW.

The IMO is anticipating positive capacity margins within Ontario to meet expected load and operating reserve requirements for peak hours of the report period based on weather normal demands.

This analysis is based on the assumption that the returning nuclear generation resources will meet their in service projections, a review of known outages, a projection of unknown outages, a forecast of price responsive loads, and the inclusion of known firm purchases that supplement the installed generating capability.

Known outages include those resources that are scheduled to be on planned outages, transmission constrained resources as well as the difference between the installed capacity and the dependable capacity associated with certain resources. For example hydroelectric capacity is reduced by varying amounts through portions of the study period to account for the energy available under median water conditions.

Unknown outages represent the average value of forced outages experienced in this same study period during previous years.

A value of 300 MW of price responsive load has been assumed to be available for this forecast based on past operational experience.

The net capacity margins, in table 5 of Appendix I, depict an estimate of the operable capacity margin that does not consider all the additional off-market control actions available to the IMO. For example, the IMO can institute a 3% or 5% voltage reduction. These control actions have the effect of reducing the demand by 1.7% to 2.5%, which, equates to approximately 390 MW to 500 MW on the peak week.

The risks associated with this analysis are that demands may be heavier than expected due to extreme weather, outages may not return to service as scheduled or delays to new and returning units. Of particular concern for this summer are the large number units on outage that are expected to return to service just prior to the summer period.

The adjustment of outage programs and securing of assistance (via market mechanisms or acquisition of emergency energy) from other control areas may be required during those periods that the margin of available capacity in Ontario is forecast to be insufficient to meet the expected Ontario demands plus operating reserve requirements.

The projected margins and controls actions available to the IMO are continuously assessed to determine the appropriate course of action.

Quebec

TransÉnergie is projecting more than adequate capacity margins for the Quebec Control Area during this period. Being a winter peaking region, the summer is the season during which maintenance work is performed, but margins in the range of 3,500 to 6,500 MW above load and firm sales projections are nevertheless expected.

Delays to In-service of New Generation Resources

Maritimes

The Maritimes Area has a 50 MW gas-fired combustion turbine scheduled for commercial operation on September 1, 2003. This unit was previously scheduled to be in service in October 2002.

New England

In the New England Control Area, from April 2001 through February 2003, approximately 4,300 MW (summer rating) of new capacity has been added with an additional forecast of 2,900 MW to be in service prior to June 1, 2003. Of the new generation assumed to be online this summer approximately 1,400 MW will be located in Boston. Past experience indicates that new projects with aggressive construction schedules, new designs or are large in magnitude, are frequently delayed due to unforeseen circumstances. ISO New England closely monitors the construction and commissioning progress of new generators. However, any delay in the commissioning of the new generation will decrease the projected capacity margins.

New York

Resource additions totaling 1,179 MW are expected to be available for service prior to the summer peak. Of this, 1080MW represents a new natural gas fired combined-cycle merchant plant located near Athens, NY, and the remaining 99 MW are simple-cycle combustion turbines in the Long Island zone. This resource assessment is based on the forecast of commercially available capacity at the start of the summer season so that any new capacity additions would serve to enhance the projected margin.

Ontario

Ontario will see the return to service of three laid-up nuclear units for the summer of 2003. The greatest concern to the summer capability period is the fact that no nuclear unit in Ontario has been returned to service from the laid-up state. Timing of the return to service of these units is critical to resource adequacy. The IMO recognizes the risks associated with the timing of the return to service and continuously monitors the resource adequacy margins.

Quebec

The commissioning of the Sainte Marguerite-3 hydro plant (900 MW) has been delayed again. It is likely that only one of its two 450 MW units shall be online for this summer. This assumption is used in this assessment. No other significant generation is expected.

Fuel Infrastructure by Area

The following is a self-assessment by each Area of the expected fuel supply infrastructure.

Maritimes

The fuel supply in the Maritimes Area is very diverse and includes Nuclear, Natural Gas, Coal, Oil (both light and residual), Orimulsion^{tm}, Petroleum Coke, Hydro, Tidal, Municipal Waste, and Wood.

The Maritimes Area does not anticipate any restrictions in capacity due fuel supply. Units that have been converted to the Orimulsion^{tm} fuel retain their full capability on oil. Moreover, the Area anticipates normal hydro conditions and the reservoirs are expected to be full.

New England

Historically, fuel supplies have been readily available to generators within New England during the summer months. For the summer of 2003, ISO New England does not foresee any fuel supply or delivery constraints.

New York

Traditionally, the New York Control Area generation mix has been dependent on fossil fuels for the largest portion of the installed capacity. Recent capacity additions or enhancements now available use natural gas as the primary fuel. While some existing units in southeastern New York have “dual-fuel” capability, use of residual or distillate oil as an alternate may be limited by environmental regulations.

Adequate supplies of all fuel types are expected to be available for the summer period.

Ontario

The majority of generation facilities operating on the IMO-controlled grid are represented by three basic types of fuel (Hydroelectric, Nuclear and Fossil). The fossil fueled facilities are predominately fired by coal. A portion of these fossil fired resources is fueled by natural gas or oil. A majority of the oil-fired capability is dual fueled by natural gas and oil. Adequate supplies of these fuels are expected to be available and there is no expectation of fuel delivery infrastructure problems for the summer period. Additionally, the hydroelectric installed capacity is reduced through portions of the study period to account for reductions in capacity when the available water falls below the dependable value. Dependable hydroelectric capacity is the capacity that is sustainable for a minimum of one hour per day, five days per week.

Quebec

Most of the generation resources in the Quebec Control Area are hydroelectric (95%) and hydraulic conditions are adequate. For the summer peak of 2003, TransÉnergie does not foresee any problems in meeting both its internal demand and full responsibility sales while still being able to assist neighboring Areas as needed.

5. Potential Usage of Operating Procedures

The NPCC CP-8 Working Group performed a probabilistic analysis to estimate the annual Loss of Load Expectation (LOLE) and projected use of Area Operating Procedures designed to mitigate resource shortages for the summer of 2003 under various conditions. This section is based on the CP-8 Study results.

The scenarios included expected and extreme load patterns. Detailed study results for each of these scenarios can be obtained from the NPCC CP-8 Working Group - Summer 2003 Multi-Area Probabilistic Reliability Assessment.

The study results indicate that all Areas demonstrated an annual LOLE of 0.1 days/year or less, under the Base Case and Severe Case assumptions for the expected load (the expected load is the weighted average of seven load levels, weighted by the probabilities assumed for each). They also indicate that New England and New York may experience conditions during the summer of 2003 that require the use of operating procedures designed to mitigate resource shortages. Use of these operating procedures is not anticipated for the Québec, Ontario, or the Maritimes Areas during the summer of 2003.

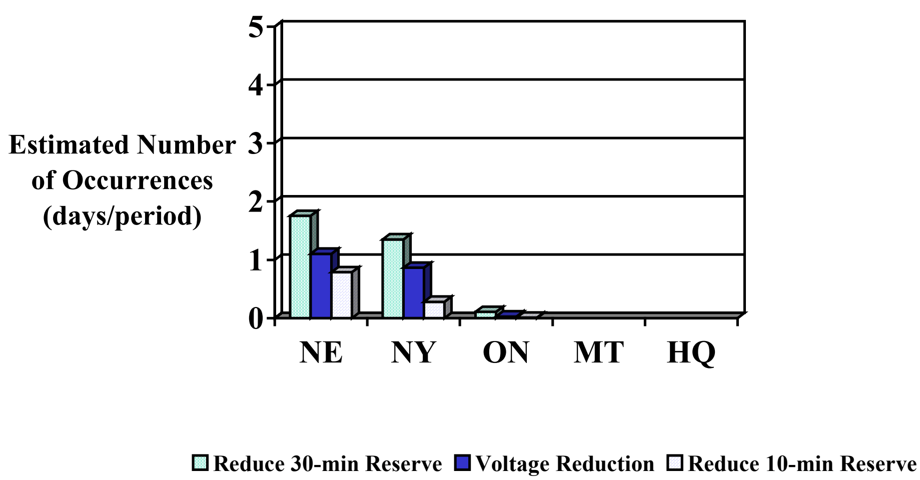
The potential use of these operating procedures in New England and New York is more likely to occur in Southwest Connecticut and New York City, respectively, if reductions in anticipated resources or increases in transmission constraints materialize coincident with higher than expected loads.

The actual number of times NPCC Area operating procedures were used to mitigate resource shortages for the summer of 2002 was within the range of last year's estimate.

As compared to last year's analysis, the identified additional resources, improved transmission transfer capability, and Demand Response Programs have reduced the estimated need for implementing operating procedures to maintain reliability within NPCC.

For the May - September 2003 period, Figure EX-1 shows the potential range of use of the indicated operating procedures under Base Case and Severe Case assumptions, expected and extreme load levels.

Figure EX-1
Potential Range of Use of Indicated Operating Procedures for Summer 2003 Considering Base and Severe Case assumptions (May – September) (Expected and Extreme load levels)



Transmission Adequacy

Many Inter-Regional and Intra-Area transmission studies are in the preliminary stages of assessment. Therefore, the transmission adequacy assessment for this report was made utilizing assumptions based on consultation with the staff in the appropriate area of expertise for Inter-Regional transfer capability, supplemented by Intra-Area Transmission assessments of each Control Area and a review of last years operating experience for equipment outage that occurred during the summer of 2002.

The following is a transmission adequacy assessment from the perspective of the ability to support energy transfers for the differing levels, Inter-Region, Inter-Area and Intra-Area.

Inter-Regional Transmission Adequacy

Evolution of the interconnected network is continuing in the northeastern U. S. Present plans are for the integration of the AEP and Dayton Power & Light systems as part of PJM's energy market operations prior to this summer with Commonwealth Edison and Dominion Resources following later in 2003. However, there have been regulatory/political challenges to those plans, which has resulted in the deferral of the plans for AEP, Dayton Power & Light and has made the Dominion Resources plan uncertain.

The final phase angle regulator installation on the Michigan-Ontario Interface (345 kV circuit L4D) is not expected to be completed until the end of August. The B3N (230 kV circuit Scott - Bunce Creek) phase angle regulator was forced from service in March 2003. The return to service of the PAR is not known at this time. This has created additional uncertainty to the projection of having all Michigan-Ontario Interface phase angle regulators in service for any portion of the summer operating period. Therefore it is assumed that the Michigan-Ontario Ties will remain free flowing for a major portion of the study period.

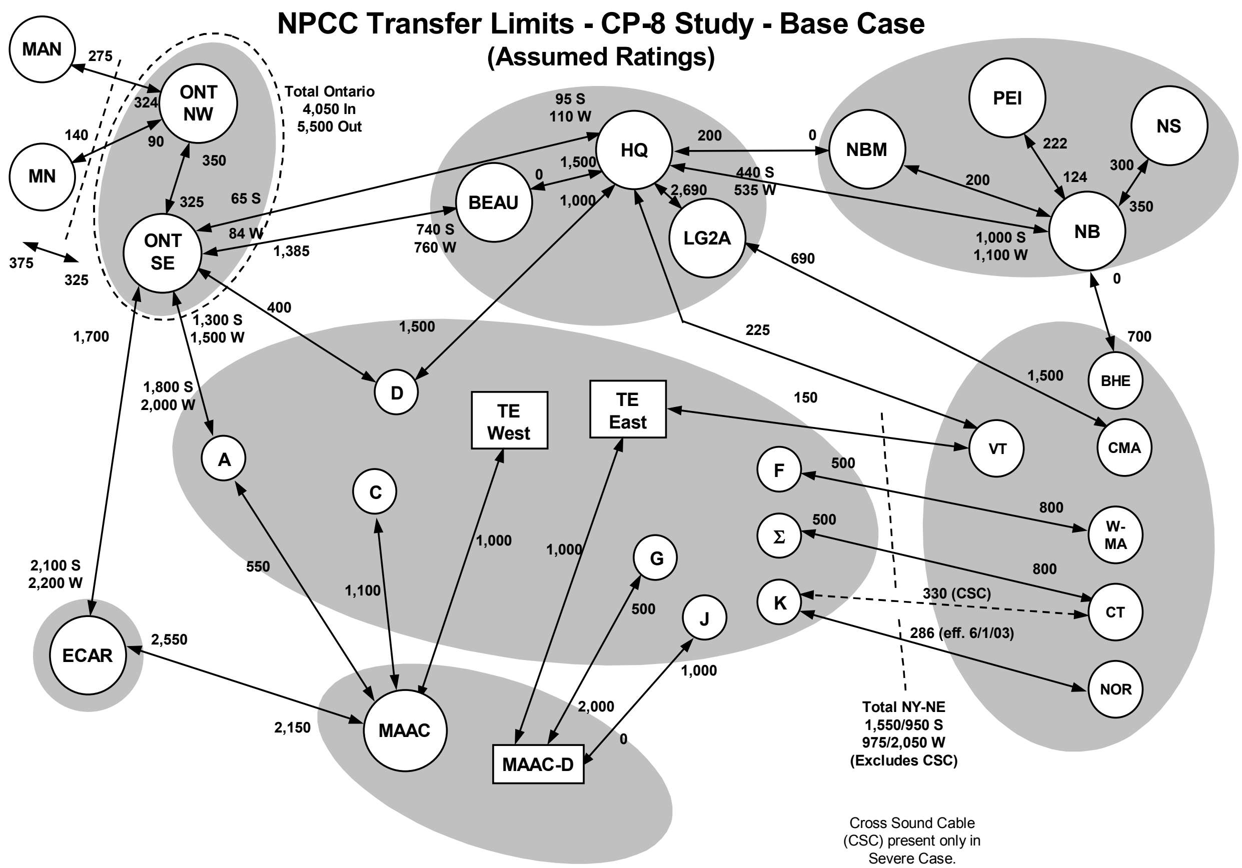
In addition, a tower on the B3N circuit was damaged, which forced the circuit out of service. The tower must be replaced and the expected return date for the circuit is July 31, 2003. During this time the ability to import energy into Ontario on the Ontario-Michigan Interface will be reduced by approximately 150 MW from the normal level.

It is expected that the transmission system is adequate to support the anticipated Inter-Regional transfers.

Inter Area Transmission Adequacy

The transfer capability between the NPCC sub-Area containing the Quebec Control Area and the Maritimes Area with the remainder of NPCC is less than the surplus capacity in this sub-Area. This accounts for the adjustment to the Net NPCC Margins in the Resource Adequacy assessment (Section 6). The estimated transfer capabilities used in the CP-8 probabilistic assessment were used to calculate the remaining transfer capability after known transactions are taken into account. These estimated transfer capabilities are illustrated in Diagram 1 NPCC Transfer Limits CP-8 Base Case.

Diagram 1
Assumed Transfer Limits Between Areas



Transmission Adequacy Assessment by Area

Maritimes

There have been no major additions to the Maritimes bulk transmission system. Interconnection capability remains unchanged and is expected to deliver up to 700 MW to New England and be capable of delivering up to 700 MW to Quebec.

New England

The following transmission upgrades are expected to be implemented during or prior to the summer of 2003:

- The installation of one 345/115 kV transformer at the Canal substation along with four additional circuit breakers to improve transmission reliability to the Cape Cod area;

- the addition of a 345/115 kV transformer at the West Rutland substation to improve reliability to the northwest Vermont region;
- Re-energizing the Coolidge to West Rutland line at 345kV will also improve the reliability to northwest Vermont;
- In order to improve reliability in the Boston area, the West Medway to Waltham 230 kV line is expected to be modified by increasing the sag limit.

For the summer of 2003, upgrades will be completed in the southwest Connecticut area that will provide some increases in the import capability. Specifically, two +/- 8 MVAR DVAR devices will be installed at the Stony Hill Bus as well as one at the Bates Rock Bus. Along with the DVAR devices, capacitor banks will be installed at the buses. The installation of these DVAR devices, along with the capacitor banks, will reduce the likelihood of load shedding in the southwest Connecticut area this summer.

Even with these scheduled improvements, there are still transmission constrained areas such as metropolitan Boston and southwest Connecticut. During periods of high demand, voltage and thermal limits may impact transfer capability into and within these transmission constrained load pockets.

New York

There are no major transmission facility additions to the New York bulk power system for the summer 2003 period.

Construction of the Cross Sound Cable, a 330 MW HVdc merchant transmission line and HVdc Converter Facilities between East Shore Substation in New Haven, CT, and the Shoreham, NY, has been completed. Commercial operation of the facility has been delayed due to regulatory issues. Parties involved in the operation of this facility are seeking an order from the FERC to allow emergency power transfer on this interconnection.

Phase II of the Marcy Flexible AC Transmission System (FACTS) Demonstration Project is scheduled for completion during the Spring 2003. The addition of static synchronous series compensator (SSSC) capability to FACTS Convertible Static Compensator (CSC) device will provide dynamic control of the transmission system power flows on either the Marcy – Coopers Corners or Marcy – New Scotland 345kV circuits. The new functionality and enhanced controls being installed in the 2nd quarter of 2003 will increase the number of operating configurations of the CSC to eleven modes.

Ontario

There are no new major transmission facilities scheduled to be placed in service prior to the summer operating period to change the overall transmission adequacy outlook from 2002. Studies indicate that there will be sufficient transmission capability to meet the projected requirements under most conditions. However, there will continue to be limitations to the outage program during extreme weather driven demands in certain sub-areas of the province.

While several new small and one large capacitor bank installation that is expected to be available for the summer of 2003, the Windsor area and Toronto area will continue to experience low system voltages during extreme weather condition. As was experienced in 2002 maintaining acceptable voltage profiles will require diligent assessment of outage plans, and dispatch/deployment of reactive resources.

Quebec

No major maintenance outages are scheduled on the interconnections with neighboring Areas from May to September. Transfer capabilities will be at their maximum throughout the summer. Internal Transmission outage plans are assessed to meet load, firm sales, expected additional sales plus additional uncertainty margins.

An experimental 100 MW Variable Frequency Transformer (VFT) is currently being installed at the Langlois substation near the Les Cedres generating plant. It will begin testing in the summer of 2003 and could eventually increase the transfer capacity via lines CD1 and CD2 from Dennison (Niagara Mohawk, NYISO). The additional margin is not expected to be commercially available before 2004. This interconnection is currently being fed by islanding generation at the Les Cedres plant and this VFT will also increase switching flexibility by reducing the number of islanding operations.

6. Operational Readiness for 2003

The Resource and Transmission adequacy assessments are key elements in determining NPCC's ability to meet the demands of the summer, but they are mere "snapshots in time" or simulations of conditions based on predictions of specific configurations. To mitigate the uncertainty surrounding load forecasts, forced outages and other conditions that cannot be controlled or predicted, the Control Areas of NPCC need to be prepared to deal with contingencies in real time.

The following is a synopsis of some of the most prevalent uncertainties affecting the ability to handle the projected demand and the mitigating actions NPCC Control Areas can take to diminish their impact during the summer 2003 period.

Reactive Capability of Generating Units

Heavy demand during the summer period requires that the transmission system voltages and the end-use reactive loads be supported by substantial reactive resources in relation to the real power requirements. While static VAR devices and shunt capacitors provide a known quantity of support based on design rating, the actual reactive capabilities of generators can vary significantly from the design capability.

The following is a discussion of each Areas methodology to monitor reactive capability.

Maritimes

The Maritimes Area, in addition to the reactive capability of the generating units, employs a number of capacitors and reactors in order to provide local area voltage control. The Area employs Static VAR Compensators and several synchronous condensers in key load centers to provide high-speed reactive power control. Further, the Maritimes Area is a winter peaking system and the loading of the transmission lines in summer is, in general, lower resulting in lower VAR consumption.

New England

ISO-NE and its satellite control centers continually monitor voltage and VAR conditions throughout the system to ensure reliability of the bulk power grid in New England. As transmission upgrades and new generators are added to the system, engineering analyses are conducted to determine appropriate voltage and VAR levels.

New York

Each generator providing voltage support service under the NYISO Tariff to the New York market is required to perform annual testing of reactive capability within 90% of its claimed operating capability. The NYISO staff reviews the test data and, if necessary, will perform appropriate voltage analysis to determine operating limits based on the reactive capability testing. In preparation for the summer peak period, the NYISO staff has reviewed the test data to ensure that all voltage support service providers are in compliance with the testing and reporting requirements for this ancillary service. The NYISO staff has also requested Transmission Owners and Generation Owners to identify local (in plant or station) issues that might limit a particular generator's voltage support capability.

Ontario

The IMO has the authority to test the declared reactive capabilities of generating units. Testing of generating units, critical to the support of key portions of the IMO-controlled grid has been performed. Analysis of the test results are underway to ensure that the demonstrated reactive capability is sufficient to meet system voltage support requirements.

Quebec

Being a winter peaking area, TransÉnergie does not encounter voltage collapse problems during the summer. On the contrary, controlling overvoltages on the 735kV network during off-peak hours is the concern. This is accomplished mainly with ample provision of shunt reactors.

Environmental Impacts

The major Federal rules that apply to electric generating sources in the northeastern United States are the Acid Rain regulations, New Source Performance Standards (NSPS) and State Implementation Plans (SIPs). The Acid Rain regulations require power plants to reduce both SO_2 and NOx emissions on a year round basis. The NSPS regulations set regulations for new power plants and States develop SIPs to meet National Ambient Air Quality Standards (NAAQS). In the northeast U. S., the NAAQS of most concern is the ozone NAAQS. In order to meet the NAAQS, states in the northeast have developed a summer time NOx Budget Trading Program that has been in effect for the last three summers. Under this program, sources in participating States will be allocated around 212,838 allowances. Last summer these same sources emitted around 193,000 tons. In the three summers prior to 2002, a bank of 78,746 tons had been saved. However, according to the Clean Air Markets Division of the EPA there will be zero banked allowances carried forward into the 2003 ozone season because the NOx Budget Program is transitioning to the NOx State Implementation Plan (SIP) Call Program.

The environmental regulations affecting electric generating sources in Regions 1 and 2 (northeastern US) for the summer 2003 include both market based cap-and-trade programs and traditional command and control programs. EPA's Acid Rain Program and the northeast's NOx Budget Program are cap-and-trade programs that encourage sources to find the most cost effective means of meeting environmental goals while promoting energy efficiency. Other programs such as the New Source Performance Standards are command and control programs based on emission rates for given boiler types. Permitting issues related to new generation placement are a major portion of the command and control rules.

Short-term impacts on individual unit operation during 2003 summer are more influenced by the summer time regulations as opposed to the annual regulations because these regulations are more stringent. For the NOx Budget Program, sources may either install NOx control technologies or buy allowances from sources that have been overcontrolled. It is possible that fuel switching between oil and gas can be a problem. Quick start-up of mothballed units is also allowed under the rules.

Overall, it is not expected that EPA rules will have a major impact on electric system reliability through its environmental programs during 2003 summer. State, provincial and local environmental rules are expected to have more of an impact on electric system reliability that is described in more detail by Control Area.

Another environmental impact influencing generation during the summer is water level. This was a significant issue during the Summer 2002. With the exception of the Great Lakes, the above average precipitation during the latter half of 2002 and continuing into 2003 has allowed most reservoirs in the northeastern states to recover to normal condition. Snowpack depth in the watershed areas of the northeast is also near normal levels. Based on current forecast information, it is anticipated that hydro generation and other generating facilities that use water for purposes of emission control or cooling are not likely to be impacted. Generators are encouraged to monitor water levels as the Summer peak season approaches.

The following are the Area assessments discussing environmental related issues.

Maritimes

The Maritimes Area closely monitors air emissions and other environmental discharges to ensure compliance with standards and limits set forth by Canadian Federal and Provincial environmental regulations. For the summer 2003 period, there may be occasions when some units are required to be de-rated in order to meet these regulations. However, these occasions are expected to be infrequent and of short duration.

New England

ISO-NE is mindful of environmental restrictions and constraints on New England's generating capacity and usually conducts an annual pre-seasonal review. In preparation for the summer of 2003, a letter will be sent to all generating facilities within New England inquiring about the status of their environmental permits and potential impacts on operations due to environmental constraints. Generators are encouraged to pursue temporary waivers of their environmental permits during periods of extreme capacity deficiencies.

New York

There is a limited possibility that there may be a shortage of available capacity in the New York City metropolitan area due to environmental constraints. An extended period of high temperatures and high humidity leading to an unacceptable level of ozone in the region may limit the availability of generation to meet load. In 2001 the NYISO obtained a waiver from the New York State Department of Environmental Conservation (DEC) to address such an air quality emergency and is continuing to work with the DEC staff on this concern. Should such a situation arise, it is incumbent on the NYISO to maximize the availability of generation outside the effected area and insure that all other steps are taken in accordance with the capacity emergency procedures (NYISO Emergency Operations Manual). After this the DEC would allow operation outside of emission limits to avoid curtailment of firm load in New York.

During the second half of 2001 and continuing into 2002, precipitation over much of the Region was below average and was approaching drought conditions. As noted above, near average rainfall in the latter half of 2002, and precipitation levels and snowpack depth in the watershed areas of upstate NY are above normal approaching the end of Winter 2003. Should precipitation levels remain near average, water use restrictions are not likely, and are not expected to effect generating availability or capacity.

Ontario

There are many environmental issues that specifically affect the operation of facilities in Ontario during the summer operating period. Compliance with these standards is strictly monitored by the facility owner.

Some facilities have annual energy limitations to observe permissible emission limits. These annual limits are not expected to impact the overall energy and capacity projections for the summer operating period.

It is also recognized that there is a potential to restrict generation to respect environmental regulations due to cooling water temperatures etc. The timing and the overall impact of any restrictions are unpredictable.

Currently it is the facility owner that would request the appropriate authority to permit a variance from these obligations to assist in a capacity deficiency. Experience gained in 2002 was utilized to revise procedures where the IMO requests the facility owner to obtain variances to environmental obligations under emergency procedures. These revised procedures should expedite any request to obtain an environmental variance if it is required.

Quebec

The bulk of generation in Quebec is hydroelectric based, therefore the environmental concerns, as they pertain to this report are not of concern.

Geomagnetically Induced Currents (GICs)

Past experiences have shown the serious effect that geomagnetic disturbances can have on the NPCC bulk power system. Quasi-DC currents induced in power lines flow to ground through transformer neutral connections. This can result in saturation of the transformer core leading to a variety of problems, including increased heating that has resulted in transformer failures. In addition, the harmonics generated in the transformer, as a result of the saturation, may produce unanticipated relay operations, such as sudden tripping of transmission lines or shunt capacitors.

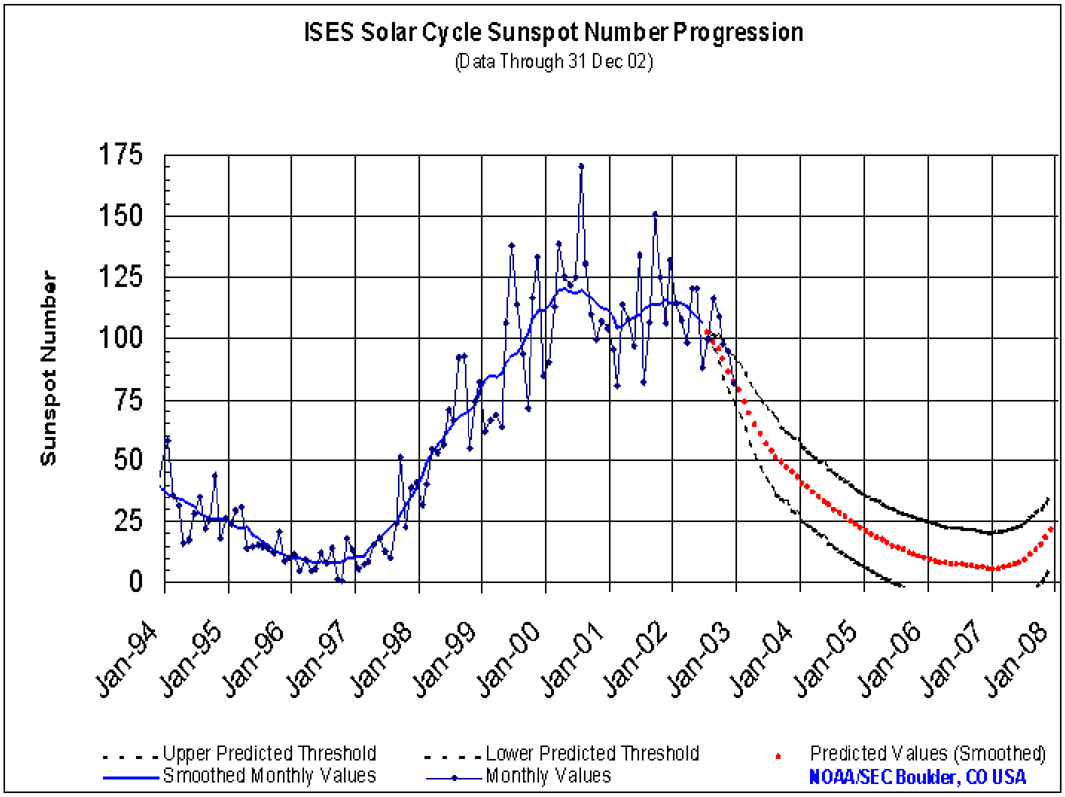
GICs are produced by the magnetic field variations that occur when a mass of electrically charged particles from a solar coronal mass ejection impacts the earth's magnetic field. Because of the low frequency compared to the AC frequency, the geomagnetically induced currents appear to a transformer as a slowly varying DC current.

GIC flowing through the transformer winding produces extra magnetization, during the half-cycles when the AC magnetization is in the same direction this effect can saturate the core of the transformer. This also results in severe distortion of the AC waveform with increased harmonic levels that can cause incorrect operation of relays and other equipment on the system and may lead to problems ranging from trip-outs of individual lines, transformers or shunt capacitors to collapse of the whole system.

GIC activity correlates to 11-year sunspot cycles. We are presently in Cycle 23 (twenty third cycle recorded runs approximately from 1996 through 2007), which began in 1996 and is predicted to end about January 2007. During the portion of the solar cycle that has greater sunspot activity, there is a higher probability of GICs occurring, which could impact the NPCC system. Observations of sunspot activity only provide insights as to the timing of the release of energy; it is the solar winds that ultimately determine the intensity and duration of a geomagnetic storm and those areas of the earth that will be ultimately affected. A satellite, positioned between the earth and the sun is capable of determining the intensity of the storm. The timing between when this satellite senses the magnitude of the storm and when the effects are noted on the earth is less than 1 hour.

Within NPCC the CO-8 Operations Managers Working Group has explored ways to obtain accurate and timely forecasts of solar magnetic disturbances and the resulting GICs for the NPCC Control Areas. NPCC has contracted for GIC forecasting services from Solar Terrestrial Dispatch (STD) for a three year period. Forecast information is provided directly to the control centers in the NPCC Areas.

Regarding recent GIC activity by the end of 2001 it was apparent sunspot activity had achieved a second peak late in the year. Activity is now on the declining side of solar cycle 23, and the minimum is predicted to occur in late 2006 or early January 2007. Significant GIC activity was observed in the months of April and October of 2002; however, no direct power system impact was identified. The following graph illustrates past geomagnetic disturbance levels and projections of future solar activity. Monthly updates, and further information can be found at www.sec.noaa.gov/. Based on historical experience, the affects of GICs to reliability should be manageable with our present procedures.



The following is a summary of each Area's experiences of GIC activity through the recent "high period" as evidence of the potential impact to NPCC Control Areas as well as a summary of control actions in place to reduce the impact of GIC.

Maritimes

The Maritimes Area did not experience any significant disturbances in 2002 and no major problems are anticipated for 2003. The Maritimes Area Operating Procedures are consistent with NPCC Operating Procedures for GIC activity.

New England

On several occasions during 2002, New England received geomagnetic storm warnings. Proper notifications were made and applicable actions were taken in accordance with NPCC document C-15 entitled, "Procedures for Solar Magnetic Disturbances on Electrical Power Systems." On May 23, 2002, several Level 1 GIC alarms were reported at the Chester Static VAR Compensator (SVC) in Maine. On that day, scheduled imports over the HQ HVDC Phase II facility and the tie with New Brunswick were temporarily reduced to ensure transmission reliability.

New York

During 2002, NYISO received notification of observed K-7 three times. There were no effects experienced that were comparable to the storms of March and November 2001, and there were no GIC power system effects observed.

Ontario

The IMO received numerous geomagnetic storm warnings throughout the period extending from 2001 into 2003. No actions beyond those required by the existing procedures were taken and no operating problems beyond elevated neutral currents were observed through this period.

Quebec

During the summer of 2002, there were two occurrences of GICs. Alerts were called on May 24, 2002 and on September 7, 2002. The alerts predicted Kp levels of 7-8 and they actually reached 7 on both occurrences and no adverse effects on the bulk system were recorded. Maximum voltage asymmetry recorded was 1.3%. Some transfer limitations on the bulk system were imposed but Interconnection capacities were not affected.

Operating Procedures

Detailed NPCC Operating Criteria, Procedures, Guides and Reference Documents provide the Areas with the necessary material to develop and maintain a concise set of operating procedures that are relevant to maintaining the security of the Control Area by observing local operating parameters. Listings and descriptions of the documents related to operational readiness for the summer months are summarized in Appendix II.

TFCO is systematically replacing operations-related “B” and “C” documents by adding the requirements language from these documents to “A” documents, creating Reference Documents with the non-requirements content.

Since the Reliability Assessment for Summer 2002, the following revisions to NPCC documentation have occurred:

The A-3 “Emergency Operation Criteria” and the A-6 “Operating Reserve Criteria” documents have been revised and approved by the NPCC membership. In addition, definitions required in the A-3 and A-6 documents have been added to the A-7 “Glossary of Terms” Document. New Reference Documents RD-04 “Operating Procedures for AEC Diversity Interchange” and RD-05 “Procedure for Operating Reserve Assistance” have been created. Also, draft versions of Reference Documents RD-06 “Monitoring Procedures for Operating Reserve Criteria” and RD-07

"Procedures for Shared Activation of Ten Minute Reserve" have been developed as revisions to the present C-9 and C-12 documents, respectively.

Major revisions to the A-3 Document include: inclusion of the requirements and specificity defined in former documents B-20, "Guidelines for Identifying Key Facilities and Their Critical Components for System Restoration," and C-31, "Testing and Reporting Procedure for Key Facilities and Their Critical Components Required for System Restoration". These requirements needed to be relocated into a criterion document. In addition, the monitoring of these requirements by the NPCC Compliance Monitoring and Assessment Subcommittee is specified.

Major revisions to the A-6 document include: the 30 minute restoration requirement for ten minute reserve deficiencies was changed to be consistent with the latest version of NERC Policy 1. This allows 90 minutes after the disturbance recovery period (15 minutes) for the contingency reserve to be restored – effectively 105 minutes from the start of the contingency and the synchronized reserve recovery requirement is extended from 10 to 15 minutes.

To be prepared to deal with the constantly changing conditions on the power system, NPCC routinely conducts weekly operational planning calls between Reliability Coordinators to coordinate short-term system operations. NPCC has also refined and expanded its emergency conference call mechanism to enable operational security entities in NPCC and neighboring regions to communicate current operating conditions and facilitate the procurement of assistance under emergency conditions. These calls may be initiated upon the request of any Reliability Coordinator and is coordinated by NPCC Staff. Due to the commercially sensitive real-time nature of the material discussed, only signatories to the NERC Confidentiality Agreement for Electric System Security Data may be party to these calls. The CO-8 Operations Managers Working Group has recently streamlined the emergency conference call procedure to be more focused on the situation causing the emergency and to limit discussion to the entities requesting emergency assistance and to those that could provide help. In addition, several security-related CO-8 conference calls have been held.

Each Area in NPCC is required under Document C-13, to review its coming twelve-week capacity margin projection on a weekly basis. This information is communicated to NPCC for review during the weekly conference operational calls held in accordance with C-13, "Operational Planning Coordination." In addition to this review of twelve-week capacity margin projections, the weekly conference call discusses operations for the coming ten-day period as well as any information that may impact operations.

Each Control Area has complemented the NPCC Procedures and Guidelines with instructions as they apply to their local conditions. The following is a summary of activity that Areas have taken to ensure that instructions remain current.

Maritimes

The Maritimes Area Operating Procedures are in compliance with the NPCC Operating Procedures and are supplemented with local procedures.

New England

On March 1, 2003, ISO-NE implemented the Standard Market Design (SMD). This new market aims to identify Locational Marginal Prices (LMP), resolving seams issues with surrounding control areas, and introduces many new features to New England's wholesale electricity markets. New features include: a Day Ahead Market (DAM), Real Time Market (RTM), Financial Transmission Rights (FTRs), LMP, Auction Revenue Rights (ARRs), and significant modifications to existing market rules and procedures.

In order to efficiently convert to the new markets, ISO-NE and NEPOOL Participants have been involved in a number of market trials. These market trials were designed to simulate the proposed markets under future conditions and provide training to all stakeholders. Market trials were completed by February 1, 2003 and any problems arising from them were managed by March 1, 2003.

In parallel with the implementation of SMD, a considerable amount of effort was focused on reviewing and revising New England's Market Rules and Operating Procedures. New England's Operating Procedures are in compliance with the NPCC Operating Procedures and NERC requirements.

New York

The NYISO continues to review and refine operating and market processes based on experience gained through the sustained peak load periods of the previous summers. The positive experience with the initial implementation of the Emergency Demand Response Program during that period means that program will continue and expand. Staff will continue the review of Operating Procedures to insure that these procedures remain consistent with NERC and NPCC requirements and with the interconnection agreements and coordinating procedures with the adjacent Areas.

Ontario

The IMO continuously reviews and revises all operating procedures to ensure that they are consistent with both NERC and NPCC requirements as well as with the Market Rules for Ontario.

Throughout the summer operating period, additional NERC Certified System Operators will be available to supplement Control Room Operations staff as conditions dictate.

Quebec

In the event of a capacity deficiency, TransEnergie would first ask Hydro-Quebec Marketing (HQM) to find additional generation in or out of the Control Area. After this step, Emergency Operating Procedures, compliant with NERC and NPCC are implemented.

Changes to Operating Procedures in Shoulder Months

As previously indicated in this report, the uncertainties associated with weather variability and maintenance overruns in the spring months can quickly lead to resource shortfalls. Past history has indicated that resource assessment procedures need special attention during this time frame. As a result of these capacity shortfalls, many of the Areas have taken actions to prevent a reoccurrence and are described below.

Maritimes

The Maritimes Area Operating Procedures for the shoulder and summer period are essentially the same as for the summer of 2002 and no changes are anticipated for the summer of 2003.

New England

ISO-NE's Outage Coordination staff has reviewed the proposed maintenance schedules for generators in the Control Area and, where appropriate, have worked with the owners to adjust their outages in anticipation of load levels that may be experienced in the weeks prior to or following the summer peak load exposure period. However, there is a large amount of capacity scheduled out-of-service in May and if many of these units experience maintenance overruns, the operable capacity margins projected for June could be adversely degraded.

New York

NYISO Scheduling staff has reviewed the proposed maintenance outage schedules for generators in the Control Area and, where appropriate, have worked with the generator owners to adjust the outage schedules in anticipation of load levels that may be experienced in the weeks prior to or following the peak load exposure period.

Ontario

As stated above, the IMO has performed an extensive review of reliability procedures prior to incorporation into new market manuals. This includes the procedure for maintaining reserve margins and rectifying negative margins. These procedures will be enforced to ensure that the necessary control actions are taken in the appropriate time frame if needed to ensure that planning obligations are met.

Quebec

The TransÉnergie Operating Procedures are updated on a continuous basis to reflect changes in the regulations, market rules and local procedures. There is not, however, any special Operating Procedures in the summer or shoulder months because TransÉnergie is a winter peaking system.

Load Response Programs

Each Area utilizes various methods of demand management associated with interruptible loads. In those Areas where market based structures have been implemented or are evolving there has been a shift in contractual obligations of the interruptible loads. The move is an attempt to manage load interruption, as a result of demand exceeding resources, by giving industrial and commercial customers the ability to respond to price signals in the wholesale electricity marketplace. Many of these programs are in varying degrees of development. The following is a summary of current interruptible load programs available or in development to be available for the summer period in each Area.

Maritimes

The Maritimes Area is a winter peaking area and does not have any Load Response Programs. Interruptible and Dispatchable loads are available for use when corrective action is required within the Control Area.

New England

During times of capacity deficiencies, ISO-NE declares NEPOOL Operating Procedure No. 4 (“Action During a Capacity Deficiency OP-4”) that includes; purchasing emergency energy from the neighboring control areas, interrupting dispatchable and interruptible load customers, implementing voltage reductions, and public appeals for conservation. This Emergency Operating Procedure (EOP) provides load relief measures estimated to be between 1,700 MW to 2,700 MW[4].

In addition to OP-4, ISO-NE and NEPOOL Participants are continuing the Load Response Program (LRP) with the goal of temporarily reducing peak electricity demand by large power users. Through the LRP, NEPOOL Participants or Demand Response Providers enrolled directly with ISO-NE can enter into agreements with retail customers to encourage them to reduce their electricity consumption during periods of high prices or peak demand.

[4] This value is based on the NEPOOL OP-4 document as of November 20, 2002 which can be found at: www.iso-ne.com/cmsmss/Standard_Market_Design/Operating_Procedures/

Within the LRP, an asset can reside in one of four distinct programs:

1 – Day-Ahead Demand Response Program
2 – Real-Time Demand Response Program
3 – Real-Time Price Response Program
4 – Real-Time Profiled Response Program

Participants in the Day-Ahead Demand Response Program will offer an amount of energy into the Day-Ahead market and, if cleared, will be required to interrupt as offered. Those participants that do not clear in the Day-Ahead Demand Response Program have the option to participate in the Real-Time Price Response Program. Within this program, participants will have the option to voluntarily reduce energy consumption in real time when the Zonal Price produced by the Day-Ahead Energy Market is greater than or equal to $100/MWh.

Participants involved in the Real-Time Demand Response and Real-Time Profiled Response Programs will be activated during pre-determined actions of OP-4. Further details pertaining to the four programs can be found in the ISO-NE Load Response Manual.

New York

The NYISO introduced a new load response program for the New York Market in May 2001. The Emergency Demand Response Program is a program in which Customers would be paid to reduce their consumption by either interrupting load or switching to emergency standby generation when requested by the NYISO. During the Summer 2002 period, NYISO activated the EDRP on two occasions. NYISO received 663MW on July 30, and 636MW on August 14.

The Emergency Demand Response Program is continuing for Summer 2003, and NYISO estimates that approximately 700MW of load relief will be available to support the New York State power system during capacity emergency periods through this program. This program is in addition to the relief obtained through the emergency procedures for Operating Reserve Peak Forecast Shortage (Section 4.4.1 NYISO Emergency Operations Manual) or in response to the major emergency state (Section 3.2 NYISO Emergency Operations Manual).

Ontario

As mentioned in the resource adequacy assessment, under the IMO-Administered Market, there are about 300 MW of price responsive loads. A majority of these loads are treated as a resource that will be dispatched off the system by the IMO once the price of energy in the real time market has exceeded the bid (to Buy) price submitted by the load. The subject load must then reduce their demand according to the dispatch instructions or the load will face compliance proceedings.

In 2002, the IMO instituted an Emergency Demand Response Program to provide additional demand relief under emergency conditions. The pilot program, which runs until April 30, 2003, saw an additional 340 MW of customers involved in this contracted ancillary service. The customers would reduce their demand on a voluntary basis. This step was implemented just prior to the interruption of firm load. The effectiveness of the pilot program has been reviewed and work is underway to extend the program for the summer of 2003.

Quebec

The Quebec Area is a winter peaking system and does not usually need to resort to the load response programs during the summer, although, of the 1,356 MW of interruptible power available in winter, 667 MW could be called on if needed during the summer.

Emergency Communications Systems with Customers

There is nominally some time lag for control actions to take effect to rectify a resource deficiency. In the evolving market places there are now many players in Areas where at one time there were only a few. As a result, simultaneous communications need to be timely and efficient for multiple resources to respond to directions by the Reliability Coordinator to quickly mitigate the need for emergency control actions, including the shedding of load.

Below is a summary of the communication medium that each Area utilizes to communicate emergency situations with generators, transmitters and customers.

Maritimes

The individual Control Centers within the Maritimes Area provide timely and accurate information regarding the status of the power system to customers via websites, news releases, high volume Interactive Voice Response System and telephone contact through Public Affairs and Customer Services departments or Call Centers.

New England

In the event of a capacity deficiency, ISO-NE's website provides real time information to the general public regarding the status of the power system and the amount of Emergency Energy Transactions requested during peak periods. In addition, Control Room Operations will convey the necessary information to ISO-NE's Customer Service & Training and the Media and Corporate Communications Departments so that they can make the necessary communications to federal and state regulatory agencies and the media. Operations personnel convey the details of any capacity deficiency to the Satellite Control Centers and neighboring NPCC Areas as appropriate.

In addition, ISO-NE creates a seven-day forecast that is posted to the ISO web site. This posting includes a capacity analysis for the peak hour of each day, detailing the forecasted amount of surplus/deficient capacity for each future day to illustrate anticipated system conditions.

New York

The NYISO is continuing implementation of its Inter-Control Center Communications Protocol communications system (ICCP) allowing bi-directional data communication directly from the NYISO control center systems to the generating plants. In normal operation this facilitates the transmitting of schedules and base-points from the NYISO dispatch system to the generators, and improves the accuracy and timeliness of generator real and reactive power metering.

The NYISO website now displays information including actual control area load in addition to the real-time zonal pricing information and transmission outage schedules. Market Participants may also access a “dispatcher notes” page that provides information on current NYISO system operating conditions.

Ontario

On a daily and weekly basis the IMO will be issuing Security and Adequacy Assessments (SAA). These supply the Market Participants with detailed adequacy projections on an hourly resolution for a period of 14 days into the future and on a weekly resolution for the following two weeks.

The IMO also publishes to Market Participants a System Status Report (SSR) three times daily by Market Forecasts and Integration during the pre-dispatch period outlining deviations from the SAA published for days 1 and 2.

The SSR has capability to identify to Market Participants the following Advisories: Major Change Advisory, System Advisory and, System Emergency Advisory.

To address global adequacy concerns when there is insufficient energy or capacity available to the IMO-controlled grid or when there are insufficient offers in the real-time dispatch of the IMO-administered markets, the IMO shift staff can also issue a SSR. The SSR can be prepared on very short notice. A notice is sent to Market Participants via their dispatch workstations notifying them that a new SSR has been issued with the details of the SSR being published to the IMO Public Web site.

To address local area adequacy concerns, the IMO will direct Market Participants to submit offers, either via the Market Participant's dispatch workstation or telephone.

The IMO also recognizes the need to communicate with the general public at times when there might be supply shortfalls. To achieve this, the IMO created a public communications process to ensure that consumers and industries in the general public were given all the information they need to make informed choices. The procedures proved to be an effective tool in 2002 for managing load during what proved to be the hottest summer in Ontario history.

Quebec

To satisfy demands in Quebec, TransÉnergie solicits additional capacity requirements it may need through Hydro Quebec Marketing (HQM). If HQM cannot secure the additional capacity required or there is not sufficient time to fulfill the need identified, TransÉnergie would take actions including the securing of emergency energy from neighboring systems, cutting of available interruptible loads and instituting voltage reductions. If these measures are deemed to be insufficient and there is adequate time a public appeal would be instituted through commercial media. The probability of resorting to these measures during the summer is very low.

Acquisition of Emergency Energy between Areas

In May of 2000, the NPCC Task Force on the Coordination of Operation adopted a Memorandum of Understanding for NPCC Area Emergency Assistance. This document outlines the steps to be taken when there is either a forecast or actual shortage of operating reserves. The objective of the process is to maximize the reliance on the marketplace to resolve resource inadequacies, minimizing the need for emergency transactions between Areas.

While all Areas are resolved to let the market place solve such inadequacies, there may be occasions where market forces cannot respond in the appropriate manner or time frame. The following is a summary of ability to transact emergency energy between adjacent Areas.

Maritimes

The Maritimes Area, through existing agreements with neighboring Control Areas, namely, ISO-NE and TransÉnergie, has established procedures for the acquisition of emergency energy.

New England

ISO-NE, through a bid based energy market, has procedures in place to determine the availability of emergency assistance from its neighboring control areas when necessary.

New York

During 2002, the NYISO completed updating of the emergency energy provisions in the interconnection agreements with the Control Areas neighboring New York.

Ontario

The IMO negotiated new operating agreements with the adjacent Reliability Authorities in 2002 as part of the steps to the new Market. These operating agreements contain provisions for the transaction of emergency energy into and out of Ontario and are only implemented in the event that market based solutions are ineffective.

Quebec

TransÉnergie has agreements with all the Control Areas neighboring Quebec that detail the conditions and procedures for acquiring emergency energy.

Training Programs

The Control Area operators routinely receive training as a regular part of their regime.

NERC is willing to offer the possibility to System Operators to replace their re-certification requirement (every five years) by a proof of attendance to 16 hours per year of training coming from certified courses or programs. This would only be required for the last 2 years prior their recertification renewal (year 4 and 5) for a total of 32 hours for operators having been certified with the actual exam and, after having provided such a proof of attendance, every 2 years. These recognised hours of attendance would give operators CEH (Continuing Education Hours). Courses or programs providing those CEH would have to be certified by the NERC CERWG (Continuing Education Review Working Group). In April, a workshop will be offered in St. Louis for course and program providers to understand more the requirements that they will need to meet to be able to provide CEH. In summer, courses and programs certified to issue CEH could be offered by these providers and finally, in October or November the NERC Board of Trustees could approve this new process. More information is available on the NERC Web site

The following is a summary of those activities planned prior to the summer operating period of 2003.

NPCC will be conducting a dispatcher seminar at ISO-New England on May 1 and 2, 2003, for dispatchers from each of the Control Areas in NPCC to share views and experiences. It is also a presentation vehicle for issues of concern to all NPCC Area operators. The keynote topic will be the New York-New England common market development. The seminar will also include the summer outlook for each Area, a summary of recent events within NPCC, developments coming from NERC, an update on NPCC policy and procedures, and a review of recent events in the industry. The agenda and seminar are developed by the NPCC CO-2 Working Group on Dispatcher Training, in conjunction with CO-8 System Operations Managers.

Maritimes

The Member companies that comprise the Maritimes Area routinely conduct their own operator training sessions and participate in NPCC Operators training seminars. Only the operators in the New Brunswick Power Control Center are required to be certified by NERC, although other operators have received certification. The Maritimes Area participates in the CO-2 Dispatcher Training Working Group.

New England

In late spring of 2003, ISO-NE Operators and satellite control center personnel will participate in training sessions in preparation for the summer peak load period. During these training sessions, applicable NPCC procedures and NEPOOL EOPs are reviewed in detail. The summer capacity assessment is also reviewed as well as area-specific voltage control issues and intra-area communication procedures. Training of ISO-NE Operations staff, including the Satellites, is continually on-going.

New York

NYISO Dispatcher Training staff will be conducting two weeks of in-house training for each crew of NYISO dispatchers prior to the summer of 2003. These sessions will address operations issues, updates on NERC activities (Policy 9, Infrastructure Protection Initiative, E-tag, etc.), NPCC policy changes, updates on NYISO market operations and market design, updates to NYISO applications and procedures.

NYISO Dispatcher Training staff also presented a series of one week System Operator Training Seminars for a combined audience of the NYISO dispatch staff and New York Transmission Owner (TO) system control operators. This program reviewed selected NYISO operating policies, recent system events, the system outlook for the Summer 2003, and issues of mutual concern to both TO and NYISO dispatchers. NYISO emergency operation procedures (Back-up Dispatch System, Alternate Control Center operation, and Restoration) were also reviewed in preparation for the spring drills.

Ontario

The IMO continuously operates a training program to ensure that the control room staff maintains awareness of current and new NERC, NPCC and local operating procedures.

In preparation for the summer operating period, the IMO has set aside time in the training program for Shift Operations staff to review results of the IMO summer assessment, review reactive dispatching techniques as well as, a review of the changes to emergency procedures.

Additionally, the IMO plans and participates in drills and exercises on a regular basis to hone emergency preparedness skills and test procedures by simulating real events.

On October 2, 2002 the IMO led an integrated power system restoration exercise to enhance and improve the response capabilities of the IMO, Market Participants and Emergency Response organization during emergency situations. Exercise 2002 successfully met all objectives through a comprehensive simulated power system restoration of southern Ontario excluding the portion east of Toronto. The Exercise involved the shift operations from the IMO and 23 other organizations. These included 11 major Distributors, 2 Transmitters, 5 Connected Wholesale Customers, the Ministry of Energy, Emergency Management Ontario, and 3 Generators.

The IMO will also perform a Rotational Load Shedding simulation exercise prior to the summer operating market commencement. This exercise will test procedures and training as well as verify communication methodologies and validate revised load shedding schedules.

Quebec

Aside from continually on-going training of the operations personnel, there are monthly and seasonal meetings where anticipated conditions are discussed and new procedures are explained.

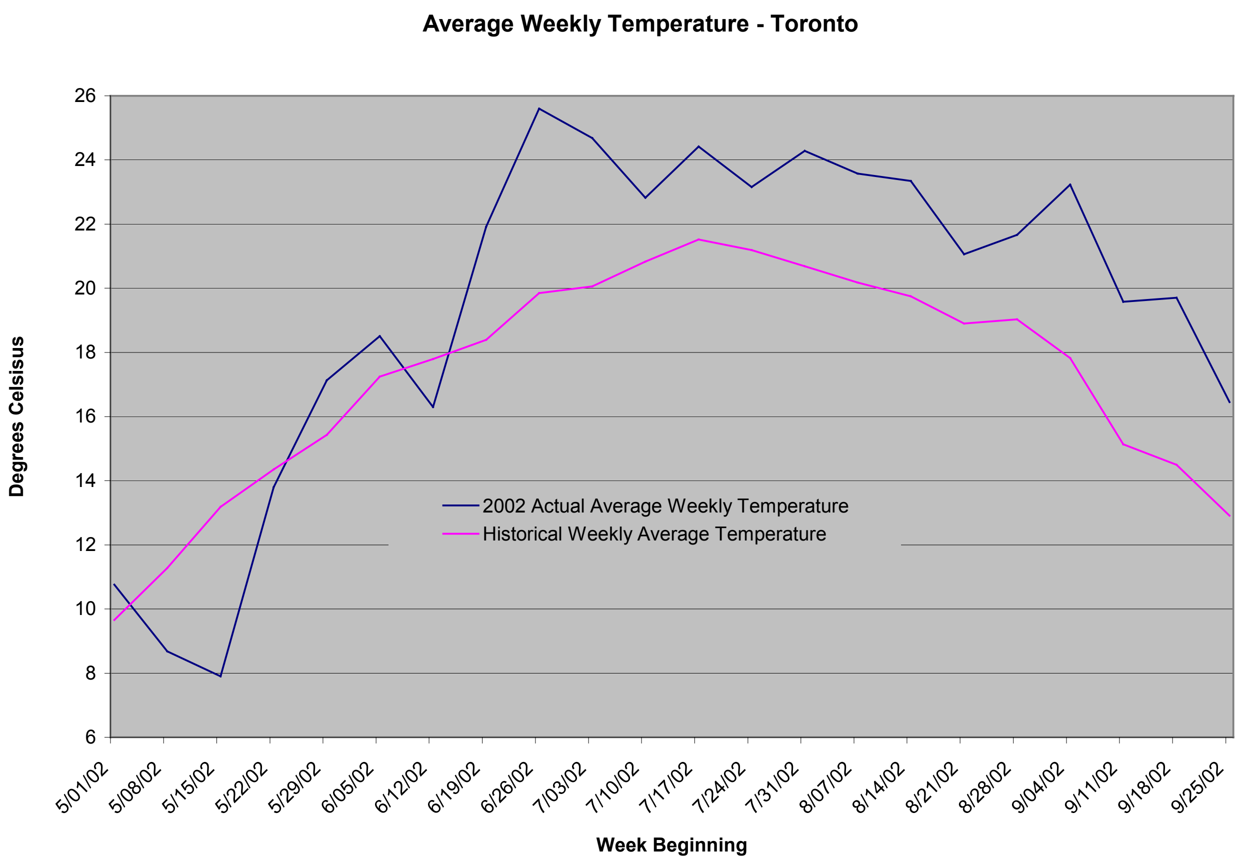
7. 2002 Post-Seasonal Assessment and Historical Review

2002 Post-Seasonal Assessment

At the request of the Task Force on Coordination of Operation the Operations Planning Working Group conducted an assessment that reviewed 2002 summer actual operating conditions versus the 2002 Summer NPCC Reliability Assessment Report projections. The following summarizes some highlights of the review. Please refer to the 2002 Summer Report for details on projections.

Ontario

The 2002 summer was one of the warmest on Record. Hot humid conditions were experienced throughout the summer in Ontario. As a comparison, the actual weekly average temperature at Toronto exceeded the historical average temperature in every week of the report period except four. The chart below shows the average weekly temperature in 2002 plotted against the 30-year weekly average temperature as

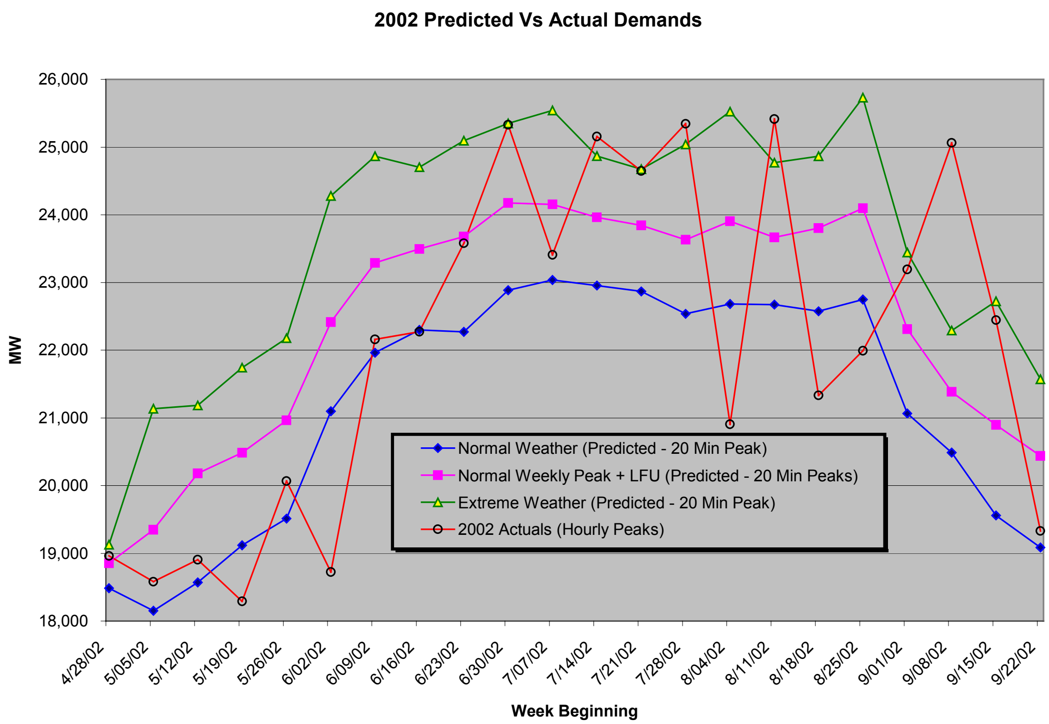


recorded at Toronto's Pearson Airport.

While the above graph shows the average temperatures for the summer exceeded the historical average, it is important to point out that there were 40 days where the maximum daily temperature exceeded 30 degrees Celsius (The historical average is normally only 12 to 13 days per summer). Additionally, there were 5 periods in the summer where this temperature extreme lasted 4 or more consecutive days with the longest lasting 8 days. Also of note were the above normal temperatures experienced though most of the month of September.

		May	June	July	August	September
Days Max Temperature above 20°c	Historical	11.8	23.6	30.1	28.8	16.7
	2002	9	21	31	30	26
Days Max Temperature above 30°c	Historical	0.43	2.3	5.7	3.2	0.8
	2002	0	6	16	12	6

With the higher than expected temperatures came higher than expected demands. The following chart shows the actual Ontario hourly peak against the three curves illustrated in the 2002 TFCO Summer Operating Reliability assessment. The load exceeded 25,000 MW on 6 days through the report period for a total of 23 hours.



Monthly Peak Hourly Demand for Ontario

Month	Day	HE	Hourly Demand
May	30	16	20,068
June	26	16	23,578
July	3	16	25,330
August	13	14	25,414
September	8	17	25,062

With no new generation resources forecasted it was highlighted in the 2002 TFCO Summer Reliability Assessment that extreme weather impacts and /or higher than forecast outage rates would require the IMO control area to have a high reliance on imports. This was true throughout the summer operating period and into September. The maximum import attained was approximately 4200 MW, which is also close to the maximum simultaneous transfer capability into Ontario.

While the IMO relied upon market mechanisms to provide the required energy and operating reserve to the maximum extent possible, off market control actions, including the purchase of Emergency Energy from Neighbouring Reliability Coordinators were required on several occasions to supplement Energy and Operating Reserves. An emergency operating state was declared twice to maximize transmission capability. An EEA 3 alert and a 3% voltage reduction were implemented on one occasion. During an EEA 3 alert firm load interruption is imminent or in progress.

The IMO requested generators to seek environmental variances from outflow discharge temperatures limits at fossil facilities on two occasions. This request was made to ensure that the IMO had adequate energy in the event that the IMO suffered its single largest contingency. The approvals were granted, but the variances were not exercised.

The IMO effectively utilized the NPCC emergency conference calls 34 times and periodically joined the MISO Planning Conference call to ensure Neighbouring Reliability Coordinators in NPCC, PJM and MISO of the current or predicted operating state of the system.

The IMO maintained contact with Market Participants through System Status Reports (SSR) and System Adequacy Assessments (SAA) to identify the current and projected status of the IMO-administered market and the IMO-controlled grid.

Additionally, as resources became strained, the IMO issued public advisories and warnings to the general public through normal media facilities.

The transmission system performed well with minimum voltages being observed at all times, although marginally during certain periods.

The IMO completed a number of activities in preparation for the summer such as training, additional reliability studies under high demand conditions and the contracting for Emergency Demand Responsive loads. Utilization of the Emergency Demand Responsive loads was not required. These measures allowed the IMO staff to operate the system in a reliable manner through the period.

New England

During the summer of 2002, there were 12 days in which the temperature exceeded 90 ^{o}F in New England. The total New England Power Pool's (NEPOOL) electrical load exceeded the reference peak load forecast of 24,200 MW (50% probability of forecast being exceeded) in 4 differing weeks. The summer 2002 New England peak load was 25,348 MW. Emergency Operating Procedures (EOPs) were implemented on six different days. Assistance from neighboring systems was utilized when necessary but overall, generation performed well and there were no major operating problems.

The load response program for the summer of 2002 included, at the time of the peak load, more than 250 customers providing a total of approximately 202 MW (including nearly 100MW in Southwest Connecticut). While the voluntary, price response program was implemented on twelve occasions during the summer of 2002, the mandatory demand response program was not activated during the summer.

About 3,800 MW of new generation had been projected to become commercial during the summer. Of this, only 350 MW actually went into service. Regional drought conditions did not have much impact on system operation.

Quebec

The Quebec summer peak load was 20,525 MW on September 9, 2002, which is about 1,000 MW above the expected peak. A late winter peak of 22,523 MW occurred on May 14 with temperatures at or below the freezing point all over the province. In July and August, major forest fires came near some major substations and the heavy smoke caused some insulator flashovers that resulted in a few lines tripping. Some transmission limitations were applied but did not affect the ability of TransÉnergie to provide outside assistance.

New York

NY experienced some unseasonably warm weather in the spring where the demands exceeded the winter peak demand. The summer of 2002 also saw several hot and humid days when demand exceeded 30,000 MW. The NYISO served demand greater than 30,000MW for a total of 25 hours and six separate days. The NY Control Area peak load was 30,664MW on July 29.

New capacity additions to the NYISO system during the summer totaled 435 MW, consisting of 10 natural gas fired combustion turbines on Long Island. The Long Island Power Authority also entered into a short-term lease for 10 truck-mounted combustion turbines for emergency energy supply during the summer peak load period. These units were used on several occasions during the peak load period.

A second Rock Tavern 345/115 kV transformer was placed in service. The Athens 345 kV substation was established on one of the existing Leeds – Pleasant Valley 345kV circuits as part of the preparation for the new Athens Generating Station expected to be operational during the Summer 2003. Construction of the HVdc Cross Sound Cable was completed between New Haven Harbor (ISO-NE) and Shoreham (NY) in August, and operational testing was conducted, but did not become available for commercial operation during the period.

Maritimes

The peak load experienced by the Maritimes Area during the May – September period was 3,731 MW, which was approximately 184 MW (5.2%) higher than last year's forecast of 3,547 MW. This is due to the peak occurring in May while experiencing below normal temperatures. This resulted in a greater electric heating load than would normally be the case.

The Maritimes Area did not anticipate, nor did it experience, any capacity shortages during the summer of 2002. In fact, it was able to supply up to 700 MW (interconnection limit) to New England. However, transmission constraints due to excess generation in Northern New England sometimes reduced the power that could be transmitted.

Historical Review (Pre-2002)

As summarized in the table below, the forecasted 2003 summer peak is projected to be below the 2001 and 2002 actual peak for the NPCC Area. This is primarily due to slower economical growth and the fact that the previous years peak demand was the result of extreme weather conditions. If extreme weather conditions are experienced again this summer, it is likely that the forecast below will be exceeded.

Table 1
Historical Peak Demands by Area Occurring May to September[5]

Year	Ontario[6]	Maritimes	New England	New York	Quebec	Total NPCC Demand
1993	20,883	2,773	19,570	25,998	17,500	86,724
1994	20,918	2,797	20,519	27,062	17,562	88,858
1995	21,674	2,958	20,499	27,206	17,960	90,297
1996	21,378	2,937	19,507	25,587	18,193	87,602
1997	21,613	3,252	20,569	28,700	17,983	92,117
1998	22,443	3,314	21,406	28,166	18,463	93,792

[5] Peak Demand in MW
[6] 20 minute Peak Demand

1999	23,435	3,249	22,544	30,311	18,965	98,504
2000	23,222	3,630	22,049	28,138	20,600	97,639
2001	25,269	3,640	24,967	30,983	20,052	104,911
2002	25,414	3,731	25,348	30,664	20,525	105,764
2003[7] Forecast	23,684	3,813	25,120	31,430	20,740	104,436
Percent Difference[8]	-6.81%	+2.20%	-0.90%	+2.50%	+1.01%	-1.26%

8. 2003 Reliability Assessments of Neighboring Regions

East Central Area Reliability Coordination Agreement (ECAR)

Information from the ECAR 2003 Summer Assessment of Load and Capacity is not available for release at this time pending review and approval of the ECAR members. The following information is taken from the "Preview of 2003 Summer Conditions" that is contained in ECAR's 2002/2003 Winter Assessment of Load and Capacity.

The projected summer peak demand in ECAR for the summer of 2003 is 101,800 MW for Total Internal Demand. This 2003 summer peak is derived from demand forecasts received in January 2002 with any updates through August 2002. Therefore, actual operating experience from the last half of 2002 was not considered in developing this peak demand forecast.

Total capacity for the summer of 2003 is projected to be 128,090 MW. This assumes 7,475 MW of announced capacity additions within the ECAR region are in service by July 2003. Net scheduled interchange into the ECAR region at the time of the peak is anticipated to be 2,590 MW, making total Capacity Resources of 130,680 MW.

Capacity Margins for the summer of 2003 are forecast to be higher than the margins forecast for the summer of 2002, based on the level of announced generation projects. The capacity margin based on Total Internal Demand (interruptible and direct control loads are served) and scheduled interchange is 28,880 MW (22.1% of Net Capacity Resources). This assumes the announced capacity additions within the ECAR region are in service by July 2003.

Recent experience indicates that a minimal amount of capacity (263 MW) is expected to be scheduled out of service during the summer peak. This scheduled capacity

[7] This value is the weather normal demand used for the base case analysis. A graph in Section 4 represents the ranges of potential demands that the IMO could experience as a result of weather variables.
[8] Percent Change reflects the increase/decrease in projected peak for the 2003 summer over the actual peak for the 2002 summer.

outage along with a 4% operating reserve requirement (4,072 MW) means that the Margin for Contingencies is expected to be 24,545 MW at the time of the ECAR peak. Recent random outage experience suggests that there is less than a 1% probability that random outages will exceed this Margin for Contingencies. This is the probability that the ECAR members will have to rely on supplemental capacity resources at the time of the peak. Supplemental capacity resources can include additional imports of power from outside the region, and/or the curtailment of contractually interruptible loads.

Under a severe condition scenario which assumes a combination of adverse conditions, (an additional 5% of load due to extreme hot weather, none of the projected capacity additions in service, and greater than 13% unavailable capacity), the ECAR Region will not have sufficient resources without supplemental power purchases. However, based on the import capability, there should be sufficient resources for this severe condition scenario.

Transmission assessment information is contained in the 2003 Summer Assessment of Transmission System Performance, ECAR report 02-TSPP-3. This report will be published in mid-May 2003.

The bulk transmission systems in ECAR are expected to perform reliably under a wide range of conditions. However, there will be a greater need for the Reliability Coordinators and Transmission Operators to communicate and coordinate their actions to preserve the continued reliability of the ECAR systems. It is anticipated that the ECAR transmission systems could become constrained as a result of unit unavailability and/or economic transactions that have historically resulted in large unanticipated power flows within and through the ECAR systems. If these conditions occur again this summer, local operating procedures, as well as the NERC Transmission Loading Relief procedure, will need to be invoked in order to maintain transmission system security. As long as transmission limitations are identified and available operating procedures are implemented when required, the ECAR bulk transmission systems are anticipated to perform reliably. During times of heavy regional and interregional transfers, it will be essential that Reliability Coordinators and Transmission Operators have timely and adequate information on the sources and sinks of scheduled transfers in order to identify appropriate corrective actions.

Mid-Atlantic Area Council (MAAC)

The MAAC 2003 summer forecast net peak demand is 53,591MW. This forecast includes the effects of interruptible demand and load management capabilities which are estimated to be 17,998 MW. The forecast peak assumes normal summer weather conditions. This forecast is 2,412 MW lower than the actual MAAC all-time summer peak of 56,003 MW that occurred on August 14, 2002.

Between June 1, 2002 and June 1, 2003, MAAC’s summer generating capacity is expected to increase by a net of 4,663 MW to 65,871 MW. 1,927 MW of the expected increase is already in service. All nuclear units should be in service and at full capacity (13,030 MW) at the time of the peak. MAAC also has 488 MW of external capacity resources under contract through the summer peak period. Also, 11 MW of generating capacity is expected to be added between June 1st and the forecasted peak in July. With the planned new generation, existing internal generation, and external capacity resources included, the MAAC capacity margin is forecasted to be 19.2% at the time of the forecasted peak.

The MAAC reserve margin is expected to be 23.8% at the time of the forecasted peak. With the 11 MW of generating capacity that is expected to be added within the summer demand period of June through the end of September, the reserve margin will remain at 23.8%.

MAAC expects to have sufficient generating capacity to serve the 2003 forecast summer peak demand. When MAAC served its all-time summer peak on August 14, 2002 no emergency procedures were implemented.

MAAC has a net of 698 MW of long-term firm transmission service in place for energy sales out of MAAC through the summer peak period. Presently, these transactions are not capacity backed and therefore can be curtailed in the event of a PJM Capacity Emergency. Historically, approximately 1,200 MW of external capacity has been transferred out of MAAC on peak summer days and could therefore decrease the capacity margin by 1.5%.

PJM, the Regional Transmission Organization (RTO) in the MAAC region, is well prepared for operating emergencies should they occur. Regular drills have been conducted to exercise procedures in preparation should there be an extremely hot summer.

The bulk transmission system is expected to perform adequately over various system conditions.

Appendix I – 2003 Expected Load and Capacity Forecasts

Table 1--NPCC Summary

Revised May 1, 2003

Week Beginning	Installed Capcity	Firm Purchases	Firm Sales	Net Capacity	Load Forecast	Interruptible Load	Known Maint./Derat.	Req. Operating Reserve	Unplanned Outages	Net Margin	Bottled Resources	Revised Margin
Sunday	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
4/27/2003	141,690	1,202	2,360	140,532	82,750	1,767	25,505	7,108	8,808	18,128	4290	13,838
5/4/2003	142,154	1,202	2,360	140,996	82,191	1,805	25,110	7,108	9,652	18,740	4645	14,095
5/11/2003	142,154	1,202	2,360	140,996	84,046	1,805	22,960	7,108	9,851	18,836	4594	14,242
5/18/2003	142,424	1,202	2,360	141,266	85,901	1,805	19,374	7,108	9,918	20,770	4642	16,128
5/25/2003	142,924	1,202	2,360	141,766	87,970	1,805	18,347	7,108	9,954	20,192	4858	15,334
6/1/2003	142,840	1,197	2,360	141,677	90,659	1,785	16,677	7,108	9,460	19,557	3889	15,668
6/8/2003	142,440	1,197	2,360	141,277	97,073	1,785	16,103	7,108	9,467	13,311	3288	10,023
6/15/2003	142,440	1,197	2,360	141,277	98,356	1,785	15,189	7,108	9,473	12,936	3485	9,451
6/22/2003	142,840	1,197	2,360	141,677	102,098	1,785	16,659	7,108	9,473	8,124	2812	5,311
6/29/2003	142,566	1,197	2,360	141,403	102,610	1,802	13,499	7,108	9,473	10,514	4569	5,945
7/6/2003	141,966	1,197	2,360	140,803	103,013	1,799	13,422	7,108	8,773	10,286	3030	7,256
7/13/2003	142,736	1,197	2,360	141,573	102,425	1,799	13,116	7,108	8,773	11,950	3951	7,998
7/20/2003	142,740	1,197	2,360	141,577	102,257	1,799	11,478	7,108	8,773	13,760	5563	8,196
7/27/2003	142,740	1,197	2,360	141,577	102,396	1,799	11,700	7,108	8,773	13,398	4520	8,878
8/3/2003	143,331	1,197	2,360	142,168	102,772	1,817	12,015	7,108	8,773	13,317	4748	8,568
8/10/2003	143,331	1,197	2,360	142,168	102,715	1,817	12,147	7,108	8,773	13,242	4752	8,489
8/17/2003	143,431	1,197	2,360	142,268	102,529	1,817	12,862	7,108	8,773	12,813	4270	8,542
8/24/2003	142,731	1,197	2,360	141,568	102,669	1,817	13,280	7,108	8,773	11,555	3684	7,871
8/31/2003	142,782	982	2,345	141,419	100,487	1,802	14,758	7,108	8,773	12,094	4031	8,063
9/7/2003	142,790	982	2,145	141,627	92,618	1,792	17,838	7,021	8,746	17,196	2472	14,724
9/14/2003	144,590	982	2,145	143,427	90,271	1,792	18,503	7,021	8,692	20,731	4093	16,638
9/21/2003	144,590	982	2,145	143,427	88,539	1,792	21,794	7,021	8,564	19,300	3694	15,606
9/28/2003	144,590	982	2,145	143,427	88,019	1,797	21,534	7,021	8,449	20,201	3654	16,546

Table 2--Maritimes
Revised March 21, 2003

Week Beginning Sunday	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Net Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
4/27/2003	6,507	0	850	5,657	3,813	556	913	528	266	693
5/4/2003	6,507	0	850	5,657	3,720	594	1,018	528	266	719
5/11/2003	6,507	0	850	5,657	3,668	594	1,027	528	266	762
5/18/2003	6,507	0	850	5,657	3,597	594	1,044	528	266	816
5/25/2003	6,507	0	850	5,657	3,547	594	1,030	528	266	880
6/1/2003	6,507	0	850	5,657	3,474	574	1,046	528	266	917
6/8/2003	6,507	0	850	5,657	3,442	574	1,037	528	266	958
6/15/2003	6,507	0	850	5,657	3,419	574	759	528	266	1,259
6/22/2003	6,507	0	850	5,657	3,401	574	1,093	528	266	943
6/29/2003	6,507	0	850	5,657	3,369	591	973	528	266	1,112
7/6/2003	6,507	0	850	5,657	3,335	588	1,119	528	266	998
7/13/2003	6,507	0	850	5,657	3,332	588	1,168	528	266	951
7/20/2003	6,507	0	850	5,657	3,338	588	1,088	528	266	1,025
7/27/2003	6,507	0	850	5,657	3,336	588	1,114	528	266	1,001
8/3/2003	6,507	0	850	5,657	3,342	606	1,181	528	266	946
8/10/2003	6,507	0	850	5,657	3,310	606	1,152	528	266	1,007
8/17/2003	6,507	0	850	5,657	3,266	606	1,093	528	266	1,110
8/24/2003	6,507	0	850	5,657	3,219	606	994	528	266	1,257
8/31/2003	6,556	0	850	5,706	3,196	591	958	528	266	1,349
9/7/2003	6,556	0	650	5,906	3,215	581	1,659	441	266	906
9/14/2003	6,556	0	650	5,906	3,271	581	1,630	441	266	879
9/21/2003	6,556	0	650	5,906	3,348	581	1,624	441	266	808
9/28/2003	6,556	0	650	5,906	3,511	586	1,627	441	266	647

Notes:

1 Installed Capacity includes IPP.

2 Load Forecast is expected weekly peak.

Table 3--New England

Revised April 23, 2003

Week Beginning	Installed Capcity1	Firm Purchases4	Firm Sales	Net Capacity	Load Forecast2	Interruptible Load3	Known Maint./Derat.	Req. Operating Reserve	Unplanned Outages	Net Margin
Sunday	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
4/27/2003	29,962	1,002	-	30,964	17,078	244	4,000	1,700	2,700	5,730
5/4/2003	29,962	1,002	-	30,964	17,052	244	4,300	1,700	3,400	4,756
5/11/2003	29,962	1,002	-	30,964	18,978	244	4,100	1,700	3,400	3,030
5/18/2003	29,962	1,002	-	30,964	19,860	244	2,300	1,700	3,400	3,948
5/25/2003	29,962	1,002	-	30,964	20,679	244	600	1,700	3,400	4,829
6/1/2003	30,818	997	-	31,815	21,578	244	1,000	1,700	2,800	4,981
6/8/2003	30,818	997	-	31,815	25,120	244	800	1,700	2,800	1,639
6/15/2003	30,818	997	-	31,815	25,120	244	800	1,700	2,800	1,639
6/22/2003	30,818	997	-	31,815	25,120	244	800	1,700	2,800	1,639
6/29/2003	30,827	997	-	31,824	25,120	244	100	1,700	2,800	2,348
7/6/2003	30,827	997	-	31,824	25,120	244	100	1,700	2,100	3,048
7/13/2003	30,827	997	-	31,824	25,120	244	100	1,700	2,100	3,048
7/20/2003	30,827	997	-	31,824	25,120	244	100	1,700	2,100	3,048
7/27/2003	30,827	997	-	31,824	25,120	244	100	1,700	2,100	3,048
8/3/2003	30,818	997	-	31,815	25,120	244	100	1,700	2,100	3,039
8/10/2003	30,818	997	-	31,815	25,120	244	100	1,700	2,100	3,039
8/17/2003	30,818	997	-	31,815	25,120	244	200	1,700	2,100	2,939
8/24/2003	30,818	997	-	31,815	25,120	244	300	1,700	2,100	2,839
8/31/2003	30,817	782	-	31,599	25,120	244	500	1,700	2,100	2,423
9/7/2003	30,817	782	-	31,599	23,100	244	1,100	1,700	2,100	3,843
9/14/2003	30,817	782	-	31,599	21,852	244	800	1,700	2,100	5,391
9/21/2003	30,817	782	-	31,599	21,520	244	2,000	1,700	2,100	4,523
9/28/2003	30,817	782	-	31,599	21,437	244	1,200	1,700	2,100	5,406

Please note that the infromation in this spreadsheet is commercially sensitive, therefore highly confidential

1 Includes IPP and other known generation

2 Load forecast is expected weekly peak (Hourly)

3 Includes Interruptible and Dispatchable Loads used for 2003/2004 Objective Capability calculations + assumed RFP values

4 Firm purchases from NB, NY, and HQ obtained from CP-8 Representative

Table 4--New York

Revised March 11, 2003

Week Beginning	Installed Capcity1	Firm Purchases4	Firm Sales4	Net Capacity	Load Forecast2	Interruptible Load3	Known Maint./Derat.	Req. Operating Reserve	Unplanned Outages	Net Margin
Sunday	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
4/27/2003	37,087			37,087	21,805		5,432	1,800	3,292	4,758
5/4/2003	37,087			37,087	22,113		4,049	1,800	3,436	5,689
5/11/2003	37,087			37,087	22,355		2,139	1,800	3,635	7,158
5/18/2003	37,087			37,087	23,382		1,493	1,800	3,702	6,710
5/25/2003	37,087			37,087	24,388		1,146	1,800	3,738	6,015
6/1/2003	37,087			37,087	24,794		121	1,800	3,844	6,528
6/8/2003	37,087			37,087	26,704		60	1,800	3,851	4,672
6/15/2003	37,087			37,087	27,660		0	1,800	3,857	3,770
6/22/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
6/29/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
7/6/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
7/13/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
7/20/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
7/27/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
8/3/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
8/10/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
8/17/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
8/24/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
8/31/2003	37,087			37,087	31,430		0	1,800	3,857	(0)
9/7/2003	37,087			37,087	25,938		262	1,800	3,830	5,257
9/14/2003	37,087			37,087	25,499		779	1,800	3,776	5,233
9/21/2003	37,087			37,087	24,072		2,006	1,800	3,648	5,560
9/28/2003	37,087			37,087	23,140		3,116	1,800	3,533	5,498

Please note that the infromation in this spreadsheet is commercially sensitive, therefore highly confidential

1 NYISO Installed Capacity (ICAP) requirement.

2 Load forecast is expected weekly peak hourly (load+losses)

3 Type II and III DSM not reported. NYISO Emergency Demand Response Program (EDRP) and Special Case Resources (SCR) are emergency procedures involving committed market resources.

4 "Full Responsibility" Purchases/Sales are included as ICAP resources.

Table 5--Ontario

Revised March 18, 2003

Week Beginning Sundays	Installed Capacity MW[1]	Purchases MW	Sales MW	Total Capacity MW	Load Forecast MW[2]	Interruptible Load MW[3]	Known Maint./Derat. MW[4]	Req. Operating Reserve MW	Unplanned Outages MW[5]	Net Margin MW	
4/27/2003	30,700	200	0	30,900	18,797	300	8,804	1,580	1,350	669	Minimum Margin week.
5/4/2003	30,700	200	0	30,900	18,566	300	8,735	1,580	1,350	969	
5/11/2003	30,700	200	0	30,900	18,972	300	7,925	1,580	1,350	1,373	
5/18/2003	31,470	200	0	31,670	19,538	300	6,713	1,580	1,350	2,789	
5/25/2003	31,470	200	0	31,670	19,942	300	7,289	1,580	1,350	1,809	
6/1/2003	31,470	200	0	31,670	21,658	300	5,904	1,580	1,350	1,478	
6/8/2003	31,470	200	0	31,670	22,550	300	5,460	1,580	1,350	1,030	
6/15/2003	31,470	200	0	31,670	22,875	300	4,805	1,580	1,350	1,360	
6/22/2003	31,470	200	0	31,670	22,827	300	5,222	1,580	1,350	991	
6/29/2003	31,470	200	0	31,670	23,479	300	4,645	1,580	1,350	916	
7/6/2003	31,470	200	0	31,670	23,684	300	3,829	1,580	1,350	1,527	Summer Peak.
7/13/2003	32,240	200	0	32,440	23,616	300	3,925	1,580	1,350	2,269	
7/20/2003	32,240	200	0	32,440	23,523	300	3,820	1,580	1,350	2,467	
7/27/2003	32,240	200	0	32,440	23,164	300	3,497	1,580	1,350	3,149	
8/3/2003	32,240	200	0	32,440	23,305	300	3,657	1,580	1,350	2,848	
8/10/2003	32,240	200	0	32,440	23,285	300	3,756	1,580	1,350	2,769	
8/17/2003	32,240	200	0	32,440	23,169	300	3,719	1,580	1,350	2,922	
8/24/2003	32,240	200	0	32,440	23,321	300	4,138	1,580	1,350	2,351	
8/31/2003	32,240	200	0	32,440	21,554	300	5,312	1,580	1,350	2,944	
9/7/2003	32,240	200	0	32,440	20,983	300	5,900	1,580	1,350	2,927	
9/14/2003	32,240	200	0	32,440	20,049	300	6,443	1,580	1,350	3,318	
9/21/2003	32,240	200	0	32,440	19,571	300	7,413	1,580	1,350	2,826	
9/28/2003	32,240	200	0	32,440	19,226	300	7,638	1,580	1,350	2,946	

Notes

1 Includes all generation registered in the IMO Administered Market.

2 Load forecast is the weekly 60-minute peak demand, based on weather normal case and median growth.

3 Estimated 300 Mw of Price responsive loads.

4 Based on the historical average amount of generation experiencing outages during the period May to September, from 1998 to 2001.

Table 6--Quebec

Revised March 21, 2003

Week Beginning Sundays	Installed Capacity[1] MW	Firm Purchases MW	Firm Sales[2] MW	Net Capacity MW	Load Forecast[3] MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages[4] MW	Net Margin MW
4/27/2003	37,434	0	1,510	35,924	21,257	667	6,356	1,500	1,200	6,278
5/4/2003	37,898	0	1,510	36,388	20,740	667	7,008	1,500	1,200	6,607
5/11/2003	37,898	0	1,510	36,388	20,073	667	7,769	1,500	1,200	6,513
5/18/2003	37,398	0	1,510	35,888	19,524	667	7,824	1,500	1,200	6,507
5/25/2003	37,898	0	1,510	36,388	19,414	667	8,282	1,500	1,200	6,659
6/1/2003	36,957	0	1,510	35,447	19,155	667	8,606	1,500	1,200	5,653
6/8/2003	36,557	0	1,510	35,047	19,257	667	8,746	1,500	1,200	5,011
6/15/2003	36,557	0	1,510	35,047	19,282	667	8,825	1,500	1,200	4,907
6/22/2003	36,957	0	1,510	35,447	19,320	667	9,544	1,500	1,200	4,550
6/29/2003	36,674	0	1,510	35,164	19,212	667	7,781	1,500	1,200	6,138
7/6/2003	36,074	0	1,510	34,564	19,444	667	8,374	1,500	1,200	4,713
7/13/2003	36,074	0	1,510	34,564	18,927	667	7,923	1,500	1,200	5,681
7/20/2003	36,078	0	1,510	34,568	18,846	667	6,470	1,500	1,200	7,219
7/27/2003	36,078	0	1,510	34,568	19,346	667	6,989	1,500	1,200	6,200
8/3/2003	36,678	0	1,510	35,168	19,575	667	7,077	1,500	1,200	6,483
8/10/2003	36,678	0	1,510	35,168	19,570	667	7,139	1,500	1,200	6,426
8/17/2003	36,778	0	1,510	35,268	19,544	667	7,850	1,500	1,200	5,841
8/24/2003	36,078	0	1,510	34,568	19,579	667	7,848	1,500	1,200	5,108
8/31/2003	36,081	0	1,495	34,586	19,187	667	7,988	1,500	1,200	5,378
9/7/2003	36,089	0	1,495	34,594	19,382	667	8,917	1,500	1,200	4,262
9/14/2003	37,889	0	1,495	36,394	19,600	667	8,851	1,500	1,200	5,910
9/21/2003	37,889	0	1,495	36,394	20,028	667	8,751	1,500	1,200	5,582
9/28/2003	37,889	0	1,495	36,394	20,705	667	7,953	1,500	1,200	5,703

Please note that the infromation in this spreadsheet is commercially sensitive, therefore highly confidential

1 Includes IPP and other known generation (Churchill Falls & Labrador Co.).

2 Includes transmission losses of 6%. Does not include firm sale of 45 MW to Cornwall Ontario - Load is supplied radially from Quebec Control Area

3 Load forecast is expected weekly peak (Hourly).

4 This value also includes a load forecast uncertainty (LFU) of 3%.

Appendix II - NPCC Operational Procedures

A-3 Emergency Operation Criteria

Description: Objectives, principles and requirements are presented to assist the NPCC **Areas** in formulating plans and procedures to be followed in an **emergency** or during conditions which could lead to an **emergency**.

A-6 Operating Reserve Criteria

Description: This Criteria establishes standard terminology and minimum requirements governing the amount, availability and distribution of operating reserve. Procedures are included for corrective action and mutual assistance in case of operating reserve shortages. The objective is to ensure a high level of reliability in the NPCC Region that is, as a minimum, consistent with the standards specified by the North American Electric Reliability Council (NERC).

B-3 Guidelines for Inter-Area Voltage Control

Description: This document establishes procedures and principles to be considered for occasions where a deficiency or an excess of reactive power can affect **bulk power system** voltage levels in a large portion of an **Area** or in two adjacent **Areas**.

B-12 Guidelines for On-Line Computer System Performance During Disturbances

Description: Establishes guidelines for the performance of NPCC **Area** on-line computer systems during a power system disturbance.

B-20 Guidelines for Identifying Key Facilities and Their Critical Components for System Restoration"

Description: Establishes requirements and guidelines for the identification of Key Facilities and their Critical Components that are required for restoration of the power system following a partial or total system blackout.

C-4 Monitoring Procedures for Guidelines for Inter-Area Voltage Control

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Guidelines for Inter-AREA Voltage Control (Document B-3).

C-5 Monitoring Procedures for Emergency Operation Criteria

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Emergency Operation Criteria (Document A-3).

C-7 Monitoring Procedures for Guide for Rating Generating Capability

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC, Guide for Rating Generating Capability (Document B-9).

C-8 Monitoring Procedures for Control Performance Guide During Normal Conditions

Description: This procedural document establishes a performance measure for NPCC **Areas** and systems and outlines the reporting function for NPCC Control Performance Guide During Normal Conditions (Document B-2)

C-9 Monitoring Procedures for Operating Reserve Criteria (This Document has recently been revised and will have a new designation as Reference Document RD-06)

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC Operating Reserve Criteria (Document A-6)

C-11 Monitoring Procedures for Interconnected System Frequency Response (This Document has recently been revised and will have a new designation as Reference Document RD-10)

Description: This procedural document defines procedures for monitoring frequency responses to large generation losses.

C-12 Procedures for Shared Activation of Ten Minute Reserve (This Document has recently been revised and will have a new designation as Reference Document RD-07)

Description: This procedural document outlines procedures to share the activation of ten-minute reserve on an Area basis. The methods prescribed by the procedure are intended to ensure that lost generation or energy purchases are quickly replaced by several areas simultaneously loading generation in the few minutes immediately following a loss.

C-13 Operational Planning Coordination
Appendix D - NPCC Critical Facilities List

Description: This document coordinates the notification of planned facility outages among the **Areas**. It also establishes formal procedures for **Area** communications in advance of a period of likely capacity shortages as well as for weekly and emergency NPCC conference call among the **Areas**.

C-15 Procedures for Solar Magnetic Disturbances on
Electrical Power Systems

Description: This procedural document clarifies the reporting channels and information available to the operator during solar alerts and suggests measures that may be taken to mitigate the impact of a solar magnetic disturbance.

C-19 Procedures During Shortages of Operating Reserve

Description: This procedure is intended to provide specific instructions for the redistribution of Operating Reserve among the Areas when one or more **Area**(s) are experiencing an Operating Reserve deficiency.

C-20 Procedures During Abnormal Operating Conditions

Description: This procedure is intended to complement the Emergency Operation Criteria (Document A-3) by providing specific instructions to the System Operator during such conditions in an NPCC Area or Areas.

RD-01 NPCC Emergency Preparedness Conference Call Procedures-NPCC Security Conference Call Procedures

RD-02 NPCC Inter-Control Area Power System Restoration Refernce Document

RD-03 Procedures for Communications During Emergencies

RD-04 Operating Procedures for ACE diversity Interchange

RD-05 Procedure for Operating Reserve Assistance

Appendix III - Web Sites

ECAR
http://www.ecar.org/

Independent Electricity Market Operator
http://www.theimo.com/

ISO- New England
http://www.iso-ne.com

LEER Members
http://www.npcc.org/leer_members.htm

MAAC
http://www.maac-ca.com/

MAPP
http://www.mapp.org/

Maritimes
Maritimes Electric Company Ltd.
http://www.maritimeelectric.com

New Brunswick Power
http://www.nbpower.com/

Nova Scotia Power
http://www.nspower.ca/

Northern Maine Independent System Administrator
http://www.nmisa.com

New York ISO
http://www.nyiso.com/

North East Power Coordinating Council
http://www.npcc.org/

TransEnergie
http://www.hydro.qc.ca/transenergie/en/index.html

Drought Predictors
Canadian
http://gfx.weatheroffice.ec.gc.ca/saisons/data/images/ccapcpn_06_s.gif

United States
http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Appendix IV - References

NPCC Summer 2003 Multi-Area Probabilistic Reliability Assessment –May 2003

NPCC Reliability Assessment for Summer 2002 - May 1, 2002

Draft 2003 Summer MEN Interregional Transmission System Reliability Assessment

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-18

Northeast Power Coordinating Council Reliability Assessment For Summer 2004

Approved by the Task Force on Coordination of Operation
May 2004

Table of Contents

Information provided in this report has been provided by the Operations Planning Working Group (CO-12) of the NPCC Task Force on Coordination of Operation with additional information from Reliability Councils adjacent to NPCC.

<u>The working group members are</u>:

Scott Hodgdon	ISO New England
Wendell Ingalls	Nova Scotia Power
Dean Landers	New Brunswick Power
Al Miller (Chair)	Independent Electricity Market Operator
Paul Roman	Northeast Power Coordinating Council
Robert Sauriol	TransEnergie
Robert Waldele	New York ISO

<u>Information from neighboring Reliability Councils provided by</u>:

Bill Harm	PJM Interconnection, LLC and Mid-Atlantic Area Council (MAAC)
Mona Megeed	PJM Interconnection, LLC and Mid-Atlantic Area Council (MAAC)
Kim Sauerwine	PJM Interconnection, LLC and Mid-Atlantic Area Council (MAAC)
Jeff Mitchell	East Central Area Reliability Coordination Agreement (ECAR)

<u>Additional support by</u>:

Phil Fedora (Chair CP-8)	Northeast Power Coordinating Council

1. Executive Summary

This report focuses on the assessment of reliability within NPCC for the summer of 2004. Portions of this report are based on work previously done for the NPCC Reliability Assessment for Summer 2003.

The NPCC Operations Planning Working Group (CO-12) worked closely with the representatives of the NPCC CP-8 Working Group to ensure results are based on consistent data and modeling assumptions between the two studies.

Those aspects that the CO-12 Working Group have examined to determine the reliability and adequacy for NPCC for the summer of 2004 are discussed in detail in the specific report sections. The following Summary of Findings address the significant points of the report discussion. These findings are based on forecasted projections of: load requirements, resource configurations and transmission configurations. This report evaluates NPCC and the associated Area's ability to deal with the differing resources and transmission configurations identifying NPCC and the associated Areas preparations to deal with possible uncertainties identified in this report.

Summary of Findings

The forecasted capacity outlook for NPCC during the peak week (week beginning July 04, 2004)[1] indicates a forecasted margin of approximately 14,300 MW of operable spare capacity. During this week approximately 8,200 MW of the spare capacity is in the Quebec and Maritimes Areas. The transfer capability between the Quebec and Maritimes Control Areas to the remainder of NPCC will not permit the usage of all this forecasted spare operable capacity. This limitation could reduce the overall capacity by approximately 3,900 MW. During high transfers from New Brunswick to New England, capacity located north of the Maine- New Hampshire interface may be bottled or locked in due to existing transmission constraints. This will reduce the overall spare capacity to NPCC by up to another 500 MW. As a result, the spare capacity available to the remainder of NPCC in the peak week is reduced to approximately 10,000 MW. This forecasted value of spare operable capacity available for the summer of 2004 represents a significant increase over the actual capacity margins observed during the summer of 2003.

- The week with the forecasted minimum margin occurs during the week beginning June 27, 2004 where the operable spare capacity available to NPCC after bottling is forecasted to be around 8,800 MW.

- Approximately 2,500 MW of new capacity (300 MW in New England and 755 MW in Ontario and 1,434 MW in NY) is still to be commissioned before summer.

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[1] Load and Capacity Forecast Summaries for NPCC, IMO, ISO-NE, NY-ISO, HQ and the Maritime's are included in Appendix 1.

The sizeable spare operable Capacity Margins forecasted for this summer should counteract any negative impact delays to these capacity additions may have to the overall NPCC reliability assessment

- Even though NPCC as a whole shows adequate resources through the report period, there remains a load pocket within the New England Control Area, specifically in the southwestern portion of Connecticut that may be at greater risk of being capacity deficient. The concerns should see some relief this summer as 500 MW of new generation has or will be commissioned in this area since last summer.

- ISO-NE is addressing reliability concerns in southwest Connecticut, an area where demand may exceed supply plus total transmission import limits. A Request For Proposal (RFP) has been issued for up to 300 MW of quick-start capacity through the combination of generation resources, demand response resources, or peak-load reducing Conservation and Load Management (CL&M) projects.

- New England and New York have market-based demand response programs in place that are expected to provide load relief measures that are in addition to measures available under emergency conditions. Ontario had an Emergency Demand Response Program in place for the summers of 2002 and 2003. Work is in progress to extend the program through the summer of 2004.

- The shoulder months indicate that overall NPCC has significant margins of spare generating capacity.

- An analysis of historical periods of high Geomagnetically Induced Currents (GICs) was performed. While GIC's experienced in late October 2003 were elevated (K9 Intensity) and caused some entities to take additional actions within their procedures, the results indicate that these procedures were adequate for managing the phenomenon.

- Area environmental constraints, specifically state, provincial and local emissions regulations may have some impact at various times through the summer 2004 period. The sizeable spare operable Capacity Margins forecasted for this summer, combined with the procedures in place should minimize any possible effects that may compromise the power system’s reliability.

- Since 2002, precipitation levels have restored most water reservoirs to near normal levels. Hydroelectric generation output may still be impacted in some isolated locations but is not expected to jeopardize the reliability of the system.

- Under specific conditions, Quebec and Ontario have identified difficulties controlling high or low voltages. As indicated in this report, these concerns should be manageable though effective management of outage programs.

- The CP-8 Working Group results indicate that all NPCC Areas demonstrated an annual Loss of Load Expectation (LOLE) of 0.1 days/year or less, under the Base Case assumptions. The potential use of operating procedures in response to a capacity shortage this summer is more likely to be required in southwest Connecticut, Boston, MA, New York City and Long Island, NY if reductions in anticipated resources and/or additional transmission limitations into NPCC materialize coincident with higher than expected loads.

- The Communication protocols in place are sufficient to ensure the timely and efficient communications in all regions to maximize reliance on the marketplace for emergency support.

- The CO-12 Working Group believes that NPCC and the associated Areas have adequate generation and transmission for the Summer Operating Period and have developed the necessary strategies and procedures to deal with operational problems and emergencies as they may develop. However, the Resource and Transmission Assessments in this report are mere snapshots in time and base case studies. Continued vigilance is required to monitor changes to any of the assumptions that can alter this report's findings.

2. Introduction

The NPCC Task Force on Coordination of Operation established the Operations Planning Working Group (CO-12) to conduct overall assessments of the reliability of the generation and transmission system in the NPCC Region for the Summer Operating Period (defined as the months of May through September[2]) and for other conditions as requested by the NPCC Task Force on Coordination of Operation.

For the operating period to be considered the CO-12 Working Group:

- Examined historical summer operational experiences and assessed their applicability for the period to be studied.
- Assessed the extent to which emergency operating procedures may be implemented by the NPCC Areas during the summer of interest.
- Reported potential sensitivities that may impact resource adequacy on an Area basis. These sensitivities included temperature variations, merchant plant delays, load forecast uncertainties, evolving load response measures, solar magnetic activity and system voltage and generator reactive capability limits.
- Reviewed the communications protocols with participants to ensure that timely and efficient communications will be in place in all regions to maximize reliance on the marketplace for emergency support.
- Reviewed the operational readiness of the NPCC and actions to mitigate potential problems.
- Assessed the implications of strategies adopted for the summer period on the adequacy of supply in the shoulder months.
- Coordinated data and modeling assumptions with NPCC Working Group CP-8, “Resource and Transmission Adequacy” and documented the methodology of each Area in its projection of load forecasts.
- Provided as appropriate, coordination with other parallel seasonal operational assessments including MAAC-ECAR-NPCC (MEN) and NERC RAS.
- Reviewed the actions that are being taken with respect to known recommendations that resulted from the August 14, 2003 Blackout.

[2] For the purpose of this report, the Summer Operating Period is defined as the week beginning May 02, 2004 to the week beginning September 26, 2004 inclusive.

3. Demand Forecasts for 2004

The non-coincident forecasted peak demand for NPCC during the summer of 2004 is 106,642 MW (May-September period). This peak demand translates to a coincident peak demand of 104,520 MW which is expected during the week beginning July 04, 2004.

Ambient weather conditions are the single most important variable impacting the demand forecasts during the summer months. As a result, each Area is aware that the summer peak demand could occur during any week of the summer period as a result of these weather variables. It should also be noted that the non coincident peak demand calculation is impacted by the fact that the Maritimes and Quebec experience late Spring demands that are influenced by heating loads that occur during the defined Summer Operating Period.

The impact of extreme ambient weather conditions on load forecasts can be demonstrated by various means. The IMO, Maritimes and TransÉnergie (transmission operations division of Hydro-Quebec) represent the resulting load forecast uncertainty in their respective Areas as a percentage of the base load. NYISO and ISO-NE use a Temperature Humidity Index (THI) as a base and increase the load by a MW factor for each degree above the base value.

Historically the peak loads and temperatures between New England and New York can have a high degree of correlation due to the relative locations of their respective load centers. Depending upon the extent of the weather system and duration, there is some potential for the Ontario peak demand to be coincident with New England and New York.

The method each Area uses to determine the peak forecast demand and the associated load forecast uncertainty relating to weather variables is described in greater detail in the Control Area Summary of Forecasts below.

Summary of Area Forecasts

Maritimes

Based on the Maritimes Area 2004 demand forecast, a peak of 3,604 MW is predicted to occur for the summer period of June through August, during the week beginning June 6, 2004. This is a 2.3% increase over the Summer 2003 actual peak of 3,523 MW, which occurred on June 27, 2003. Since the Maritimes Area is a winter-peaking area, forecasted peaks for the shoulder months of May and September are normally higher than the summer period. For the week beginning May 2, 2004, the predicted peak is 3,922 MW; for the week beginning September 26, 2004, the predicted peak is 3,640 MW.

The load forecast for the Maritimes Area represents the expected load for the 2004 Summer Operating Period. It should be noted that the Maritimes Area load is simply the mathematical sum of the forecasted weekly peak loads of the sub-areas (New Brunswick, Nova Scotia, Prince Edward Island, and the area served by the Northern Maine Independent System Operator). As such, it does not take the effect of load coincidence within the week into account. If the total Maritimes Area load included a coincidence factor, the forecast load would be approximately 1 - 3% lower.

For New Brunswick Power, the load forecast is based on an End-use Model (sum of forecasted loads by use e.g. water heating, space heating, lighting etc.) for residential loads and an Econometric Model for general service and industrial loads, correlating forecasted economic growth and historical loads. Each of these models is weather adjusted using a 30-year historical average.

For Nova Scotia Power, the load forecast is based on a 30-year historical climate normal for the major load center, along with analyses of sales history, economic indicators, customer surveys, technological and demographic changes in the market, and the price and availability of other energy sources.

Maritimes Electric Company Ltd.’s (Prince Edward Island) load forecast uses average long-term weather for the peak period (typically December) and a time-based regression model to determine the forecasted annual peak. The remaining months are prorated on the previous year.

The Northern Maine Independent System Administrator performs a trend analysis on historic data in order to develop an estimate of future loads.

New England

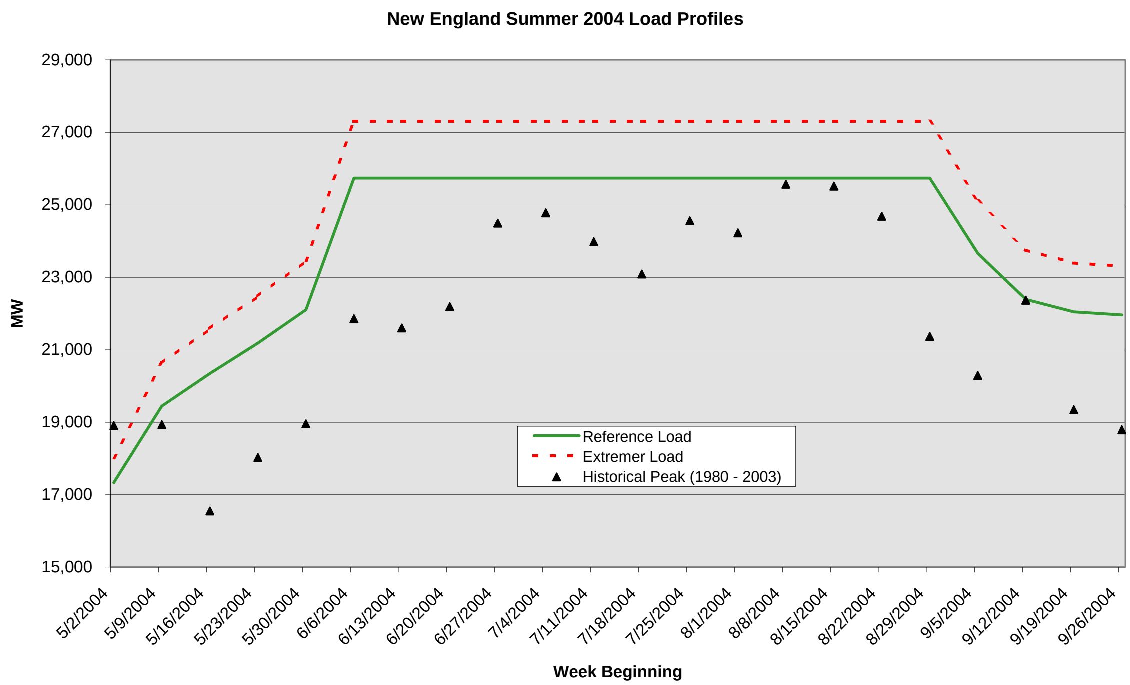
The New England Control Area’s forecasted summer 2004 peak demand is 25,735 MW. This is 615 MW (2.4%) higher than last year's forecast for 2003 of 25,120 MW. In order to arrive at the forecast for summer 2004, last years forecast was first weather normalized to 25,170 MW and using this value, the forecast for 2004 is 565 MW (2.2%) higher.

In comparison to actual historical peak loads, the summer 2004 forecast is 1,050 MW (4.3%) higher than last year's actual peak electrical load of 24,685 MW. The all time electrical peak load for New England is 25,348 MW. This load was experienced on August 14, 2002.

The demand forecast for New England is based on weekly weather distributions. The weekly weather distributions were built using 30 years of Temperature Humidity Index (THI) data at the time of daily peaks (for non-holiday weekdays). The reference load forecast is based on a 50/50 probability of occurrence. While this temperature sampling is used to project temperature sensitive loads, a complete process of sampling and econometric models are used to project the overall aggregate demand. A reasonable approximation for "normal weather" associated with this projection is 90 degrees Fahrenheit (32 degrees Celsius) and a dew point of 70 degrees Fahrenheit (21 degrees Celsius). At these forecasted load levels, a one-degree Fahrenheit increase in the THI (Fahrenheit) will result in approximately 800 MW of additional load. The amount of additional load depends on the total deviation from the "normal weather" approximation.

The reference case forecast of 25,735 MW has a 50% chance of being exceeded. New England also produces a load forecast of 27,305 MW that has only a 10% chance of being exceeded. This would be equivalent to an increase in the 50% load forecast of approximately 1,570 MW.

The following graph illustrates the range of potential peak demands that ISO-NE may experience this summer and compares them to historical peaks. It should be noted that the historical peak values illustrated below are the peak loads reconstituted to reflect power system invoked load relief procedures (Operating Procedures) that may have been implemented at such times.

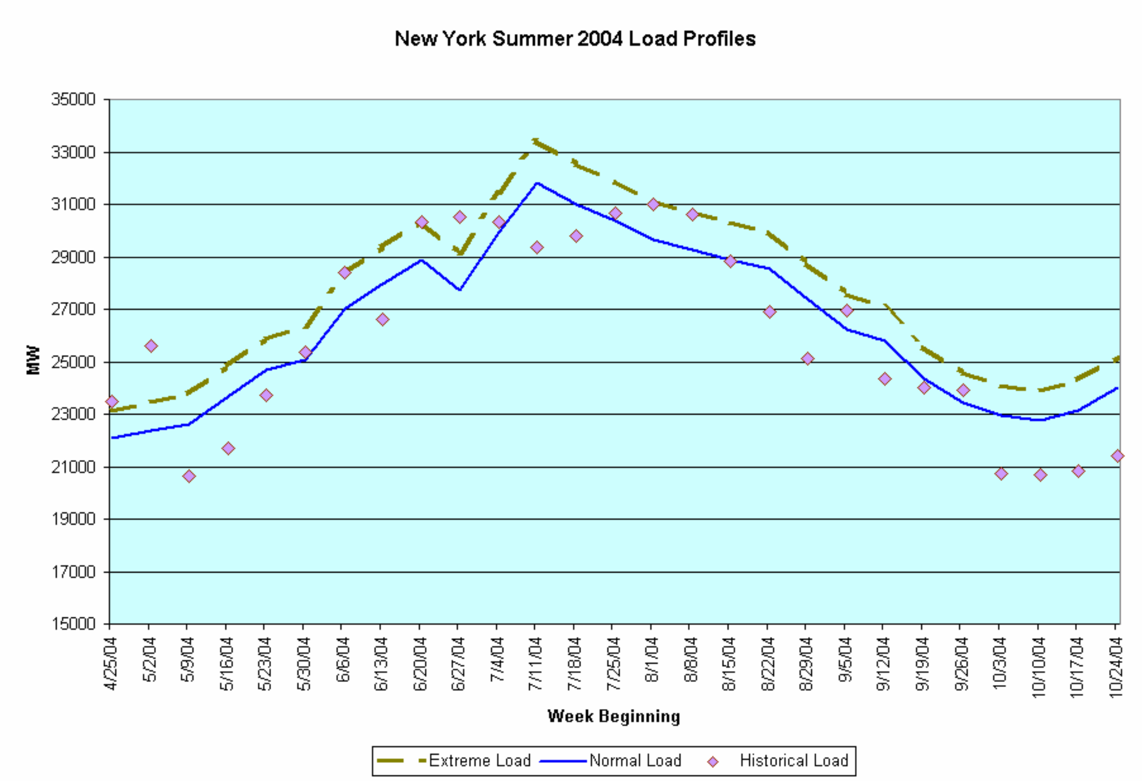


New York

The forecast peak for the New York Control Area is 31,800 MW, which is 370 MW higher than last year's forecast of 31,430 MW. This forecast is 2.6 % higher than the all time peak of 30,983 MW that occurred on August 9, 2001. The forecast is based on the forecasts for the transmission districts by the Transmission Owners and municipal agencies. For peak load normalization, the NYISO uses a Temperature-

Humidity Index (THI) value of 81 degrees Fahrenheit (27 degrees Celsius). At forecast load levels, a one-degree increase in the THI (Fahrenheit) will result in approximately 500 MW additional load. The extreme weather forecast peak is 33,390 MW.

The following illustration provides the range of potential peak demands that the New York Control Area may experience this summer.



Ontario

The forecasted weather normal, summer hourly peak demand for 2004 is 23,668 MW. This hourly peak is forecasted to occur during the week beginning July 04, 2004. The weather normal forecast is derived from an analysis of the average demands using 30 years of historical weather based on a weekly resolution. The normal weather equates to an approximate average daily temperature of 28 degrees Celsius (82 degrees Fahrenheit) and 65% relative humidity and represents the average weather that can be experienced during any given week during the assessment period.

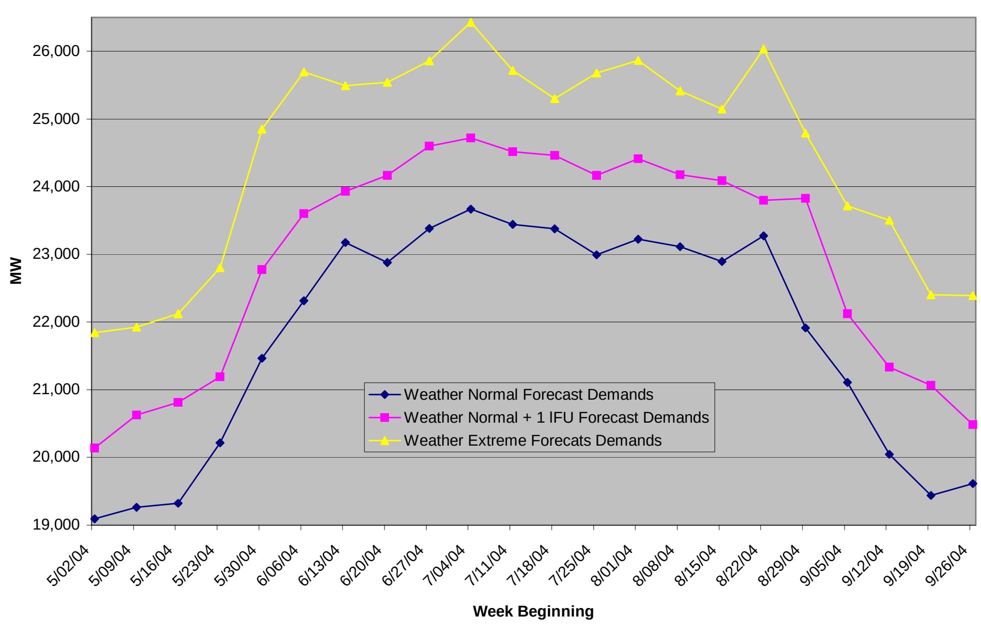
The load model and resultant demands have been updated to reflect the latest median economic growth forecasts for Ontario. As was seen in 2001 and 2002, weather extremes can propel the demands significantly higher than the weather normal values. Since peak demands are highly weather sensitive the impacts of additional weather scenarios need to be understood as part of the assessment.

Load Forecast Uncertainty (LFU) is used to capture, in MW, the impact of these variations from normal weather. Therefore demands can be derived and given a probability of occurring based on the likelihood of observing the normal weather. For this forecast, there is a 50% chance the peak demand in any given week will exceed the weather normal base demands. LFU represents the impact on the peak demand of one standard deviation in the weather elements. The values of LFU associated with this analysis ranges from about 5% to 9% of the predicted normal weather demands. The highest values of LFU for Ontario appear during those weeks just prior to and after the traditional summer vacation periods of July and August. LFU equates to a potential increase in demand of about 1,200 MW over the weather normal for the peak week.

Lastly, the summer period can experience extreme weather driven demands where the system is likely to be under duress. For any given week, the IMO forecasts extreme weather demand by using the hottest day in the past thirty years as the reference point. Depending upon the week in this assessment period, the values that could be experienced under extreme weather conditions can be 8 – 17% higher than the normal weather prediction. This can equate to an increase of approximately 2,600 MW over the normal weather prediction on the peak week. During the shoulder months of May and September, the impact of extreme weather over normal weather forecasted demand can reach as high as approximately 3,200 MW.

The following graph indicates the range of possible demands that Ontario may experience over the assessment period.

Ontario Forecast Demands Summer 2004



Quebec

The forecasted summer peak for the Quebec Control Area in 2004 is 21,517 MW. This is 296 MW (1.3%) lower than last summer's peak of 21,813 MW which happened on an unseasonably cold day at the beginning of May, with temperatures around 5 degrees Celsius (41 degrees Fahrenheit). If we exclude this anomaly, the forecasted summer peak for 2004 is 966 MW (4.7%) above the peak of 20,551 MW reached on June 26th of last year, when temperatures reached 33 degrees Celsius (92 degrees Fahrenheit) with a Heat and Humidity Index of 42 degrees Celsius (108 degrees Fahrenheit) on the major load centers.

The forecast is based on 35 years of historical weather with an offset of ±3 days for every date, which amounts to the equivalent of 245 years of sampling. Being exposed over the year to all kinds of extremes in weather, TransÉnergie uses three different load forecasting models (autumn, winter and spring). For the purpose of this assessment, the spring model is used up to the middle of August and the autumn model is used for the remainder of the period. The boundaries of the parameters of these models are regularly calibrated by comparing the results to the last two years of historical weather to reflect any new tendencies. Finally, TransÉnergie defines load forecast uncertainty (LFU) as a percentage calculated on a monthly resolution. The value for LFU is approximately 3% for the summer months, which represents from 600 to 700 MW. This value is accounted for in the Load and Capacity table provided in this assessment.

4. Resource Adequacy

NPCC Summary for 2004

The following assessment of resource adequacy indicates the week with the highest overall NPCC demand is July 04, 2004[3].

With the addition of resources the overall net margin for NPCC has improved over the assessment for 2003. The majority of the resource increase is in Ontario and involves generation that has already returned to service. Therefore, if the expected additional resources do not materialize, the overall effect on the projected operable spare capacity for the 2004 Summer Period should be minimal.

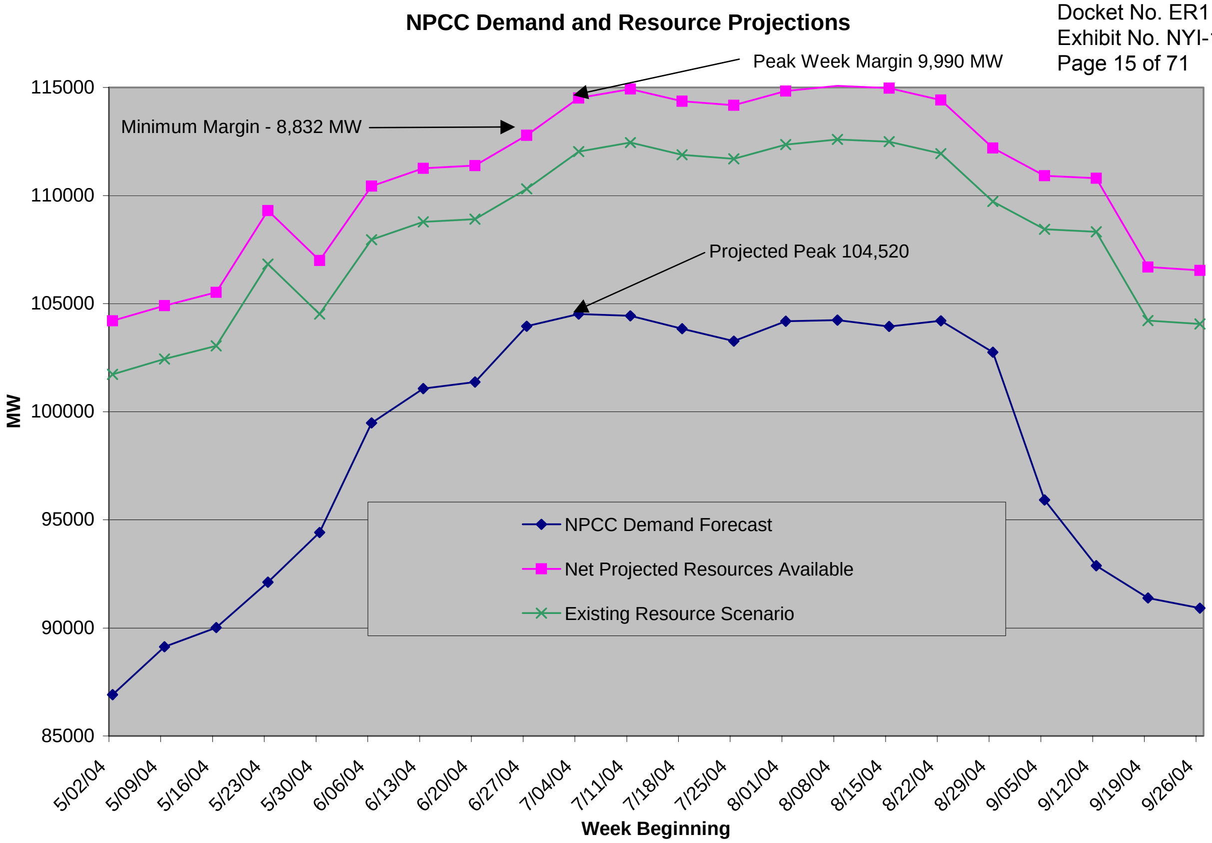
During the peak week for NPCC the overall spare operable capacity is forecasted to be slightly greater than 14,300 MW. However, a portion of this spare operable capacity is in the Quebec and Maritimes Area. If conditions materialize as expected, transmission transfer capability between these Areas and the remainder of the NPCC Areas will limit the usage of all of these resources.

Additionally, under conditions of high transfers from New Brunswick to New England up to 500 MW of resources may become bottled north of the Maine / New Hampshire border due to possible transmission constraints.

The overall net margins for NPCC have been reduced by approximately 2,600 to 5,400MW during the period of mid June to late August to account for this bottled capacity. After accounting for possible transmission constraints within NPCC, approximately 8,800 MW of spare operable capacity is forecasted for the week with the lowest net margin.

The following graph highlights the projection of NPCC Demands, a Projected Resources Scenario and an Existing Resource Scenario for the Summer Operating Period. The projection of NPCC Demand is a summation of each Areas projected demand on a weekly basis. The Projected Resources Scenario is a summation of each Areas; Projected Installed Capacity plus a projection of Interruptible Demands less Operating Reserve requirements, a projection of Known Outages, a projection of Unknown Outages, Bottled Resources and the Net of Firm Imports / Exports to NPCC. The Existing Resource Scenario uses the same elements as the Projected Resources Scenario but assumes that none of the resources that are currently undergoing commissioning or are forecast to be in service will be available at any time for the summer.

[3] Detailed Load and Capacity Forecast Summaries specific to NPCC and each Area are included in Appendix I.



The assessment was performed on the basis of projected available capacity. Inadequate fuel supply, lower than normal water reservoirs, higher than anticipated forced outages or delays in anticipated new facilities can have an adverse impact on these capacity projections.

The following are the Area assessments supporting this overall resource adequacy assessment.

Projected Load and Capacity Analysis by Area

Maritimes

When allowances for unplanned outages (based on a discrete MW value representing a typical forced outage) are considered, the Maritimes Area is projecting more than adequate capacity margins for the Summer 2004 assessment period. Net margins ranging from 4% to 37% are projected over the period May through September 2004.

New England

Operable capacity within New England is forecasted to be sufficient to meet load plus operating reserve requirements during the 2004 Summer Operating Period. The lowest projected operable capacity margin of 388 MW is expected to occur during the week beginning June 6, 2004 while the highest projected capacity margin of 8,038 MW is expected to occur during the week beginning May 2, 2004 if all assumed system conditions materialize. Available operable capacity is based on known outages, an allowance for unplanned outages[4], anticipated generation additions and retirements, projected firm purchases and sales, and the impact of expected Demand Response Programs.

While ISO-NE expects to have adequate operable capacity margins for this summer, if operable capacity shortages occur due to higher than expected resource unavailability or higher than expected load conditions, ISO-NE may have to implement NEPOOL Operating Procedure No. 4 – Action During a Capacity Deficiency (OP-4). OP-4 is designed to provide additional generation and load relief needed to balance electric demand and supply while striving to maintain appropriate operating reserves.

Although it is projected that operable capacity is surplus for the ISO-NE Control Area, the southwestern Connecticut region may face reliability problems due to transmission constraints into and within that region. Pursuant to planning studies conducted for the 2003 and 2004 Regional Transmission Expansion Plans, ISO-NE has identified concerns regarding electric transmission reliability in the southwestern Connecticut sub-region. Under certain conditions, the electric load in the southwestern Connecticut region could exceed the combined ability of the electric generating resources in the region, and the available transmission capacity to import electric energy into the region. Under these conditions, the generation and transmission systems within the region may not be able to supply the electric load without overloading lines or causing low voltage. In order to address this reliability concern, ISO-NE has issued a Request For Proposal (RFP) for up to 300 MW of quick-start capacity through the combination of generation resources, demand response resources, or peak-load reducing Conservation and Load Management (CL&M) projects. This RFP defines a contract term of up to four years, covering 2004 – 2007, with an option for a one-year extension.

New York

NYISO forecasts available capacity of 38,518 MW for the peak week resulting in a capacity margin of 1,543 MW.

These resources represent all generation capability located physically within the New York Control Area and are able to participate in NYISO ICAP market. In addition to these generation resources within the NYCA, generation resources external to the NYCA can also participate in the NY ICAP market. Resources within the NYCA that provide firm capacity to an entity external to the NYCA are not qualified to participate in the ICAP market.

[4] The allowance for unplanned outages is based on historical trends and is estimated to be between 2,100 MW and 3,400 MW during the summer.

NYISO conducts semi-annual and monthly Installed Capability (ICAP) auctions. Based on the forecast load for 2004, the ICAP requirement is 37,524 MW based on the 18% installed reserve margin requirement. When allowances are taken for unplanned outages (based on historical performance of 9.7 % unavailable capacity), the net available resources will be 33,865 MW, which will be sufficient to meet the New York Control Area (NYCA) load and operating reserve requirement during the peak load hours, with a reserve margin of approximately 265 MW expected at peak conditions.

NYISO expects approximately 1,100 MW of load relief from emergency operating procedures that include internal load curtailment by the transmission owners, public appeals and 5% system wide voltage reductions. Participation in the Emergency Demand Response Program and Special Case Resources programs represents an additional 877 MW available through the market. NYISO Emergency Demand Response Program (EDRP) and Special Case Resources (SCR) are emergency procedures involving committed market resources but are not considered as interruptible load in the Load & Capacity table calculations of net margin.

New York Resource additions, totaling 1, 434 MW are expected to be available for service prior to the summer peak. The Athens station represents 1073 MW of the total, and will connect to the 345 kV transmission system in upstate New York. The plant has completed testing and is expected to be commercial prior to the Summer peak period. Ravenswood 4 will have a real power output of 221 MW and will connect to the 138 kV system in New York City. These units are undergoing final testing and are expected to be commercial prior to the Summer peak period. Both Athens and Ravenswood 4 are natural gas fired combined cycle plants.

Two natural gas fired combustion turbines with a combined capability of 91 MW are being installed at Freeport in Long Island zone. Both are expected to be in service prior to July 1. Additionally, the Long Island Power Authority (LIPA) is installing two 48MW blocks of emergency generation at the Holtsville and Shoreham stations. These units are expected to be available for service June 1 through October 31, 2004.

As in previous years as part of the peak period capacity assessment, the NYISO determines the locational capacity requirements for the NYC and Long Island load zones in addition to the statewide capacity requirement. For the Summer 2004, based on the installed capacity as of February 2004, there was a projected deficiency of 270MW statewide, 109MW for the NYC load zone, and an 83MW surplus for the Long Island load zone. New capacity additions prior to the Summer will satisfy the statewide and locational requirements. The capacity additions on Long Island will further enhance the locational capacity margin in that zone.

Ontario

The return to service of three nuclear units that were laid up in the late 1990's began in 2003. Bruce A units G4 and G3 and Pickering G4 unit began generating electricity in the later half of 2003. This represented a net capacity addition of 2,065 MW to Ontario.

The IMO is anticipating an additional 755 MW of gas fired operating capacity for the 2004 summer operating period. The generation addition at Imperial Oil is expected to complete commissioning by the Summer Operating Period adding 98 MW of capacity. The IMO also expects 625 MW of generation at Brighton Beach by June 30, 2004 and 32 MW at Northland Power - Kirkland Lake to be in commercial service by August 1, 2004.

With these additions, the IMO is anticipating positive spare operable capacity margin of 2,440 MW on the peak week based on the expected the weather normal load forecast.
This forecast of spare operable capacity is based on the assumption that the new generating resources will meet their in service projections, known outages will proceed as planned, a projection of unknown outages, and a forecast of price responsive loads.

Known outages include the following; those resources that are scheduled to be on planned outages, transmission constrained resources and the difference between the installed capacity and the dependable capacity. For example, hydroelectric capacity is reduced by varying amounts through portions of the study period to account for the energy available under median water conditions.

Unknown outages represent the average value of forced outages experienced in this same study period during previous years.

A value of 300 MW of price responsive load has been assumed to be available for this forecast based on past operational experience.

The net capacity margins, in Table 5 of Appendix I, depict an estimate of the operable capacity margin that does not consider all the additional off-market control actions available to the IMO. For example, the IMO can institute a 3% or 5% voltage reduction. These control actions have the effect of reducing the demand by 1.7% to 2.5%, which, equates to approximately 390 MW to 500 MW on the peak week.

The risks associated with this analysis are that demands may be heavier than expected due to extreme weather, units on outage may not return to service as scheduled or there are delays to new and returning units. Of some concern for this summer are the number of units on outage that are expected to return to service before the end of June. While Ontario has a spare operable capacity margin of 1,200 MW or more during this period, the IMO will monitor the capacity balance and take appropriate actions where necessary.

Quebec

TransEnergie is projecting more than adequate capacity margins for the Quebec Control Area during this period. Being a winter peaking region, the summer is the season during which maintenance work is performed, but margins in the range of 4,700 to 7,000 MW above load and firm sales projections are nevertheless expected.

Delays to In-service of New Generation Resources

Maritimes

The Maritimes Area has no new generation resources scheduled for commercial operation during the summer period May through September 2004.

New England

In the New England Control Area, from April 2001 through February 2003, approximately 7,200 MW (summer rating) of new capacity has been added to the system with an additional forecast of approximately 300 MW to be in service prior to June 1, 2004. Of the new generation assumed to be commercial this summer, approximately 250 MW will be located in southwestern Connecticut. This additional capacity will enhance the reliability of southwest Connecticut and assist in meeting the overall electricity demands during summer peak periods.

ISO New England closely monitors the construction and commissioning of new generators as well as transmission projects. However, any delay in the commissioning of the projected new generation within New England will decrease projected capacity margins.

New York

Construction at the Ravenswood and Athens sites is essentially complete, and the units have completed capability testing, these units are expected to be in commercial operation well in advance of the summer peak period.

The Ravenswood unit #4 became commercial on March 29 2004 and will satisfy the locational capacity deficiency noted in the NYC load zone. The balance of any statewide shortfall would be satisfied by Athens, new resources in the Long Island load zone or by external ICAP resources. The Long Island zone shows a surplus for the locational capacity assessment. Any delay in the operation of the planned units is not expected to have a reliability impact. In addition, the installation of two 48MW blocks of emergency generation at the Shoreham and Holtsville sites will further enhance system reliability for the summer period.

Ontario

With the recent return to service of the three laid up nuclear units the impact of a delayed in service of new generation to the resource adequacy margin is not expected to be significant under normal weather conditions for the Summer Operating Period.

The IMO recognizes the risks associated with the timing of the in service of new generation facilities as well as the impact of weather on the demands. The IMO continuously monitors the in service date and the associated impact on the resource adequacy margins.

Quebec

The Sainte Marguerite-3 hydro plant (900 MW) was finally commissioned after a two year delay over the initial planning target. However, its total output continues to be restricted to 580 MW until a solution to problems with the turbines is found and implemented. This will not be done before the summer of 2004. No other significant generation is expected.

Fuel Infrastructure by Area

The following is a self-assessment by each Area of the expected fuel supply infrastructure.

Maritimes

The fuel supply in the Maritimes Area is very diverse and includes Nuclear, Natural Gas, Coal, Oil (both light and residual), Orimulsion™, Petroleum Coke, Hydro, Tidal, Municipal Waste, and Wood.

The Maritimes Area does not anticipate any restrictions in capacity due to fuel supply. Units that have been converted to the Orimulsion™ fuel retain their full capability on oil. Moreover, the Area anticipates normal hydro conditions and the reservoirs are expected to be full.

New England

In July of 2003, ISO New England formed the Fuel Diversity Working Group (FDWG) as a subcommittee reporting to the Transmission Expansion Advisory Committee (TEAC). The FDWG provides an arena for all stakeholders to discuss and assess the reliability impacts resulting from the range of fuel mix and fuel delivery options available to electric generators serving New England.

Historically, traditional fuel supply and delivery options have been readily available to generators within New England during the summer months. For the summer of 2004, ISO New England does not foresee any fuel supply or delivery constraints.

New York

Traditionally, the New York Control Area generation mix has been dependent on fossil fuels for the largest portion of the installed capacity. Recent capacity additions or enhancements now available use natural gas as the primary fuel. While some existing units in southeastern New York have “dual-fuel” capability, use of residual or distillate oil as an alternate may be limited by environmental regulations. Adequate supplies of all fuel types are expected to be available for the summer period.

Ontario

The majority of generation facilities operating on the IMO-controlled grid are represented by three basic types of fuel (Hydroelectric, Nuclear and Fossil). The fossil-fueled facilities are predominately fired by coal. A portion of these fossil-fired resources is fueled by natural gas or oil. A majority of the oil-fired capability is dual fueled by natural gas and oil. The IMO does not anticipate any fuel supply inventory or delivery infrastructure concerns over the Summer Operating Period. While there are storage lakes associated with most hydroelectric facilities, the ability to predict hydroelectric energy is difficult as water flow conditions are primarily influenced by precipitation. To counter this, the hydroelectric installed capacity is reduced through portions of the study period to account for reductions in capacity when the available water historically falls below the dependable value. For the purposes of this assessment, dependable hydroelectric capacity is the capacity that is sustainable for a minimum of one hour per day, five days per week.

Quebec

Most of the generation resources in the Quebec Control Area are hydroelectric (95%) and hydraulic conditions are adequate. For the summer peak of 2004, TransÉnergie does not foresee any problems in meeting both its internal demand and full responsibility sales while still being able to assist neighboring Areas as needed.

5. Potential Usage of Operating Procedures

The NPCC CP-8 Working Group performed a probabilistic analysis to estimate the annual Loss of Load Expectation (LOLE) and projected use of Area Operating Procedures designed to mitigate resource shortages for the summer of 2004 under various conditions. This section is based on the CP-8 Study results.

The scenarios included expected and extreme load patterns. Detailed study results for each of these scenarios can be obtained from the NPCC CP-8 Working Group - Summer 2004 Multi-Area Probabilistic Reliability Assessment.

The study results indicate that all NPCC Areas demonstrated an annual loss of Load expectation (LOLE) of 0.1 days/year or less, under the Base Case assumptions for the expected load (the expected load is the weighted average of seven load levels, weighted by the probabilities assumed for each). Recent capacity added in New England, New York and Ontario, in addition to the capacity and Demand Response Programs planned to be available this year are contributing factors that tend to reduce the need for the use of operating procedures designed to mitigate resource shortages in 2004, as compared to last year's analysis, under the identified expected conditions.

For the May - September 2004 period, Figure EX-1 shows the estimated potential range of use of the indicated operating procedures under Base Case assumptions. Figure EX-1 displays the results for the expected load and the extreme load (the extreme load level represents the second to highest load level).

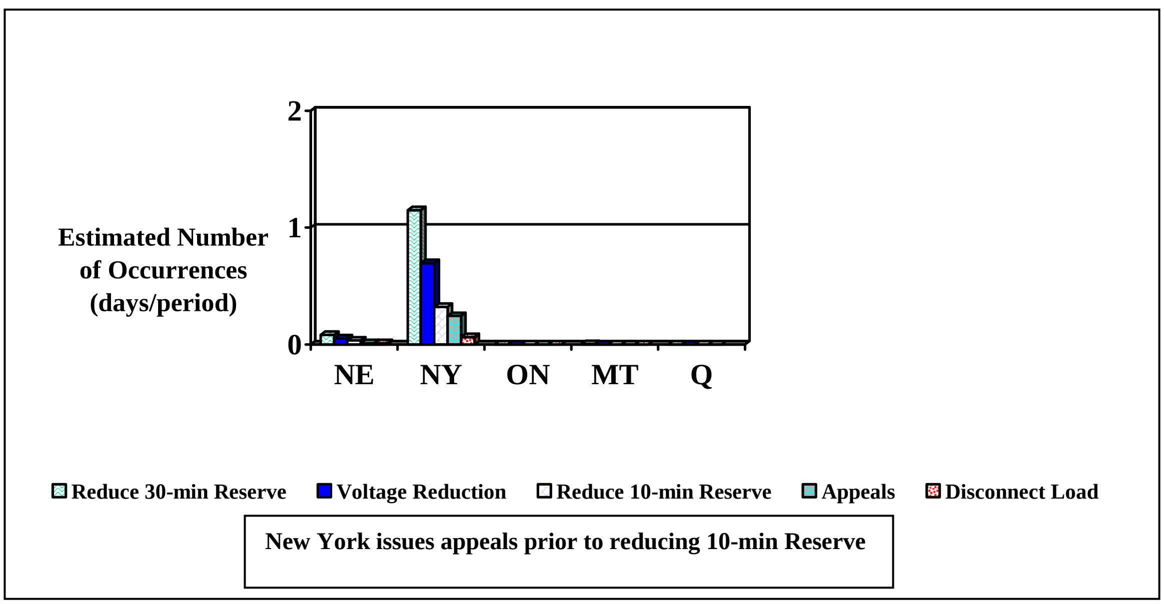


Figure EX-1
Potential Range of Use of Indicated Operating Procedures for Summer 2004
Considering Base Case Assumptions (May – September)
(Expected and Extreme load levels)

However, the potential use of these operating procedures is more likely to be required in southwest Connecticut and Boston MA and New York City and Long Island, NY, if reductions in anticipated resources and/or additional transmission limitations into NPCC materialize coincident with higher than expected loads.

6. Transmission Adequacy

Many Inter-Regional and Intra-Area transmission studies are in the preliminary stages of assessment. Therefore, the transmission adequacy assessment for this report was made utilizing assumptions based on consultation with the staff in the appropriate area of expertise for Inter-Regional transfer capability, supplemented by Intra-Area Transmission assessments of each Control Area and a review of the actual operating experience during the summer of 2003.

The following is a transmission adequacy assessment from the perspective of the ability to support energy transfers for the differing levels, Inter-Region, Inter-Area and Intra-Area.

Inter-Regional Transmission Adequacy

Evolution of the interconnected network is continuing in the northeastern U. S. Present plans are for the integration of Commonwealth Edison as part of PJM's energy market operations prior to this summer with AEP and Dominion Resources following later in 2004

A tower on the B3N circuit between Ontario and Michigan (230 kV circuit Scott - Bunce Creek) was damaged in April of 2003. The options to return the circuit to service are still being explored. At the current time, it is estimated that the circuit will not return until after the summer operating period.

As a result, the ability to transfer energy into / out of Ontario on the Ontario-Michigan Interface will remain the same as last summer.

The B3N phase angle regulator (PAR) was forced from service in March 2003. The return to service of the PAR is not known at this time. Additionally, the final phase angle regulator installation on the Michigan-Ontario Interface (Lambton-St. Clair 345 kV circuit L4D) is not expected to be completed until the end of September. For the study period it has been assumed that the Michigan-Ontario Ties will remain free flowing.

It is expected that the transmission system is adequate to support the anticipated Inter-Regional transfers.

Inter Area Transmission Adequacy

The transfer capability between the NPCC sub-Area containing the Quebec Control Area and the Maritimes Area with the remainder of NPCC is less than the surplus capacity in this sub-Area. The estimated transfer capabilities used in the CP-8 probabilistic assessment were used to calculate the remaining transfer capability after known transactions are taken into account.

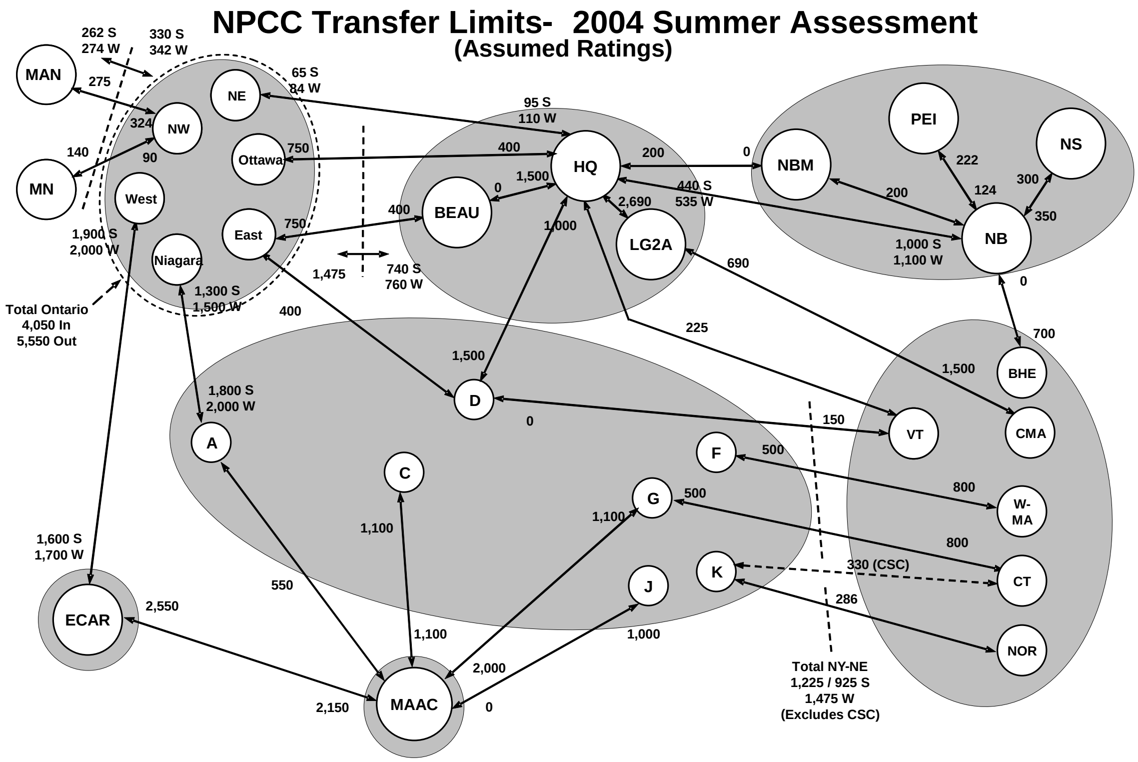
Above this restrictive condition, high transfer conditions from New Brunswick to New England can bottle up to an additional 500 MW of operable spare capacity north of the Maine / New Hampshire border. This accounts for the adjustment to the Net NPCC Margins in the Resource Adequacy assessment (Section 4).

The installation of the PAR at Sandbar is part of the Northwest Vermont Reliability Project, and was expedited due the failure of the Plattsburgh PAR in April 2003. The new Sandbar PAR will be used to regulate the flow on the PV20 tie line between New York and Vermont. This new PAR will provide greater regulating range than the previous Plattsburgh PAR.

After August 14 the Long Island Power Authority obtained an emergency order from the US Department of Energy to operate the Cross-Sound Cable HVdc tie-line between New Haven Harbor (ISO-NE) and Shoreham (NYISO). Since that time the tie-line has been operated under this order, however, it is not yet considered commercially available and operation of it during the Summer Operating Period is not a certainty.

The following diagram indicates the assumed transfer capability used in the CP-8 Probabilistic studies. These same transfer capabilities were used in this report for the determination of Inter-Area / Inter-Region transmission adequacy and the calculation of bottled resources within NPCC.

<u>Diagram 1</u>
Assumed Transfer Limits Between Areas



Transmission Adequacy Assessment by Area

Maritimes

There have been no major additions to the Maritimes bulk transmission system. Interconnection capability remains unchanged and is expected to deliver up to 700 MW to New England and be capable of delivering up to 700 MW to Quebec.

New England

During the summer of 2004 there are a few transmission upgrades that are expected to become in-service. These include the Sandbar Phase Angle Regulator (PAR) located in Vermont, the addition of a second Scobie Transformer in New Hampshire, and the Glenbrook STATCOM project that includes the tapping of the Darien-Southend 115 kV 1977 line located in CT.

As noted in the InterArea transmission adequacy review, the Sandbar PAR will be used to regulate the flow on the PV20 tie line between New York and Vermont.

The second Scobie autotransformer improves the regional reliability in the Manchester-Nashua area of New Hampshire. Due to area load growth, the existing autotransformer has recently experienced heavy loadings.

The Glenbrook STATCOM project and the tapping of the 1977 line into the Glenbrook Substation improve dynamic voltage and thermal response to contingencies in the Norwalk-Stamford area.

In November of 2003, the ISO-NE's Board for Directors approved the 2003 Regional Transmission Expansion Plan (RTEP03). RTEP03 is a comprehensive electrical engineering assessment comprised of numerous studies and analyses of New England's bulk electric power system.

RTEP03 concluded that the southwestern Connecticut (SWCT) region remains the first area of concern as it lacks the required transmission infrastructure needed to provide adequate reliability.

New York

There are no major transmission facility additions to the New York bulk power system expected for the 2004 Summer Operating Period.

After August 14 the Long Island Power Authority obtained an emergency order from the US Department of Energy to operate the Cross-Sound Cable HVdc tie-line between New Haven Harbor (ISO-NE) and Shoreham (NYISO). This line continues to operate under this condition, and is not considered commercially available for operation.

Ontario

There are no new major transmission facilities scheduled to be placed in service prior to the Summer Operating Period to change the overall transmission adequacy outlook from 2003. Studies indicate that there will be sufficient transmission capability to meet the projected requirements under most conditions.

The installation of capacitor banks totaling 375 MVAr (250 MVAr scheduled for installation before summer and 125 MVAr installed late last summer), along with the reactive output of the new Brighton Beach Generation facility should ease voltage concerns previously identified in the Windsor, Burlington and Toronto areas. While the concerns may be eased, maintaining acceptable voltage profiles in these areas will still require diligent assessment of outage plans, and dispatch/deployment of reactive resources.

Quebec

The Levis 315kV substation will see a major overhaul of its configuration this summer. This will permit, in the future, to diminish the impacts of outages on the transfer capability to New Brunswick. The work will run from April to November and some steps will have major impacts on the transfer capability to New Brunswick (during 4 days in August, the capability will be around 200 MW versus a maximum capability of 1050 MW). The transfer capability from New Brunswick to Quebec will not be affected for the outages planned during the Summer Operating Period.

An experimental 100 MW Variable Frequency Transformer (VFT) has been installed at the Langlois substation near the Les Cedres generating plant. It will still be in tests for the summer of 2004 and could eventually increase the transfer capacity via lines CD1 and CD2 from Dennison (Niagara Mohawk, NYISO). The additional margin is not expected to be commercially available for 2004. This interconnection is currently being fed by islanding generation at the Les Cedres plant and this VFT will also increase switching flexibility by reducing the number of islanding operations.

Apart from the preceding, no major maintenance outages are scheduled on the interconnections with neighboring Areas from May to September. Transfer capabilities will be at their maximum throughout the summer. Internal Transmission outage plans are assessed to meet load, firm sales, expected additional sales plus additional uncertainty margins.

7. Operational Readiness for 2004

The Resource and Transmission adequacy assessments are key elements in determining NPCC's ability to meet the demands of the summer, but they are mere "snapshots in time" or simulations of conditions based on predictions of specific configurations. To mitigate the uncertainty surrounding load forecasts, forced outages and other conditions that cannot be controlled or predicted, the Control Areas of NPCC need to be prepared to deal with contingencies in real time.

The following is a synopsis of some of the most prevalent uncertainties affecting the ability to handle the projected demand and the mitigating actions NPCC Control Areas can take to diminish their impact during the summer 2004 period.

Reactive Capability of Generating Units

Heavy demand during the summer period requires that the transmission system voltages and the end-use reactive loads be supported by substantial reactive resources in relation to the real power requirements. While static VAR devices and shunt capacitors provide a known quantity of support based on design rating, the actual reactive capabilities of generators can vary significantly from the design capability.

The following is a discussion of each Areas methodology to monitor reactive capability.

Maritimes

The Maritimes Area, in addition to the reactive capability of the generating units, employs a number of capacitors and reactors in order to provide local area voltage control. The Area employs Static VAR Compensators and several synchronous condensers in key load centers to provide high-speed reactive power control. Further, the Maritimes Area is a winter peaking system and the loading of the transmission lines in summer is, in general, lower resulting in lower VAR consumption.

New England

ISO-NE and its satellite control centers continually monitor voltage and VAR conditions throughout the system to ensure reliability of the bulk power grid in New England. Major generating stations throughout New England have specified voltage schedules, which are maintained as closely as possible in system operations. In addition to voltage schedules, minimum and maximum voltage limits at several key generating or transmission stations have been established to promote system reliability during adverse voltage/reactive conditions. Also, a Tariff has been in place since August of 2001 that compensates New England generators for VAR support.

As part of the NERC transmittal entitled "Near-Term Actions to Assure Reliable Operations" as a result of the August 14 blackout, ISO-NE has surveyed the status of all generators in New England to ensure that Automatic Voltage Regulators (AVR) exist and are normally in-service for the resources as required by NEPOOL Operating Procedure No. 14 - Technical Requirements for Generation, Dispatchable and Interruptible Loads (OP-14).

New York

Each generator providing voltage support service under the NYISO Tariff to the New York market is required to perform annual testing of reactive capability within 90 % of its claimed operating capability. The NYISO staff reviews the test data and, if necessary, will perform appropriate voltage analysis to determine operating limits based on the reactive capability testing. In preparation for the summer peak period, the NYISO staff has been reviewing the test data to ensure that all voltage support service providers are in compliance with the testing and reporting requirements for this ancillary service. The NYISO staff has also requested Transmission Owners and Generation Owners to identify local (in plant or station) issues that might limit a particular generator's voltage support capability.

Ontario

The IMO has the authority to test the declared reactive capabilities of generating units. Testing of generating units, critical to the support of key portions of the IMO-controlled grid was completed in February 2004. Analyses of the test results are underway to ensure that the demonstrated reactive capability is sufficient to meet system voltage support requirements. The results of the tests will be incorporated into the detailed capability studies for the summer.

Quebec

Being a winter peaking area, TransÉnergie does not expect to encounter voltage collapse problems during the summer. On the contrary, controlling overvoltages on the 735kV network during off-peak hours is the concern. This is accomplished mainly with ample provision of shunt reactors.

Environmental Impacts

The major Federal rules that apply to electric generating sources in the northeastern United States are the Acid Rain regulations, New Source Performance Standards (NSPS) and State Implementation Plans (SIPs). The Acid Rain regulations require power plants to reduce both SO_2 and NOx emissions on a year round basis. The

NSPS regulations set regulations for new power plants and States develop SIPs to meet National Ambient Air Quality Standards (NAAQS). In the northeast U. S., the NAAQS of most concern is the ozone NAAQS. In order to meet the NAAQS, states in the northeast have developed a summer time NOx Budget Trading Program that has been in effect for the last three summers.

Short-term impacts on individual unit operation during 2004 summer are more influenced by the summer time regulations as opposed to annual regulations because these regulations are more stringent. For the NOx Budget Program, sources may either install NOx control technologies or buy allowances from sources that have been overcontrolled. It is possible that fuel switching between oil and gas can be a problem. Quick start-up of mothballed units is also allowed under the rules.

Overall, it is not expected that EPA rules will have a major impact on electric system reliability through its environmental programs during 2004 summer. State, provincial and local environmental rules are expected to have more of an impact on electric system reliability that is described in more detail by Control Area.

Another environmental impact influencing generation during the past few summers was water level. Water levels have improved considerably and for 2004 Summer Operating Period this is not expected to be a significant concern.
The following are the Area assessments discussing environmental related issues.

Maritimes

The Maritimes Area closely monitors air emissions and other environmental discharges to ensure compliance with standards and limits set forth by Canadian Federal and Provincial environmental regulations. For the summer 2004 period, there may be occasions when some units are required to be de-rated in order to meet these regulations. However, these occasions are expected to be infrequent and of short duration.

New England

ISO-NE is mindful of environmental restrictions and constraints on New England's generating capacity, however it is the responsibility of the resource owners to monitor their compliance with state or federal standards. In order to mitigate the impact that these restrictions may have on the availability of generating units within New England, generator owners are encouraged to pursue temporary waivers to their environmental permits especially during periods of extreme capacity deficiencies.

In addition, ISO-NE includes discussions on the air emission impacts from the generating units within the 2003 RTEP report. Results of this analysis illustrate that air emissions by fossil-fueled generating units are highly dependent upon fuel prices (because of prices' effect on dispatch of such units), but show less correlation with transmission improvements.

New York

There is a limited possibility that there may be a shortage of available capacity in the New York City metropolitan area due to environmental constraints. An extended period of high temperatures and high humidity leading to an unacceptable level of ozone in the region may limit the allowable dispatch of generation to meet load. In 2001 the NYISO obtained a waiver from the New York State Department of Environmental Conservation (DEC) to address such an air quality emergency and is continuing to work with the DEC staff on this concern. Should such a situation arise, it is incumbent on the NYISO to maximize the availability of generation outside the effected area and insure that all other steps are taken in accordance with the capacity emergency procedures (NYISO Emergency Operations Manual). After this the DEC would allow operation outside of emission limits to avoid curtailment of firm load in New York.

Ontario

There are many environmental issues that specifically affect the operation of facilities in Ontario during the Summer Operating Period. Compliance with these standards is strictly monitored by the facility owner.

Some facilities have annual energy limitations to observe permissible emission limits. These annual limits are not expected to impact the overall energy and capacity projections for the Summer Operating Period.

It is also recognized that there is a potential to restrict generation to respect environmental regulations due to cooling water temperatures etc. The timing and the overall impact of any restrictions are unpredictable.

Currently it is the facility owner that would request the appropriate authority to permit a variance from these obligations to assist in a capacity deficiency. Experience gained in 2002 was utilized to revise procedures where the IMO requests the facility owner to obtain variances to environmental obligations under emergency procedures.

Quebec

The bulk of generation in Quebec is hydroelectric based, therefore the environmental concerns, as they pertain to this report are not of concern.

Geomagnetically Induced Currents (GICs)

Past experiences have shown the serious effect that geomagnetic disturbances can have on the NPCC bulk power system. Quasi-DC currents induced in power lines flow to ground through transformer neutral connections. This can result in saturation of the transformer core leading to a variety of problems, including increased heating that has resulted in transformer failures. In addition, the harmonics generated in the transformer, as a result of the saturation, may produce unanticipated relay operations, such as sudden tripping of transmission lines or shunt capacitors.

GICs are produced by the magnetic field variations that occur when a mass of electrically charged particles from a solar coronal mass ejection impacts the earth's magnetic field. Because of the low frequency compared to the AC frequency, the geomagnetically induced currents appear to a transformer as a slowly varying DC current.

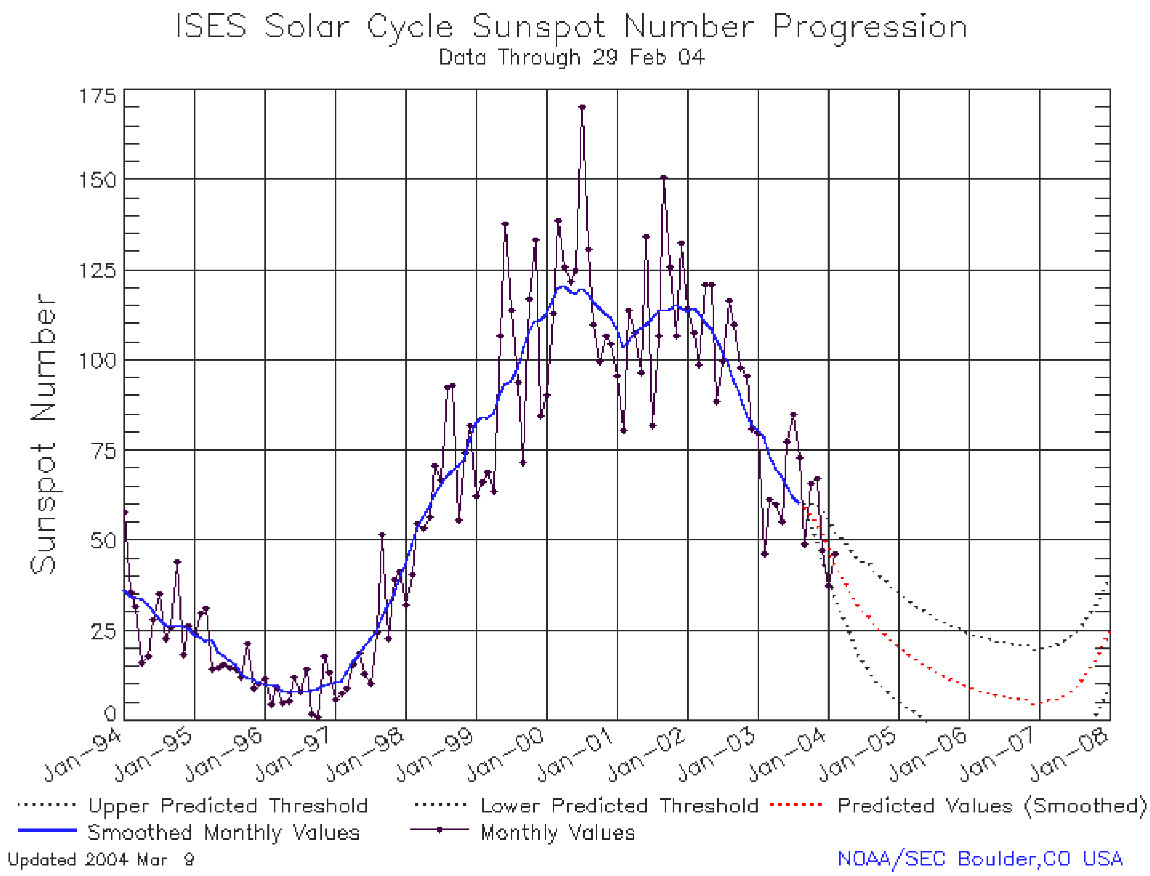
GIC flowing through the transformer winding produces extra magnetization, during the half-cycles when the AC magnetization is in the same direction this effect can saturate the core of the transformer. This also results in severe distortion of the AC waveform with increased harmonic levels that can cause incorrect operation of relays and other equipment on the system and may lead to problems ranging from trip-outs of individual lines, transformers or shunt capacitors to collapse of the whole system.

GIC activity correlates to 11-year sunspot cycles. We are presently in Cycle 23, which began in 1996 and is predicted to end about January 2007. During the portion of the solar cycle that has greater sunspot activity, there is a higher probability of GICs occurring, which could impact the NPCC system. Observations of sunspot activity only provide insights as to the timing of the release of energy; it is the solar winds that ultimately determine the intensity and duration of a geomagnetic storm and those areas of the earth that will be ultimately affected. A satellite positioned between the earth and the sun is capable of determining the intensity of the storm. The timing between when this satellite senses the magnitude of the storm and when the effects are noted on the earth is less than 1 hour.

The CO-8 Operations Managers Working Group explored ways to obtain accurate and timely forecasts of solar magnetic disturbances and the resulting GICs for the NPCC Control Areas. As a result, NPCC contracted for GIC forecasting services from Solar Terrestrial Dispatch (STD) for a three-year period that began mid-2003. Forecast information is provided directly to the control centers in the NPCC Areas.

Activity is now on the declining side of solar cycle 23 and the minimum is predicted to occur in late 2006 or early January 2007. Even though we are on the declining side of the solar cycle there were a number of occasions during 2003 and early into 2004 in which STD provided alerts of solar activity that could reach K7 index of intensity or above. These alerts were provided for May 29, October 28-30, and November 4, 6, 18-20 of 2003 as well as January 19-20 of 2004. The most significant activity occurred on October 29, 2003 when intensity reached K9.

The following chart indicates the solar activity up to February 2004.



Monthly updates to this chart and further information can be found at www.sec.noaa.gov/.

With regard to expectations from STD of GIC activity during summer 2004 it is important to emphasize that it is not possible to predict several months in advance the extreme episodes of activity such as those that occurred during late October 2003.

While we are well on our way toward solar minimum in terms of sunspot counts, the geomagnetic activity cycle lags the sunspot cycle by several years. As a result, we are still very close to the maximum (perhaps just beginning to edge down off the maximum of the geomagnetic activity peak).

The biggest source of enhanced geomagnetic activity will continue to come from coronal hole-based sources over the next year. Although these sources of activity tend to be less of a concern, they are still quite capable of producing periods of GIC activity.

Minor to major geomagnetic storm intervals (K-indices of 5 to 6) will continue to be possible for several days each month during the summer months. Severe storm intervals (K-indices of 7) will also be slightly possible for a few days during the summer months. Coronal hole-based disturbances rarely produce activity greater than K-indices of 7. Therefore, it is not expected that many events will exceed K-indices of 6 or 7, unless there is another burst of unexpected solar activity.

Overall, the summer should be fairly stable, with modestly elevated risks of GIC activity occurring for a few days approximately once (at most twice) each month during the summer months. GIC activity should remain confined to mostly weak levels when it occurs, but may infrequently (if at all, and then probably only briefly) reach moderate levels in some regions.

If the trend continues (and this is dependent upon whether new coronal holes form and/or old coronal holes maintain their structure), the last week and/or the first week of each month during the summer may see elevated levels of geomagnetic activity due to coronal hole disturbances.

In summary, there is no ability to forecast any significant solar activity in advance of this summer, it is very possible something could materialize.

The following is a summary of each Area's experiences of GIC activity through the recent "high period" in October 2003. The resultant impact observed in the NPCC Control Areas indicates that the control actions that are in place appear to reasonably reduce the impact of GIC.

Maritimes

The Maritimes Area did not experience any significant disturbances in 2003 and no major problems are anticipated for 2004. The Maritimes Area did perform some limited control actions reducing exports on interconnections. On March 17, 2003 New England reduced imports from the Maritimes due to increased solar activity (K7). During the period October 29-30, 2003 exports to Hydro Quebec and, internally on the interconnection between New Brunswick and Nova Scotia were reduced according to procedures as a precaution due to the solar activity (K7).

The Maritimes Area Operating Procedures are consistent with NPCC Operating Procedures for GIC activity.

New England

In late October and early November of 2003, the New England Area experienced a significant amount of solar activity. Although these solar storms did not cause any major problems within the region, specific actions were taken as a result of the storms intensity in order to maintain the reliability of the system. Specifically, certain transmission maintenance outages were called back to service and energy transactions with surrounding Control Areas were reduced during several observed Solar Magnetic Disturbances.

New York

The major solar storm that occurred in late October 2003 did not produce any perceptible impact on the New York system.

The NYISO System Operations Advisory Subcommittee is investigating the inclusion of an exclusive contingency set that would incorporate contingencies that have a higher probability of occurring during high levels of solar activity. The contingency list would be activated in the NYISO Security Constrained Dispatch program when a high level of GIC activity is present, and would help to mitigate the potential impact of these contingencies on the system.

Ontario

Throughout the period extending from 2001 into 2003, no actions beyond those required by the existing procedures were taken by the IMO. During the period of elevated GIC forecasts for the October 29 to 30 2003 solar storm period, the IMO undertook additional actions as indicated within procedures. These actions included the recall of certain planned transmission outages and the starting of additional units beyond normal requirements. While the IMO noted minor swings on the real and reactive power outputs at certain generating stations no specific operations can be attributed directly to the solar storm.

Quebec

During the summer of 2003, there were three occurrences of GICs. Alerts were called on May 29th, June 2nd and August 18th. The alerts predicted Kp levels of 7-8 and they actually reached a level of 8 in May and August, and only 6 in June. No adverse effects on the bulk system were recorded. Maximum voltage asymmetry recorded was 2 - 53% at the Châteauguay substation at 21h20 on May 29. Some transfer limitations on the bulk system were imposed but Interconnection capacities were not affected.

However, it is important to mention that at the end of October 2003, a massive storm hit the Quebec network as well as its neighbors with a maximum Kp level of 9 observed at 01h14 and at 12h15 on October 29. On the main grid, the 735kV network having all its lines series-compensated, the effects on the main grid were minor. The most severe impacts were felt on the Brisay to Tilly 315kV network in the north of James Bay (1,000 miles north of Montreal), which was not series-compensated. The maximum voltage asymmetry (7 - 15%) and quantity of even harmonics (9 - 8%) were both recorded at the Tilly substation where this 315kV subnetwork joins the main grid. This brought the voltage to as low as 722kV at Tilly, which is only a minor violation of the low operating limit of 725kV. No equipment was lost during the storm that lasted 25 hours. During the two nights, imports from New England to Quebec on Phase-2 were limited to 200 MW by ISO-NE instead of the scheduled values between 500 and 600 MW.

Operating Procedures

Detailed NPCC Operating Criteria, Procedures, Guides and Reference Documents provide the Areas with the necessary material to develop and maintain a concise set of operating procedures that are relevant to maintaining the security of the Control Area by observing local operating parameters. Listings and descriptions of the documents related to operational readiness for the summer months are summarized in Appendix II.

TFCO is systematically replacing the existing operations-related “B” and “C” documents by adding the requirement language from these documents to “A” documents. Over the past few years several Reference Documents had been developed, which have similar content to the “C” documents and have no requirement language. TFCO has now agreed to keep the “C” designation for the existing Procedures. These will be periodically reviewed and updated, as necessary. In addition, the Reference Documents will be reviewed and re-designated as new “C” documents. This will be a gradual process.

Since the Reliability Assessment for Summer 2003, the following revisions to NPCC documentation have occurred:

The C-9 “Monitoring Procedures for Operating Reserve Criteria” and C-12 “Procedures for Shared Activation of Ten Minute Reserve” Documents have been updated. Modifications had been made to the C-9 Document to make this document consistent with NERC DCS and with the NPCC A-06 Document (Operating Reserve Criteria). Modifications made to the C-12 Document addressed counterflows in the examples and included a number of editorial changes.

It should also be noted that the A-2 Document, “Basic Criteria for Design and Operation of Interconnected Power Systems” had gone through a review period of about one and a half years and recently received approval by the Reliability Coordinating Committee at a March 18, 2004 meeting. This document will still need to receive approval of the full NPCC membership before it is fully adopted.

To be prepared to deal with the constantly changing conditions on the power system, NPCC routinely conducts weekly operational planning calls between Reliability Coordinators to coordinate short-term system operations. NPCC has also refined and expanded its emergency conference call mechanism to enable operational security entities in NPCC and neighboring regions to communicate current operating conditions and facilitate the procurement of assistance under emergency conditions. These calls may be initiated upon the request of any Reliability Coordinator and is coordinated by NPCC Staff. Due to the commercially sensitive real-time nature of the material discussed, only signatories to the NERC Confidentiality Agreement for Electric System Security Data may be party to these calls. Eighteen of these emergency preparedness conference calls were successfully conducted during 2003.

Each Area in NPCC is required under Document C-13, to review its coming twelve-week capacity margin projection on a weekly basis. This information is communicated to NPCC for review during the weekly conference operational calls held in accordance with C-13, "Operational Planning Coordination." In addition to this review of twelve-week capacity margin projections, the weekly conference call discusses operations for the coming ten-day period as well as any information that may impact operations.

Each Control Area has complemented the NPCC Procedures and Guidelines with instructions as they apply to their local conditions. The following is a summary of activity that Areas have taken to ensure that instructions remain current.

Maritimes

The Maritimes Area Operating Procedures are in compliance with the NPCC Operating Procedures and are supplemented with local procedures.

New England

Since the implementation of the Standard Market Design (SMD) in March 2003, ISO-NE has placed a considerable amount of effort reviewing and revising as necessary, New England's Market Rules and Operating Procedures. New England's Operating Procedures are in compliance with the NPCC Operating Procedures and are supplemented with local procedures.

New York

The NYISO continues to review and refine operating and market processes based on experience gained through the sustained peak load periods of previous summers. The positive experience with the initial implementation of the Emergency Demand Response Program during that period means that program will continue and expand. Staff will continue the review of Normal and Emergency Operating Procedures to improve the implementation and usefulness of that and other programs. There continue to be refinements to the NYISO Market operation based on the experience gained during peak load period operation, and new products and facilities are being added.

Ontario

The IMO continuously reviews and revises all operating procedures to ensure that they are consistent with both NERC and NPCC requirements as well as with the Market Rules for Ontario.

As a result of the Blackout in August 2003, specific emphasis was placed on the review of Reactive Dispatch Procedures and Procedures for Loss of Telemetry.

Throughout the summer operating period, additional NERC Certified System Operators will be available to supplement Control Room Operations staff as conditions dictate.

Quebec

In the event of a capacity deficiency, TransEnergie would first ask Hydro-Quebec Marketing to find additional generation in or out of the Control Area. After this step, Emergency Operating Procedures, compliant with NERC and NPCC are implemented.

Operating Procedures in Shoulder Months

The uncertainties associated with weather variability and maintenance overruns in the spring months can quickly lead to resource shortfalls. Past history has indicated that resource assessment procedures need special attention during this time frame. As a result of these capacity shortfalls, many of the Areas have taken actions to prevent a reoccurrence and are described below.

Maritimes

The Maritimes Area Operating Procedures for the shoulder and summer period are essentially the same as for the summer of 2003 and no changes are anticipated for the summer of 2004.

New England

ISO-NE's Outage Coordination staff has reviewed the proposed maintenance schedules for generators in the Control Area and, where appropriate, has worked with the owners to adjust their outages in anticipation of load levels that may be experienced in the weeks prior to or following the summer peak load exposure period. However, there is a significant amount of capacity scheduled out-of-service in May. Since much of the generation on maintenance in May consists of large generator outages, a delay in the return to service date of one or two generators could have a considerable impact on the operable capacity margin projected for June.

New York

NYISO Scheduling staff has reviewed the proposed maintenance outage schedules for generators in the Control Area and, where appropriate, have worked with the generator owners to adjust the outage schedules in anticipation of load levels that may be experienced in the weeks prior to or following the peak load exposure period.

Ontario

As stated above, the IMO performs extensive reviews of reliability procedures on a regular basis. This includes the procedure for maintaining reserve margins and rectifying negative margins. These procedures are enforced during the shoulder months to ensure that the necessary control actions are taken in the appropriate time frame if needed to ensure that planning obligations are met.

Quebec

The TransÉnergie Operating Procedures are updated on a continuous basis to reflect changes in the regulations, market rules and local procedures. There is not, however, any special Operating Procedures in the summer or shoulder months because TransÉnergie is a winter peaking system.

Load Response Programs

Each Area utilizes various methods of demand management associated with interruptible loads. In those Areas where market based structures have been implemented or are evolving there has been a shift in contractual obligations of the interruptible loads. The move is an attempt to manage load interruption, as a result of demand exceeding resources, by giving industrial and commercial customers the ability to respond to price signals in the wholesale electricity marketplace. Many of these programs are in varying degrees of development. The following is a summary of current interruptible load programs available or in development to be available for the summer period in each Area.

Maritimes

The Maritimes Area is a winter peaking area and does not have any Load Response Programs. Interruptible and Dispatchable loads are available for use when corrective action is required within the Control Area.

New England

During times of capacity deficiencies, ISO-NE declares NEPOOL Operating Procedure No. 4 – Action During a Capacity Deficiency (OP-4) that includes; interrupting customers within Real-Time Demand and Profiled Response Program, purchasing emergency energy from the neighboring Control Areas, implementing voltage reductions, and public appeals for conservation. This emergency operating procedure provides load relief measures estimated to be between 3,000 to 4,000 MW[5].

In addition to load relief measures from OP-4, Enrolling Participants or Demand Response Providers enrolled in the Real-Time Price Response Program have the option to voluntarily reduce energy consumption in real-time on the days ISO-NE activates the program and during the hours specified. ISO-NE typically activates the Real-Time Price Response Program when hourly Zonal Price are forecasted to be greater than or equal to $100/MWh.

New York

The NYISO introduced two load response programs for the New York Market in May 2001. The Emergency Demand Response Program (EDRP) is a program in which Customers would be paid to reduce their consumption by either interrupting load or switching to emergency standby generation when requested by the NYISO. During the Summer 2003 period the NYISO did not experience peak conditions that required activation of the EDRP. However, load response programs were useful to maintain the balance between generation and load, during the system restoration period following the August 14, 2003 blackout.

The Emergency Demand Response Program is continuing for Summer 2004, and NYISO estimates potentially 900 MW of load relief, with 225 MW of that total being designated as “reliable.” This load relief will be available to support the New York State power system during capacity emergency periods. This program is in addition to the relief obtained through the emergency procedures for Operating Reserve Peak Forecast Shortage (Section 4.4.1 NYISO Emergency Operations Manual) or in

[5] This value is based on the NEPOOL OP-4 documents as of February 3, 2004 which can be found on the ISO-NE website.

response to the major emergency state (Section 3.2 NYISO Emergency Operations Manual).

Ontario

Under the IMO-Administered Market, there are about 300 MW of price responsive loads. A majority of these loads are treated as a resource that will be dispatched off the system by the IMO once the price of energy in the real time market has exceeded the bid (to Buy) price submitted by the load. The subject load must then reduce their demand according to the dispatch instructions or the load will face compliance proceedings.

In 2002, the IMO instituted an Emergency Demand Response Program to provide additional demand relief under emergency conditions. The program involves 16 different customer sites with approximately 400 MW of load contracted in this ancillary service. When requested, the customers would reduce their demand on a voluntary basis. This demand response program would be implemented just prior to the interruption of firm load. The effectiveness of the program has been reviewed and approvals have been received to extend the program beyond the summer of 2004.

Quebec

The Quebec Area is a winter peaking system and does not usually need to resort to the load response programs during the summer, although, of the 1713 MW of interruptible power available in winter, 1054 MW could be called on if needed during the summer.

Communications Systems with Operators and Customers

There is nominally some time lag for control actions to take effect to rectify a resource deficiency. In the evolving market places there are now many players in Areas where at one time there were only a few. As a result, simultaneous communications need to be timely and efficient for multiple resources to respond to directions by the Reliability Coordinator to quickly mitigate the need for emergency control actions, including the shedding of load.

Below is a summary of the communication medium that each Area utilizes to communicate emergency situations with generators, transmitters and customers.

Maritimes

The individual Control Centers within the Maritimes Area provide timely and accurate information regarding the status of the power system to customers via websites, news releases, high volume Interactive Voice Response System and telephone contact through Public Affairs and Customer Services departments or Call Centers.

New England

In the event of a capacity deficiency, ISO-NE's website provides real-time information to stakeholders and the general public regarding the status of the power system and the amount of Emergency Energy Transactions requested during peak periods. In addition, Control Room operations will convey the necessary information to ISO-NE's Customer Service and Corporate Communications Departments so that they can make the necessary communications to federal and state regulatory agencies and the media. Operations personnel convey the details of any capacity deficiency to the Satellite Control Centers and neighboring Control Areas as appropriate.

In addition, ISO-NE creates a seven-day forecast that is posted to the ISO-NE web site. This posting includes a capacity analysis for the peak hour of each day, detailing the forecasted amount of surplus/deficient capacity for each future day to illustrate anticipated system conditions.

New York

The NYISO is continuing implementation of its Inter-Control Center Communications Protocol communications system (ICCP) allowing bi-directional data communication directly from the NYISO control center systems to the generating plants. In normal operation this facilitates the transmitting of schedules and base-points from the NYISO dispatch system to the generators, and improves the accuracy and timeliness of generator real and reactive power metering.

The NYISO website now displays information including actual Control Area load in addition to the real-time zonal pricing information and transmission outage schedules. Market Participants may also access a "dispatcher notes" page that provides information on current NYISO system operating conditions.

Ontario

On a daily and weekly basis the IMO issues Security and Adequacy Assessments (SAA). These supply the Market Participants with detailed adequacy projections on an hourly resolution for a period of 14 days into the future and on a weekly resolution for the following two weeks.

The IMO also publishes to Market Participants a System Status Report (SSR) three times daily by Market Forecasts and Integration during the pre-dispatch period outlining deviations from the SAA published for days one and two.

The SSR has capability to identify to Market Participants the following Advisories: Major Change Advisory, System Advisory and, System Emergency Advisory.

To address global adequacy concerns when there is insufficient energy or capacity available to the IMO-controlled grid or when there are insufficient offers in the real-time dispatch of the IMO-administered markets, the IMO shift staff can also issue a SSR. The SSR can be prepared on very short notice. A notice is sent to Market Participants via their dispatch workstations notifying them that a new SSR has been issued with the details of the SSR being published to the IMO Public Web site.

To address local area adequacy concerns, the IMO will direct Market Participants to submit offers, either via the Market Participant's dispatch workstation or telephone.

During the summer of 2004 the IMO will be introducing Multi Interval Optimization into the dispatch process. A benefit of this enhancement to the dispatch process is that Market Participants will now receive, in addition to actual dispatch instructions for the next interval, a dispatch advisory that will project out in time the potential dispatch requirements.

While the phone systems and associated infrastructure worked adequately during the blackout of 2003, the IMO recognized a number of areas of improvement. At the time of the blackout a Request for Proposal (RFP) was in place to replace the IMO phone system. This RFP was subsequently revised to include additional requirements, and the upgraded phone system will be in place prior to the summer operating period.

The IMO also recognizes the need to communicate with the general public at times when there might be supply shortfalls. To achieve this, the IMO created a public communications process to ensure that consumers and industries in the general public were given all the information they need to make informed choices. This process for communicating to the general public on resource issues proved to be an effective tool in 2003 for managing the resource shortfalls during the post blackout period. On April 1, 2004 the IMO corporate web site was revised with a number of enhancements. One of the enhancements will be placing an increased emphasis on resource adequacy issues by placing postings in a more prominent manner.

Quebec

To satisfy demands in Quebec, TransÉnergie solicits additional capacity requirements it may need through Hydro Quebec Marketing (HQM). If HQM cannot secure the additional capacity required or there is not sufficient time to fulfill the need identified, TransÉnergie would take actions including the securing of emergency energy from neighboring systems, cutting of available interruptible loads and instituting voltage reductions. If these measures are deemed to be insufficient and there is adequate time a public appeal would be instituted through commercial media. The probability of resorting to these measures during the summer is very low.

Acquisition of Emergency Energy between Areas

In May of 2000, the NPCC Task Force on the Coordination of Operation adopted a Memorandum of Understanding for NPCC Area Emergency Assistance. This document outlines the steps to be taken when there is either a forecast or actual shortage of operating reserves. The objective of the process is to maximize the reliance on the marketplace to resolve resource inadequacies, minimizing the need for emergency transactions between Areas.

While all Areas are resolved to let the marketplace solve such inadequacies, there may be occasions where market forces cannot respond in the appropriate manner or time frame. The following is a summary of ability to transact emergency energy between adjacent Areas.

Maritimes

The Maritimes Area, through existing agreements with neighboring Control Areas, namely, ISO-NE and Trans-Energie, has established procedures for the acquisition of emergency energy.

New England

When the NEPOOL Control Area experiences or is forecasted to experience a shortage of operating capacity, ISO-NE will request NEPOOL Participants to submit Emergency Energy Transactions (EETs) through the NEPOOL Market System. Through this bid based energy market, procedures are in place to determine the availability of the emergency assistance from its neighboring Control Areas when necessary.

New York

During 2002, the NYISO completed the process to review and update the emergency energy provisions in the interconnection agreements with the Control Areas neighboring New York.

Ontario

The IMO negotiated new operating agreements with the adjacent Reliability Authorities in 2002 as part of the steps to the new Market. These operating agreements contain provisions for the transaction of emergency energy into and out of

Ontario and are only implemented in the event that market based solutions are ineffective.

Quebec

TransÉnergie has agreements with all the Control Areas neighboring Quebec that detail the conditions and procedures for acquiring emergency energy.

Training Programs

The Control Area operators routinely receive training as a regular part of their regime.

NPCC will be conducting a dispatcher and schedulers seminar in Toronto on May 5 and 6, 2004, for dispatchers and schedulers from each of the Control Areas in NPCC to share views and experiences. It is also a presentation vehicle for issues of concern to all NPCC Area operations staff. The keynote topic for the shift operations staff will be a through review of NPCC Inter-Control Area Restoration Coordination including a table top exercise. The seminar will also include the summer outlook for each Area, a summary of recent events within the industry and NPCC, developments coming from NERC, an update on NPCC policy and procedures, and a review of recent events in the industry. The schedulers in attendance will review the intricacies of their system and the impact of other areas on their system.

The agenda and seminar are developed by the NPCC CO-2 Working Group on Dispatcher Training, in conjunction with CO-8 System Operations Managers. The agenda for the scheduler's sessions is developed by an ad hoc group of Scheduling staff at the various areas also under the auspices of CO-8.

Maritimes

The Member companies that comprise the Maritimes Area routinely conduct their own operator training sessions and participate in NPCC Operators training seminars. Only the operators in the New Brunswick Power Control Center are required to be certified by NERC, although other operators have received certification. The Maritimes Area participates in the CO-2 Dispatcher Training Working Group.

New England

Throughout the year, ISO-NE Operators and satellite control center personnel participate in training session in preparation for both the summer and winter peak load periods. During the training sessions, applicable NPCC procedures and NEPOOL emergency operating procedures are reviewed in detail. The summer capacity assessment is also reviewed as well as area-specific voltage control issues and intra-area communication procedures. The NERC certification program at ISO-NE is a NERC accredited training program.

New York

NYISO Dispatcher Training staff will be conducting two weeks of in-house training for each crew of NYISO dispatchers prior to the summer of 2004. The training includes detailed review of the August 14, 2003 blackout, NERC and NPCC issues affected operations, full-scale system simulation emergency exercises, and acclimation to the upcoming hardware and software replacement of the NYISO EMS (SMD2).

NYISO Dispatcher Training staff will also present one week System Operator Training Seminars (SOTS) for a combined audience of the NYISO and New York Transmission Owner (TO) dispatcher crews. The topics addressed include an update on the NYISO EMS/Market tools replacement, back-up dispatch, restoration exercises, review of major emergencies, review of operating policies, update on the August 14, 2003 blackout and restoration, system protection, effects of GIC, regional issues, the summer outlook and a NYISO/industry update.

Single crews will participate in a statewide Restoration Drill and an Alternate Control Center Drill.

The combination of In-House Training, simulation and SOTS will meet the NERC Board of Trustees Blackout Recommendation #6 requirement for training prior to June 30, 2004.

Ontario

The IMO continuously operates a training program to ensure that the control room staff maintains awareness of current and new NERC, NPCC and local operating procedures.

In preparation for the summer operating period, the IMO has set aside time in the training program for Shift Operations staff to review results of the IMO summer capability assessment, review reactive dispatching techniques as well as, a review of the changes to emergency procedures.

Ontario will also adhere to the training recommendation set out in the NERC Board of Trustees Recommendations on the August 14, 2003 Blackout.

Additionally, the IMO plans and participates in drills and exercises on a regular basis to hone emergency preparedness skills and test procedures by simulating real events. On November 26, 2003 the IMO led the annual integrated power system restoration exercise to enhance and improve the response capabilities of the IMO, Market

Participants and Emergency Response organization during emergency situations. Exercise 2003 successfully met all objectives through a comprehensive simulated power system restoration of northern Ontario. The Exercise involved the shift operations from the IMO and 23 other organizations. These included nine major Distributors, two Transmitters, ten Connected Wholesale Customers operating from 15 different sites, the Ministry of Energy, Emergency Management Ontario, and seven Generators operating from 14 different sites.

Lastly, each shift at the IMO will perform a Rotational Load Shedding simulation exercise prior to the summer operating market commencement. This exercise will test procedures and training as well as verify communication methodologies and validate revised load shedding schedules.

Quebec

Aside from continually on-going training of the operations personnel, there are monthly and seasonal meetings where anticipated conditions are discussed and new procedures are explained.

8. Impact of NERC Blackout Recommendations

The Blackout of August 14, 2003 has had repercussion throughout the industry. The NPCC Area was hardest hit and, as a result, is particularly sensitive to ensure that actions are taken to prevent a reoccurrence.

To this end, NPCC has formed a Blackout Investigation Team (BIT). The NPCC-BIT provides oversight and monitoring of the activities of the NPCC Areas and the various Working Groups and Task Forces within NPCC to ensure that any near term operations related actions are completed prior to the summer of 2004. It is not intended for this report to provide a detailed account of the activities of this team. However, the CO-12 Working Group noted that there are three areas that deserve specific recognition in this report.

These are:

- Situational Awareness (By the Reliability Coordinator of events beyond the Reliability Coordinator Boundaries)
- Reactive Burden on the Power System
- Communication between Reliability Coordinators (RC) and Control Areas

Prior to the blackout, each RC in NPCC and PJM had access to power system data from beyond their boundaries. As a result of the blackout, New England, New York and Ontario are reviewing the interconnection data they receive, requesting additional telemetered data points from neighbouring interconnections and beyond, making this data readily accessible to the operations staff and providing the data in an easy to assimilate format. Each Area expects to have this work completed prior to the summer operating period.

During the month of April NERC-sponsored teams conducted reliability readiness audits of the IMO, NYISO, and ISO-NE. This included an on-site review of policies, procedures, facilities of each of these Control Area and Reliability Coordinator functions at each location. The teams also interviewed management, supervisory, and control center staff. Reports and findings are expected in May.

With respect to reactive burden to the power system, *NPCC Document B3 - Guidelines for Inter-AREA Voltage Control* provides general principles and guidance for effective inter-Area voltage control within NPCC. The procedure recognizes local control actions as the most effective method for voltage regulation, along with outlining steps to be taken when an area becomes deficient in reactive resources. While each Area is committed to reactive dispatching methodologies that will ensure compliance to this procedure, the TFCO at its March 4, 2004 meeting, took an action to review the procedure, and each Areas conformance prior to the Summer Operating Period.

Section 7 of this report outlines all Areas operational readiness to communicate with their customers quickly and take required actions needed to mitigate the need for emergency control actions. Communication between NPCC Areas benefited from the significant capacity deficiencies experienced by NPCC members in recent years by the development of well defined communication protocols to deal with emerging issues such as forecast and real-time energy and capacity deficiencies. These communication protocols have evolved and are now well defined and understood by all operations staff.

The PJM operations staff is in frequent communication with neighboring systems to the south and west and also has a close working relationship with NYISO.

These Inter-Region communication protocols have proven to be effective as was demonstrated during the restoration efforts of August 14, 2003 and the subsequent capacity deficiencies experienced by Ontario and NYISO in the following days.

The NERC Board of Trustees (BoT) approved a set of 14 recommendations to prevent and mitigate the impacts of future blackouts in February of 2004. Specific to the recommendations were remedial actions to be completed by June 30, 2004 along with associated readiness audits of PJM, MISO and First Energy.

The NERC BoT recommendations also outlined specific "reliability readiness" audits of Control Areas and Reliability Coordinators in the Eastern Interconnection to[6] be performed to ensure these Reliability Coordinators and Control Areas can perform well, particularly under emergency conditions, and to strive for excellence in their assigned reliability functions and responsibilities.

The PJM, MISO and First Energy Audits were completed by the end of February and the results were presented at the NERC:OC meeting in March. NERC:OC accepted the Audit Reports for each of these entities, subject to completion of any outstanding actions identified. The Control Area Audits will be completed by the end of April with results known by late June.

PJM and MISO formulated remedial action plans to address BoT Blackout Recommendations specific to their Reliability Areas. The action plans were reviewed and approved at the March NERC:OC meeting with a requirement to have all tasks outlined in the plan verified as completed by June 30, 2004.

Synopses of the plans are as follows:

PJM

- Significant effort is being placed on improving communications with MISO. A Joint Operating Agreement (JOA) that is close to execution will detail a number

[6] ISO-NE, NYISO, IMO, AEP, MECS, Cinergy and LG&E

of processes where MISO and PJM will exchange data, respect limits in operation, and communicate status with each other to ensure that each organization is fully informed. Upon approval, the JOA will set a new standard in communications and coordination between RCs.

- Improve Operator and Reliability Coordinator Training - The recent NERC Audit found PJM's Operator/RC training to be high quality. PJM's use of realistic simulators as well as a comprehensive training program ensures that the PJM Operations team is capable of rapidly responding to any emergency.

- Evaluate Reactive Power and Voltage Control Practices - PJM's On-line Reactive Transfer Monitoring continues to set the standard for advanced applications. With the expansion of the PJM EMS Model to now include AEP, DPL, and ComEd and beyond this wide area capability is further enhanced. PJM has started work on the joint development and monitoring of critical reactive interfaces near our various seams.

- Detailed protocols currently being drafted include - Outage Coordination, Emergency Operations, and Restoration - Ensure that emergency action plans and procedures are in place to safeguard the system under emergency conditions by defining actions operators may take to arrest disturbances and prevent cascading.

MISO

- The state estimator has been fully tested and was implemented on December 31, 2003. A new System Topology processor that will display each topology change by exception without any delay, and capable of running independent of the state estimator will be in service by June 30, 2004.

- Several wide area overviews of both the MISO footprint and beyond were implemented on December 31, 2003. The overviews allow the system operator to narrow the field of view and zero in on smaller segments of the system.

- Prior to June 30, 2004 all MISO operators will have completed the mandatory five days of system emergency training. The training will include regional / sub regional restoration drills, table-top drills with MISO and member company staff, and operations simulator training on a range of emergency conditions.

- Communication protocols have been reevaluated and improved along with associated procedures for emergency response and conservative operating. Neighbouring Reliability Coordinators (including the IMO) now receive a copy of MISO's Next-day and current day security analysis.

- A review of agreements with all entities that MISO performs Reliability Coordination Services for has been undertaken.

9. 2003 Post-Seasonal Assessment and Historical Review

The following summarizes some highlights of the review. Please refer to the NPCC Reliability Assessment for Summer 2003 for details on projections.

Maritimes

The peak load experienced by the Maritimes Area during the May – September period was 3,902 MW, which was approximately 88 MW (2.3%) higher than last year’s forecast of 3,813 MW. This is due to the peak occurring in May while experiencing below normal temperatures. This resulted in a greater electric heating load than would normally be the case.

The Maritimes Area did not anticipate, nor did it experience, any capacity shortages during the summer of 2003. In fact, it was able to supply up to 700 MW (interconnection limit) to New England. However, transmission constraints due to excess generation in Northern New England sometimes reduced the power that could be transmitted.

New England

The peak demand for the summer of 2003 was 24,685 MW and occurred hour ending 15:00 on August 22. This was 663 MW less than the all time summer peak demand of 25,348 MW that was experienced during the summer of 2002.

Overall, the weather during the 2003 summer was mild. Although it was a relatively humid summer, the ambient temperature only approached 90degrees Fahrenheit (32 degrees Celsius) towards the end of June and again at the end of August. Because of the mild weather, no extreme peaks were experienced.

NEPOOL Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4) was called once during the summer of 2003. These actions were only required within the state of Connecticut in an effort to aid in the system restoration following the August 14 blackout.

All of the new generation projects that had been expected to become commercial during the summer 2003 were in-service and participating in New England’s energy market in time for the summer peak. Drought conditions did not have a significant effect on operations.

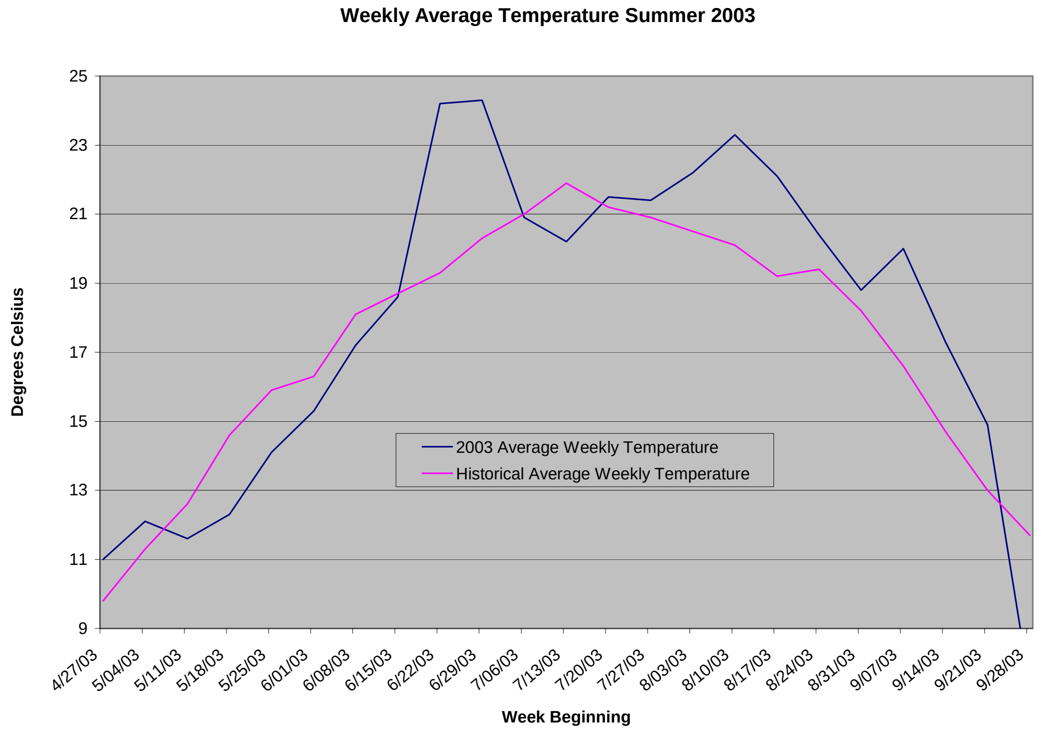
New York

The New York Control Area did not experience temperatures associated with design conditions during the summer of 2003, and therefore did not realize the forecast peak of 31,430 MW. The summer 2003 NYISO peak load of 30,333 MW occurred on June 26.

Ontario

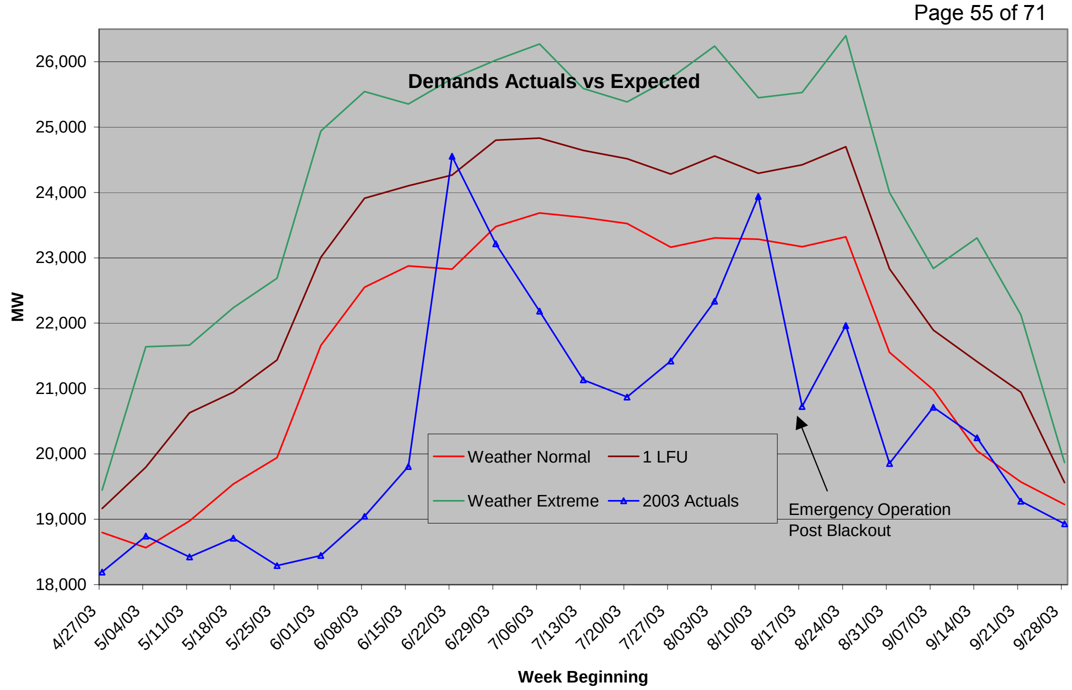
The peak demand for the summer of 2003 was 24,753 MW and occurred on June 26, 2003. The date of the summer peak is reflective of the milder weather experienced in Ontario through most of July, compounded by the affects of the blackout that occurred on August 14, 2003. Had a request for conservation due to resource concerns not been issued, it is likely that the summer peak would have been set during the week following the blackout.

The following charts indicate the correlation of weather experienced during the summer on the resultant demands by displaying the average weekly temperature in Toronto for the summer of 2003 as compared to the historical average weekly temperature and the number of days the maximum daily temperature exceeded the historical average maximum.



		May	June	July	August	September
Days Max Temperature above 20°c	Historical	11.8	23.6	30.1	28.8	16.7
	2003	6	22	30	31	22
Days Max Temperature above 30°c	Historical	0.43	2.3	5.7	3.2	0.8
	2003	0	4	4	6	0

The following chart shows the actual Ontario hourly peak demands for each week against the demand curves forecasted in the NPPC Reliability Assessment for Summer 2003. It can be noted that the lower demands in July are consistent with the temperatures experienced.



Monthly Peak Hourly Demand for Ontario for 2003

Month	Date	HE	Hourly Demand (MW)
May	5	17	18,741
June	26	16	24,753
July	4	13	23,175
August	14	15	23,891
September	11	16	20,700

After excluding the events associated with August 14, the demands were met without use of any extraordinary control actions beyond the issuance of Energy Emergency Alerts (EEA). The IMO issued EEA 1 notifications on 8 days through the summer and proceeded to an EEA 2 on 1 day. Almost all notifications were attributed to a sudden loss of resources within the day and not an overall adequacy concern.

Quebec

The Quebec summer peak load was 20,551 MW on June 26 2003, which is about 200 MW below the expected peak. A late winter peak of 21,813 MW occurred on May 2 with temperatures at or near the freezing point all over the province. The summer of 2003 was quite uneventful with no significant things to report as far as forced outages, weather conditions, forest fires, etc…

Historical Review (Pre-2003)

The previous non-coincident peaks for each NPCC Area, the forecasted 2004 summer peak for each NPCC Area and the NPCC Coincident peak for 2004 are summarized in the table below.

Table 1
Historical Peak Demands by Area Occurring May to September (MW)

Year	Ontario[7]	Maritimes	New England	New York	Quebec	Total NPCC Demand
1993	20,883	2,773	19,570	25,998	17,500	86,724
1994	20,918	2,797	20,519	27,062	17,562	88,858
1995	21,674	2,958	20,499	27,206	17,960	90,297
1996	21,378	2,937	19,507	25,587	18,193	87,602
1997	21,613	3,252	20,569	28,700	17,983	92,117
1998	22,443	3,314	21,406	28,166	18,463	93,792
1999	23,435	3,249	22,544	30,311	18,965	98,504
2000	23,222	3,630	22,049	28,138	20,600	97,639
2001	25,269	3,640	24,967	30,983	20,052	104,911
2002	25,414	3,731	25,348	30,664	20,525	105,764
2003 Forecast	23,684	3,813	25,120	31,430	20,740	104,436
2003 Actual	24,753	3,902	24,685	30,333	20,551	104,223
2004 Forecast	23,668[8]	3,922	25,735	31,800	21,517	104,520[9]
Percent Difference[10]	-..44%[11]	0.54%	+4.25%	+4.84%	+4.7%	+.28%

[7] 20 minute Peak Demand 1993 to 2001, peak hourly demand thereafter
[8] This value is the weather normal demand used for the base case analysis. A graph in Section 4 represents the ranges of potential demands that the IMO could experience as a result of weather variables.
[9] Forecast NPCC Coincident Peak Demand, not the sum of each individual Areas Forecasted Peak Demand.
[10] Percent Change reflects the increase/decrease in projected peak for the 2004 Summer Operating Period over the actual peak for the 2003 summer.
[11] Based on the extreme weather case, the IMO could experience a peak of 26,430, which represents an increase of 6.77% over the 2003 actual. This would translate into an NPCC Coincident Peak Demand of 107,282 MW for a 2.94 % increase over 2003.

10. 2004 Reliability Assessments of Neighboring Regions

East Central Area Reliability Coordination Agreement (ECAR)

Information from the ECAR 2004 Summer Assessment of Load and Capacity is not available for release at this time pending review and approval of the ECAR members. The following information is taken from the “Preview of 2004 Summer Conditions” that is contained in ECAR’s 2003/2004 Winter Assessment of Load and Capacity.

The projected summer peak demand in ECAR for the summer of 2004 is 102,724 MW for Total Internal Demand. This 2004 summer peak is derived from demand forecasts received in January 2003 with any updates through August 2003. Therefore, actual operating experience from the last half of 2003 was not considered in developing this peak demand forecast.

Total capacity for the summer of 2004 is projected to be 127,115 MW. This assumes 1,420 MW of announced capacity additions within the ECAR region are in service by July 2004. Net scheduled interchange into the ECAR region at the time of the peak is anticipated to be 2,337 MW, making total Capacity Resources of 129,452 MW.

Capacity Margins for the summer of 2004 are forecast to be slightly higher than the margins forecast for the summer of 2003, based on the level of announced generation projects. The capacity margin based on Total Internal Demand (interruptible and direct control loads are served) and scheduled interchange is 26,728 MW (20.6% of Net Capacity Resources). This assumes the announced capacity additions within the ECAR region are in service by July 2004.

Recent experience indicates that a minimal amount of capacity (1,197 MW) is expected to be scheduled out of service during the summer peak. This scheduled capacity outage along with a 4% operating reserve requirement (4,109 MW) means that the Margin for Contingencies is expected to be 21,422 MW at the time of the ECAR peak. Recent random outage experience suggests that there is less than a 1% probability that random outages will exceed this Margin for Contingencies. This is the probability that the ECAR members will have to rely on supplemental capacity resources at the time of the peak. Supplemental capacity resources can include additional imports of power from outside the region, and/or the curtailment of contractually interruptible loads.

Under a severe condition scenario which assumes a combination of adverse conditions, (an additional 5% of load due to extreme hot weather, none of the projected capacity additions in service, and greater than 14% unavailable capacity), the ECAR Region will not have sufficient resources without supplemental power purchases. However, based on the import capability, there should be sufficient resources for this severe condition scenario.

Transmission assessment information is contained in the 2004 Summer Assessment of Transmission System Performance, ECAR report 04-TSPP-3. This report will be published in mid-May 2004.

The bulk transmission systems in ECAR are expected to perform reliably under a wide range of conditions. However, there will be a greater need for the Reliability Coordinators and Transmission Operators to communicate and coordinate their actions to preserve the continued reliability of the ECAR systems. It is anticipated that the ECAR transmission systems could become constrained as a result of unit unavailability and/or economic transactions that have historically resulted in large unanticipated power flows within and through the ECAR systems. If these conditions occur again this summer, local operating procedures, as well as the NERC Transmission Loading Relief procedure, will need to be invoked in order to maintain transmission system security. As long as transmission limitations are identified and available operating procedures are implemented when required, the ECAR bulk transmission systems are anticipated to perform reliably. During times of heavy regional and interregional transfers, it will be essential that Reliability Coordinators and Transmission Operators have timely and adequate information on the sources and sinks of scheduled transfers in order to identify appropriate corrective actions.

Mid-Atlantic Area Council (MAAC)

The MAAC 2004 summer forecast net peak demand is 56,201 MW. This forecast includes the effects of interruptible demand and load management capabilities, which are estimated to be 1,129 MW. The forecast peak assumes normal summer weather conditions. This forecast is 632 MW higher than the actual MAAC all-time summer peak of 55,569 MW that occurred on August 14, 2002.

Between June 1, 2003 and mid-July 2004, MAAC's summer generating capacity is expected to increase by a net of 5,020 MW to 68,903 MW. 1,459 MW of the expected increase is already in service. All nuclear units should be in service and at full capacity (13,320 MW) at the time of the peak. MAAC also has 488 MW of external capacity resources under contract through the summer peak period. With the planned new generation, existing internal generation, and external capacity resources included, the MAAC capacity margin is forecasted to be 19.0% at the time of the forecasted peak.

The MAAC reserve margin is expected to be 23.5% at the time of the forecasted peak.

MAAC expects to have sufficient generating capacity to serve the 2004 forecast summer peak demand. When MAAC served its all-time summer peak on August 14, 2002 no emergency procedures were implemented.

MAAC has a net of 1,979 MW of long-term firm transmission service in place for energy sales out of MAAC through the summer peak period. Presently, these transactions are not capacity backed and therefore can be curtailed in the event of a PJM Capacity Emergency. Historically, approximately 1,200 MW of external capacity has been transferred out of MAAC on peak summer days and could therefore decrease the capacity margin by 1.4%.

PJM, the Regional Transmission Organization (RTO) for the MAAC region, is well prepared for operating emergencies should they occur. PJM's certified operating staff are trained and participate in regular emergency drills that include the criteria for declaring emergencies, prioritized action plans, staffing and responsibilities in preparation should there be an extremely hot summer.

The bulk transmission system is expected to perform adequately over various system conditions.

Appendix I – 2004 Expected Load and Capacity Forecasts

Table 1 - NPCC Summary

Updated -April 19, 2004

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW[1]	Firm Sales MW[2]	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW	Bottled Resources MW	Revised Net Margin MW
02-May-04	145,839	36	176	145,699	86,908	2,342	23,752	7,006	9,860	20,515	3,219	17,296
09-May-04	145,999	36	176	145,859	89,129	2,342	23,323	7,006	9,860	18,884	3,102	15,782
16-May-04	145,835	36	176	145,695	90,018	2,342	21,726	7,006	9,862	19,426	3,919	15,507
23-May-04	144,819	36	176	144,679	92,119	2,342	18,862	7,006	9,862	19,173	1,983	17,190
30-May-04	142,458	36	176	142,318	94,411	2,316	19,097	7,006	9,862	14,259	1,676	12,583
06-Jun-04	142,598	36	176	142,458	99,482	2,316	14,992	7,229	9,262	13,810	2,863	10,947
13-Jun-04	142,598	36	176	142,458	101,073	2,316	13,379	7,229	9,262	13,832	3,648	10,184
20-Jun-04	142,598	36	176	142,458	101,370	2,316	12,659	7,229	9,262	14,255	4,243	10,011
27-Jun-04	143,763	36	176	143,623	103,952	2,316	11,728	7,229	9,262	13,769	4,936	8,832
04-Jul-04	143,810	36	176	143,670	104,520	2,339	11,320	7,229	8,562	14,379	4,388	9,990
11-Jul-04	143,980	36	176	143,840	104,435	2,339	11,597	7,229	8,562	14,357	3,865	10,491
18-Jul-04	143,480	36	176	143,340	103,845	2,339	10,427	7,229	8,562	15,617	5,101	10,515
25-Jul-04	143,381	36	176	143,241	103,260	2,339	10,222	7,229	8,562	16,307	5,396	10,911
01-Aug-04	143,739	36	176	143,599	104,185	2,347	11,321	7,229	8,562	14,650	4,003	10,646
08-Aug-04	143,909	36	176	143,769	104,236	2,347	11,575	7,229	8,562	14,515	3,680	10,835
15-Aug-04	143,909	36	176	143,769	103,946	2,347	11,863	7,229	8,562	14,517	3,498	11,018
22-Aug-04	143,909	36	176	143,769	104,207	2,347	12,300	7,229	8,562	13,819	3,613	10,206
29-Aug-04	143,317	36	176	143,177	102,751	2,322	14,865	7,229	8,562	12,093	2,641	9,451
05-Sep-04	143,422	36	176	143,282	95,922	2,333	15,320	7,229	8,562	18,584	3,591	14,993
12-Sep-04	144,162	36	176	144,022	92,874	2,333	16,607	7,229	8,562	21,085	3,157	17,927
19-Sep-04	144,162	36	176	144,022	91,389	2,333	20,321	7,229	8,562	18,856	3,555	15,300
26-Sep-04	144,162	36	176	144,022	90,913	2,333	20,850	7,229	8,562	18,802	3,184	15,618

Notes
1. Firm Purchases represent firm purchases from entities external to NPCC to be delivered at the PJM / NY interface
2 Firm Sales represent firm sales to entities external to NPCC to be delivered at the PJM / NY interface

Table 2 - Maritimes

Revised 19-Mar-04

Week Beginning Sundays	Installed Capacity MW	Purchases MW	Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
02-May-04	6,172	0	200	5,972	3,922	506	1,441	626	263	226
09-May-04	6,172	0	200	5,972	3,863	506	1,441	626	263	286
16-May-04	6,172	0	200	5,972	3,790	506	1,333	626	265	465
23-May-04	6,172	0	200	5,972	3,728	506	1,331	626	265	529
30-May-04	6,172	0	200	5,972	3,633	480	1,439	626	265	490
06-Jun-04	6,172	0	200	5,972	3,604	480	1,001	849	265	734
13-Jun-04	6,172	0	200	5,972	3,592	480	1,312	849	265	435
20-Jun-04	6,172	0	200	5,972	3,530	480	1,171	849	265	637
27-Jun-04	6,172	0	200	5,972	3,522	480	940	849	265	876
04-Jul-04	6,172	0	200	5,972	3,529	503	904	849	265	928
11-Jul-04	6,172	0	200	5,972	3,571	503	842	849	265	948
18-Jul-04	6,172	0	200	5,972	3,516	503	842	849	265	1,003
25-Jul-04	6,172	0	200	5,972	3,530	503	825	849	265	1,006
01-Aug-04	6,172	0	200	5,972	3,557	511	666	849	265	1,146
08-Aug-04	6,172	0	200	5,972	3,560	511	816	849	265	994
15-Aug-04	6,172	0	200	5,972	3,474	511	816	849	265	1,079
22-Aug-04	6,172	0	200	5,972	3,405	511	816	849	265	1,149
29-Aug-04	6,172	0	200	5,972	3,351	486	1,137	849	265	856
05-Sep-04	6,172	0	200	5,972	3,333	497	808	849	265	1,216
12-Sep-04	6,172	0	200	5,972	3,410	497	933	849	265	1,013
19-Sep-04	6,172	0	200	5,972	3,508	497	808	849	265	1,040
26-Sep-04	6,172	0	200	5,972	3,640	497	976	849	265	740

Notes

1. Installed capacity includes capacity associated with IPPs.
2. Load forecast is expected weekly peak.

Please note that the information on this page is commercially sensitive, therefore confidential.

Table 3—New England

Week Beginning Sundays	Installed Capacity MW	Purchases MW	Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
02-May-04	33,434	452	0	33,886	17,330	482	3,900	1,700	3,400	8,038
09-May-04	33,434	452	0	33,886	19,443	482	4,500	1,700	3,400	5,325
16-May-04	33,434	452	0	33,886	20,346	482	4,600	1,700	3,400	4,322
23-May-04	33,434	452	0	33,886	21,185	482	3,500	1,700	3,400	4,583
30-May-04	30,889	452	0	31,341	22,106	482	3,000	1,700	3,400	1,617
06-Jun-04	30,889	452	0	31,341	25,735	482	1,200	1,700	2,800	388
13-Jun-04	30,889	452	0	31,341	25,735	482	700	1,700	2,800	888
20-Jun-04	30,889	452	0	31,341	25,735	482	500	1,700	2,800	1,088
27-Jun-04	30,898	452	0	31,350	25,735	482	500	1,700	2,800	1,097
04-Jul-04	30,898	452	0	31,350	25,735	482	100	1,700	2,100	2,197
11-Jul-04	30,898	452	0	31,350	25,735	482	100	1,700	2,100	2,197
18-Jul-04	30,898	452	0	31,350	25,735	482	100	1,700	2,100	2,197
25-Jul-04	30,898	452	0	31,350	25,735	482	100	1,700	2,100	2,197
01-Aug-04	30,889	452	0	31,341	25,735	482	100	1,700	2,100	2,188
08-Aug-04	30,889	452	0	31,341	25,735	482	100	1,700	2,100	2,188
15-Aug-04	30,889	452	0	31,341	25,735	482	100	1,700	2,100	2,188
22-Aug-04	30,889	452	0	31,341	25,735	482	100	1,700	2,100	2,188
29-Aug-04	30,888	452	0	31,340	25,735	482	400	1,700	2,100	1,887
05-Sep-04	30,888	452	0	31,340	23,666	482	900	1,700	2,100	3,456
12-Sep-04	30,888	452	0	31,340	22,387	482	1,000	1,700	2,100	4,635
19-Sep-04	30,888	452	0	31,340	22,047	482	1,900	1,700	2,100	4,075
26-Sep-04	30,888	452	0	31,340	21,962	482	1,300	1,700	2,100	4,760

Notes

- Installed capacity includes unit addition and retirement assumptions as outlined for the 04-05 OC and CP-8 MARS analysis

- Purchases assumed are those noted in 2004 CELT report with minor adjustments made (NY) for consistency purposes

- Load Forecast as determined for CELT 2004 and has a 50% chance of being exceeded

- Interruptible Loads include 100% of the Day-Ahead Demand Response, Real-Time Demand Response, Real-Time Profiled Response; 50% of the Real-Time Price Response; and 200 MW assumed for SWCT RFP

- Known Maintenance and Derating as April 5, 2004

- Required operating reserve based on the first contingency (Generator at 1,160 MW) plus 1/2 the second contingency (Generator at 1,145MW)

Unplanned outages includes: forced outages and maintenance outages scheduled less than 14 day sin advance

Table 4—New York

Revised April 16, 2004

Week Beginning	Available Capcity[1]	Firm Purchases[4]	Firm Sales[4]	Net Capacity	Load Forecast[2]	Interruptible Load[3]	Known Maint./Derat.	Req. Operating Reserve	Unplanned Outages	Net Margin
Saturday	MW	MW	MW	MW	MW	MW	MW	MW	MW	MW
5/02/04	38,331	586	302	38,615	25,046	0	3,311	1,800	3,647	4,811
5/09/04	38,331	586	302	38,615	25,713	0	2,394	1,800	3,647	5,061
5/16/04	38,331	586	302	38,615	26,380	0	2,028	1,800	3,647	4,760
5/23/04	38,331	586	302	38,615	27,047	0	417	1,800	3,647	5,704
5/30/04	38,331	586	302	38,615	27,713	0	342	1,800	3,647	5,113
6/06/04	38,471	586	302	38,755	28,380	0	62	1,800	3,647	4,866
6/13/04	38,471	586	302	38,755	29,047	0	0	1,800	3,647	4,261
6/20/04	38,471	586	302	38,755	29,713	0	0	1,800	3,647	3,595
6/27/04	38,471	586	302	38,755	31,800	0	0	1,800	3,647	1,508
7/04/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
7/11/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
7/18/04	38,518	586	302	38,802	31,800	0	12	1,800	3,647	1,543
7/25/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
8/01/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
8/08/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
8/15/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
8/22/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
8/29/04	38,518	586	302	38,802	31,800	0	0	1,800	3,647	1,555
9/05/04	38,518	586	302	38,802	27,965	0	0	1,800	3,647	5,390
9/12/04	38,518	586	302	38,802	26,954	0	265	1,800	3,647	6,136
9/19/04	38,518	586	302	38,802	25,943	0	1,769	1,800	3,647	5,643
9/26/04	38,518	586	302	38,802	24,931	0	1,778	1,800	3,647	6,646

Important Notes

1 Includes all known generation, including new generation expected to be online in the New York Control Area

2 Load forecast is expected weekly peak hourly (load+losses)

3 Type II and III DSM not reported. NYISO Emergency Demand Response Program (EDRP) and Special Case Resources (SCR) are emergency procedures involving commited market resources.

4 "Full Responsibility" Purchases/Sales are represented as per NYISO ICAP rules.

Please note that the information on this page is commercially sensitive, therefore confidential.

Table 5--Ontario Summary

Updated - March 26, 2004

Week Beginning Sundays	Installed[1] Capacity MW	Purchases MW	Sales MW	Total Capacity MW	Load[2] Forecast MW	Interruptible[3] Load MW	Known [4] Maint./Derat. MW	Req. Operating Reserve MW	Unplanned[5] Outages MW	Net Margin MW
02-May-04	30,599	0	0	30,599	19,093	300	8,427	1,380	1,350	649
09-May-04	30,599	0	0	30,599	19,264	300	7,307	1,380	1,350	1,598
16-May-04	30,599	0	0	30,599	19,321	300	6,221	1,380	1,350	2,627
23-May-04	30,599	0	0	30,599	20,217	300	4,847	1,380	1,350	3,105
30-May-04	30,599	0	0	30,599	21,464	300	4,650	1,380	1,350	2,055
06-Jun-04	30,599	0	0	30,599	22,314	300	3,960	1,380	1,350	1,895
13-Jun-04	30,599	0	0	30,599	23,176	300	3,756	1,380	1,350	1,237
20-Jun-04	30,599	0	0	30,599	22,879	300	3,760	1,380	1,350	1,530
27-Jun-04	31,224	0	0	31,224	23,383	300	2,982	1,380	1,350	2,429
04-Jul-04	31,224	0	0	31,224	23,668	300	2,686	1,380	1,350	2,440
11-Jul-04	31,224	0	0	31,224	23,441	300	2,412	1,380	1,350	2,941
18-Jul-04	31,224	0	0	31,224	23,378	300	2,439	1,380	1,350	2,977
25-Jul-04	31,224	0	0	31,224	22,994	300	2,439	1,380	1,350	3,361
01-Aug-04	31,256	0	0	31,256	23,225	300	2,496	1,380	1,350	3,105
08-Aug-04	31,256	0	0	31,256	23,112	300	2,420	1,380	1,350	3,294
15-Aug-04	31,256	0	0	31,256	22,894	300	2,455	1,380	1,350	3,477
22-Aug-04	31,256	0	0	31,256	23,271	300	2,890	1,380	1,350	2,665
29-Aug-04	31,256	0	0	31,256	21,917	300	4,698	1,380	1,350	2,211
05-Sep-04	31,256	0	0	31,256	21,107	300	5,370	1,380	1,350	2,349
12-Sep-04	31,256	0	0	31,256	20,045	300	5,423	1,380	1,350	3,358
19-Sep-04	31,256	0	0	31,256	19,438	300	7,604	1,380	1,350	1,784
26-Sep-04	31,256	0	0	31,256	19,611	300	8,801	1,380	1,350	414

Important notes

1. Includes all generation registered in the market.
2. Load forecast is median growth, normal weather case, weekly 60-minute peaks.
3. 300 MW of price-responsive demand is assumed.
4. Includes known outages, deratings and allowances for hydroelectric capacity.
5. Is based on the average amount of generation in forced outage during May, June, July, August, and September, from 1998 to 2001.

Please note that the information on this page is commercially sensitive, therefore confidential.

Table 6--Quebec Summary

2004 TransEnergie - Load and Capacity Forecast for Quebec

Revised April 23, 2004

Week Beginning Sundays	Installed Capacity[1] MW	Firm Purchases MW	Firm Sales[2] MW	Net Capacity MW	Load Forecast[3] MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages[4] MW	Net Margin MW
02-May-04	37303	200	837	36666	21517	1054	6673	1500	1200	6830
09-May-04	37463	200	837	36826	20846	1054	7681	1500	1200	6653
16-May-04	37299	200	837	36662	20181	1054	7544	1500	1200	7291
23-May-04	36283	200	837	35646	19942	1054	8767	1500	1200	5291
30-May-04	36467	200	837	35830	19495	1054	9666	1500	1200	5023
06-Jun-04	36467	200	837	35830	19449	1054	8769	1500	1200	5966
13-Jun-04	36467	200	837	35830	19523	1054	7611	1500	1200	7050
20-Jun-04	36467	200	837	35830	19513	1054	7228	1500	1200	7443
27-Jun-04	36998	200	837	36361	19512	1054	7306	1500	1200	7897
04-Jul-04	36998	200	837	36361	19788	1054	7630	1500	1200	7297
11-Jul-04	37168	200	837	36531	19888	1054	8243	1500	1200	6754
18-Jul-04	36668	200	837	36031	19416	1054	7034	1500	1200	7935
25-Jul-04	36569	200	837	35932	19201	1054	6858	1500	1200	8227
01-Aug-04	36904	200	837	36267	19868	1054	8059	1500	1200	6694
08-Aug-04	37074	200	837	36437	20029	1054	8239	1500	1200	6523
15-Aug-04	37074	200	837	36437	20043	1054	8492	1500	1200	6256
22-Aug-04	37074	200	837	36437	19996	1054	8494	1500	1200	6301
29-Aug-04	36483	200	837	35846	19948	1054	8630	1500	1200	5622
05-Sep-04	36588	200	837	35951	19851	1054	8242	1500	1200	6212
12-Sep-04	37328	200	837	36691	20078	1054	8986	1500	1200	5981
19-Sep-04	37328	200	837	36691	20453	1054	8240	1500	1200	6352
26-Sep-04	37328	200	837	36691	20769	1054	7995	1500	1200	6281

1) Includes IPP and other known generation (Churchill Falls & Labrador Co.).

2) Includes transmission losses of 6%. Does not include firm sale of 45 MW to Cornwall Ontario - Load is supplied radially from Quebec Control Area

3) Load forecast is expected weekly peak (Hourly).

4) This value also includes a load forecast uncertainty (LFU) of 3%.

Please note that the information on this page is commercially sensitive, therefore highly confidential.

Table 7 - NPCC Bottled Capacity Calculations

CP-8 Assumed Transfer Capability

Revised April 19, 2004

		Transaction Breakdown April 19, 2004	
TE to ON	1540	Maritimes to NE	0
TE to NY	1500	TE to NE	326
TE to NE	1500	TE to NY	550
NB to NE	700		876
Total Transfer Capability	5240		
	876	Transactions between TE/ Maritimes and Remainder of NPCC	
	4364	ATC - TE plus Maritmes to remainder of NPCC	

Week Beginning Sunday	TE Margin	Maritimes Margin	Net Margin	Avaliable Transfer Capability	Bottled NE resources	Bottled Resources	
02-May-04	6,857	226	7,083	4,364	500	3,219	
09-May-04	6,680	286	6,966	4,364	500	3,102	
16-May-04	7,318	465	7,783	4,364	500	3,919	
23-May-04	5,318	529	5,847	4,364	500	1,983	
30-May-04	5,050	490	5,540	4,364	500	1,676	
06-Jun-04	5,993	734	6,727	4,364	500	2,863	
13-Jun-04	7,077	435	7,512	4,364	500	3,648	
20-Jun-04	7,470	637	8,107	4,364	500	4,243	
27-Jun-04	7,924	876	8,800	4,364	500	4,936	
04-Jul-04	7,324	928	8,252	4,364	500	4,388	Peak Week
11-Jul-04	6,781	948	7,729	4,364	500	3,865	
18-Jul-04	7,962	1,003	8,965	4,364	500	5,101	
25-Jul-04	8,254	1,006	9,260	4,364	500	5,396	
01-Aug-04	6,721	1,146	7,867	4,364	500	4,003	
08-Aug-04	6,550	994	7,544	4,364	500	3,680	
15-Aug-04	6,283	1,079	7,362	4,364	500	3,498	
22-Aug-04	6,328	1,149	7,477	4,364	500	3,613	
29-Aug-04	5,649	856	6,505	4,364	500	2,641	
05-Sep-04	6,239	1,216	7,455	4,364	500	3,591	
12-Sep-04	6,008	1,013	7,021	4,364	500	3,157	
19-Sep-04	6,379	1,040	7,419	4,364	500	3,555	
26-Sep-04	6,308	740	7,048	4,364	500	3,184	

Appendix II - NPCC Operational Criteria and Procedures

A-2 Basic Criteria for Design and Operation of Interconnected Power Systems

Description: This Criteria establishes the basic principles and requirements for the design and the operation of the NPCC **bulk power system**.

A-3 Emergency Operation Criteria

Description: Objectives, principles and requirements are presented to assist the NPCC **Areas** in formulating plans and procedures to be followed in an **emergency** or during conditions which could lead to an **emergency**.

A-6 Operating Reserve Criteria

Description: This Criteria establishes standard terminology and minimum requirements governing the amount, availability and distribution of operating reserve. Procedures are included for corrective action and mutual assistance in case of operating reserve shortages. The objective is to ensure a high level of reliability in the NPCC Region that is, as a minimum, consistent with the standards specified by the North American Electric Reliability Council (NERC).

B-3 Guidelines for Inter-Area Voltage Control

Description: This document establishes procedures and principles to be considered for occasions where a deficiency or an excess of reactive power can affect **bulk power system** voltage levels in a large portion of an **Area** or in two adjacent **Areas**.

B-12 Guidelines for On-Line Computer System Performance During Disturbances

Description: Establishes guidelines for the performance of NPCC **Area** on-line computer systems during a power system disturbance.

B-20 Guidelines for Identifying Key Facilities and Their Critical Components for System Restoration”

Description: Establishes requirements and guidelines for the identification of Key Facilities and their Critical Components that are required for restoration of the power system following a partial or total system blackout.

C-4 Monitoring Procedures for Guidelines for Inter-Area Voltage Control

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Guidelines for Inter-AREA Voltage Control (Document B-3).

C-5 Monitoring Procedures for Emergency Operation Criteria

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Emergency Operation Criteria (Document A-3).

C-7 Monitoring Procedures for Guide for Rating Generating Capability

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC, Guide for Rating Generating Capability (Document B-9).

C-8 Monitoring Procedures for Control Performance Guide During Normal Conditions

Description: This procedural document establishes a performance measure for NPCC **Areas** and systems and outlines the reporting function for NPCC Control Performance Guide During Normal Conditions (Document B-2)

C-9 Monitoring Procedures for Operating Reserve Criteria

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC Operating Reserve Criteria (Document A-6)

C-11 Monitoring Procedures for Interconnected System Frequency Response (This Document has recently been revised and will have a new designation as Reference Document RD-10)

Description: This procedural document defines procedures for monitoring frequency responses to large generation losses.

C-12 Procedures for Shared Activation of Ten Minute Reserve

Description: This procedural document outlines procedures to share the activation of ten-minute reserve on an Area basis. The methods prescribed by the procedure are intended to ensure that lost generation or energy purchases are quickly replaced by several areas simultaneously loading generation in the few minutes immediately following a loss.

C-13 Operational Planning Coordination
Appendix D - NPCC Critical Facilities List

Description: This document coordinates the notification of planned facility outages among the **Areas**. It also establishes formal procedures for **Area** communications in advance of a period of likely capacity shortages as well as for weekly and emergency NPCC conference call among the **Areas**.

C-15 Procedures for Solar Magnetic Disturbances on
Electrical Power Systems

Description: This procedural document clarifies the reporting channels and information available to the operator during solar alerts and suggests measures that may be taken to mitigate the impact of a solar magnetic disturbance.

C-19 Procedures During Shortages of Operating Reserve

Description: This procedure is intended to provide specific instructions for the redistribution of Operating Reserve among the Areas when one or more **Area**(s) are experiencing an Operating Reserve deficiency.

C-20 Procedures During Abnormal Operating Conditions

Description: This procedure is intended to complement the Emergency Operation Criteria (Document A-3) by providing specific instructions to the System Operator during such conditions in an NPCC Area or Areas.

RD-01 NPCC Emergency Preparedness Conference Call Procedures-NPCC Security Conference Call Procedures

RD-02 NPCC Inter-Control Area Power System Restoration Refernce Document

RD-03 Procedures for Communications During Emergencies

RD-04 Operating Procedures for ACE diversity Interchange

RD-05 Procedure for Operating Reserve Assistance

Appendix III - Web Sites

ECAR
http://www.ecar.org/

Independent Electricity Market Operator
http://www.theimo.com/

ISO- New England
http://www.iso-ne.com

LEER Members
http://www.npcc.org/leer_members.htm

MAAC
http://www.maac-ca.com/

MAPP
http://www.mapp.org/

Maritimes
Maritimes Electric Company Ltd.
http://www.maritimeelectric.com

New Brunswick Power
http://www.nbpower.com/

Nova Scotia Power
http://www.nspower.ca/

Northern Maine Independent System Administrator
http://www.nmisa.com

New York ISO
http://www.nyiso.com/

North East Power Coordinating Council
http://www.npcc.org/

TransEnergie
http://www.hydro.qc.ca/transenergie/en/index.html

Drought Predictors
Canadian

http://gfx.weatheroffice.ec.gc.ca/saisons/data/images/ccapcpn_06_s.gif

United States
http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Appendix IV - References

NPCC Summer 2004 Multi-Area Probabilistic Reliability Assessment –May 2004

NPCC Reliability Assessment for Summer 2003 - May 1, 2003

Draft 2004 Summer MEN Interregional Transmission System Reliability Assessment

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-19

Northeast Power Coordinating Council
Reliability Assessment
For
Summer 2005

Conducted by the

NPCC CO-12 Working Group

April 2005

TABLE OF CONTENTS

Information provided in this report has been provided by the Operations Planning Working Group of the NPCC Task Force on Coordination of Operation with additional information from Reliability Councils adjacent to NPCC.

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Additional support by:

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1. Executive Summary

This report focuses on the assessment of reliability within NPCC for the summer of 2005. Portions of this report are based on work previously completed for the NPCC Reliability Assessment for Summer 2004[1].

The NPCC Operations Planning Working Group (CO-12) works closely with the representatives of the NPCC CP-8 Working Group to ensure results are based on consistent data and modeling assumptions between the two studies.

Those aspects that the CO-12 Working Group have examined to determine the reliability and adequacy for NPCC for the summer of 2005 are discussed in detail in the specific report sections. The following *Summary of Findings* address the significant points of the report discussion. These findings are based on projections of: electric demand requirements, available resources and transmission configurations. This report evaluates NPCC and the associated Areas' ability to deal with the differing resources and transmission configurations identifying NPCC and the associated Areas' preparations to deal with possible uncertainties identified in this report.

Summary of Findings

The forecasted capacity outlook for NPCC during the peak week (week beginning July 10, 2005)[2] indicates a forecasted available capacity margin of 13,006 MW. During this week, 6,850 MW of the spare capacity is in the Quebec and Maritimes Areas. The transfer capability between the Quebec and Maritimes Control Areas to the remainder of NPCC will not permit the usage of all this forecasted spare operable capacity. This limitation could reduce the overall capacity margin by approximately 3,375 MW. During high transfers from New Brunswick to New England, capacity located north of the Maine- New Hampshire interface may be bottled or locked in due to existing transmission constraints. This will reduce the overall spare capacity to NPCC by up to another 400 MW. As a result, the spare capacity available to the remainder of NPCC in the peak week is reduced to approximately 9,630 MW.

- The week with the forecasted minimum margin occurs during the week beginning June 26, 2005 where the operable spare capacity available to NPCC after bottling is forecasted to be 9,100 MW.
- Approximately 1,469 MW of new capacity (8 MW in New England, 810 MW in New York, 626 MW in Quebec, and 25 MW in Ontario) is still to be commissioned before the summer. The sizeable spare operable capacity margins

1 The NPCC Reliability Assessment for Summer 2004 can be downloaded from the NPCC members website.

2 Load and Capacity Forecast Summaries for NPCC, IESO, ISO-NE, NY-ISO, HQ and the Maritimes are included in Appendix 1.

forecasted for this summer should counteract any negative impact delays to these capacity additions may have to the overall NPCC reliability assessment.

- While Ontario is anticipating adequate resources to meet forecasted weather normal demands, Ontario may require support from neighboring areas when extreme weather conditions or higher than normal outage rates are experienced.
- New England may experience negative capacity margins in June if assumed demand and generator availability occurs. Under this scenario, New England would require assistance from surrounding Control Areas and the implementation of operating procedures to help maintain power system reliability.
- Even though NPCC as a whole shows adequate resources through the Summer Operating Period, there remains a load pocket within the New England Control Area where there are still supply concerns, specifically in the southwestern portion of Connecticut. In order to address this reliability concern, ISO-NE issued a Request For Proposal (RFP) in December 2003 for quick-start capacity through the combination of generation resources, demand response resources, or peak-load reducing Conservation and Load Management (CL&M) projects. Under this RFP, approximately 218 MW of capacity is available for the summer of 2005.
- New England and New York have market-based demand response programs in place that are expected to provide load relief measures that are in addition to measures available under emergency conditions. Ontario had an Emergency Demand Response Program in place for the summer of 2002 through 2004. This program has been extended to October 31, 2005.
- During the months of May and September (Shoulder Months), there is forecasted to be a significant amount of spare operable capacity.
- An analysis of historical periods of high Geomagnetically Induced Currents (GICs) was performed. While GICs experienced in late 2004 and early 2005 caused some entities to take action to minimize the effect of the solar storms, the results of the procedures indicate that they are adequate for managing the phenomenon.
- Area environmental constraints, specifically state, provincial and local emissions regulations may have some minor impact at various times through the 2005 Summer Operating Period. The sizeable spare operable capacity margins forecasted for this period, combined with the procedures in place, should minimize any possible effects that may compromise the power system's reliability.
- Control Areas within NPCC have procedures in place to monitor and operate the system as needed to maintain desired voltage levels. As indicated in this report, controlling over voltages on the 735kV in Quebec network during off-peak hours is a concern.
- The CP-8 Working Group results indicate that all NPCC Control Areas demonstrated an annual Loss of Load Expectation (LOLE) of 0.1 days/year or less, under Base Case assumptions. The use of the indicated operating procedures

designed to mitigate resource shortages (specifically, reducing 30-minute reserve, voltage reduction, reducing 10-minute reserve, and public appeals) is not anticipated (risk significantly less than one occurrence) for the NPCC Areas during the summer of 2005 period, assuming the expected load (represents the weighted average of the probabilities associated with seven load levels, having a 50% chance of being exceeded) and Base Case conditions materialize.

- Communication protocols in place are sufficient to ensure the timely and efficient communications in all regions to maximize reliance on the marketplace for emergency support.
- The CO-12 Working Group believes that NPCC and the associated Areas have adequate generation and transmission for the Summer Operating Period and have developed the necessary strategies and procedures to deal with operational problems and emergencies as they may develop. However, the resource and transmission assessments in this report are mere snapshots in time and base case studies. Continued vigilance is required to monitor changes to any of the assumptions that can alter this report's findings.

2. Introduction

The NPCC Task Force on Coordination of Operation (TFCO) established the CO-12 Working Group to conduct overall assessments of the reliability of the generation and transmission system in the NPCC Region for the Summer Operating Period (defined as the months of May through September[3]) and for other conditions as requested by the TFCO.

For the 2005 Summer Operating Period, the CO-12 Working Group:

- Examined historical summer operational experiences and assessed their applicability for the period to be studied.
- Assessed the extent to which the NPCC Areas may implement emergency operating procedures.
- Reported potential sensitivities that may impact resource adequacy on an Area basis. These sensitivities included temperature variations, delays to in-service of new generation resources, load forecast uncertainties, evolving load response measures, solar magnetic activity, system voltage and generator reactive capability limits.
- Reviewed the communications protocols with participants to ensure that timely and efficient communications will be in place in all regions to maximize reliance on the marketplace for emergency support.
- Reviewed the operational readiness of the NPCC and actions to mitigate potential problems.
- Assessed the implications of strategies adopted for the Summer Operating Period on the adequacy of supply in the shoulder months.
- Coordinated data and modeling assumptions with NPCC Review of Resource and Transmission Adequacy Working Group (CP-8) and documented the methodology of each Area in its projection of load forecasts.
- Provided as appropriate, coordination with other parallel seasonal operational assessments including MAAC-ECAR-NPCC (MEN) and the NERC Reliability Assessment Subcommittee (RAS).

[3] For the purpose of this report, the Summer Operating Period is defined as the week beginning May 1, 2005 to the week beginning September 25, 2005 inclusive.

3. Demand Forecasts for 2005

The non-coincident forecasted peak demand for NPCC over the 2005 Summer Operating Period is 108,297 MW. This peak demand translates to a coincident peak demand of 106,618 MW which is expected during the week beginning July 10, 2005. The actual NPCC coincident peak demand during the 2004 Summer Operating Period was 97,296 MW at hour 16:00 on July 22. This was relatively low because of the moderate weather experienced during 2004 summer.

Ambient weather conditions are the single most important variable impacting the demand forecasts during the summer months. As a result, each Area is aware that the summer peak demand could occur during any week of the summer period as a result of these weather variables. It should also be noted that the non-coincident peak demand calculation is impacted by the fact that the Maritimes and Quebec experience late spring demands that are influenced by heating loads that occur during the defined Summer Operating Period.

The impact of extreme ambient weather conditions on load forecasts can be demonstrated by various means. The IESO, Maritimes and TransÉnergie (transmission operations division of Hydro-Quebec) represent the resulting load forecast uncertainty in their respective Areas as a percentage of the base load. NYISO and ISO-NE use a Temperature Humidity Index (THI) as a base and increase the load by a MW factor for each degree above the base value.

Historically the peak loads and temperatures between New England and New York can have a high degree of correlation due to the relative locations of their respective load centers. Depending upon the extent of the weather system and duration, there is some potential for the Ontario peak demand to be coincident with New England and New York.

The method each Area uses to determine the peak forecast demand and the associated load forecast uncertainty relating to weather variables is described in greater detail in the *Summary of Area Forecasts* below.

Summary of Area Forecasts

Maritimes

Based on the Maritimes Area 2005 demand forecast, a peak of 3,705 MW is predicted to occur for the summer period, June through August, during the week beginning May 29, 2005. This is a 4.96% increase over the Summer 2004 actual peak of 3,529 MW which occurred on June 25, 2004 (The 2004 Summer Operating Period peak was 3,635 MW and occurred on May 25). Since the Maritimes Area is a winter-peaking area, forecasted peaks for the shoulder months of May and September are normally higher than the summer period. For the week beginning May 1, 2005, the predicted peak is 4,000 MW; for the week beginning September 25, 2005, the predicted peak is 3,711 MW.

The load forecast for the Maritimes Area represents the expected load for the Summer 2005 assessment period. It should be noted that the Maritimes Area load is simply the mathematical sum of the forecasted weekly peak loads of the sub-areas (New Brunswick, Nova Scotia, Prince Edward Island, and the area served by the Northern Maine Independent System Operator). As such, it does not take the effect of load coincidence within the week into account. If the total Maritimes Area load included a coincidence factor, the forecast load would be approximately 1-3% lower.

For the NBSO, the load forecast is based on an End-use Model (sum of forecasted loads by use e.g. water heating, space heating, lighting etc.) for residential loads and an Econometric Model for general service and industrial loads, correlating forecasted economic growth and historical loads. Each of these models is weather adjusted using a 30-year historical average.

For Nova Scotia Power, the load forecast is based on a 30-year historical climate normal for the major load center, along with analyses of sales history, economic indicators, customer surveys, technological and demographic changes in the market, and the price and availability of other energy sources.

Maritimes Electric Company Ltd.'s (Prince Edward Island) load forecast uses average long-term weather for the peak period (typically December) and a time-based regression model to determine the forecasted annual peak. The remaining months are prorated on the previous year.

The Northern Maine Independent System Administrator performs a trend analysis on historic data in order to develop an estimate of future loads.

New England

The New England Control Area's forecasted summer 2005 peak electric load demand is 26,355 MW assuming historically based expected summer peak weather conditions (90.4 degrees Fahrenheit). This is 595 MW (2.3%) higher than the 2004 weather normal summer peak of 25,760 MW, based on growth in economic and demographic factors as well as increased load sensitivity to weather. The average annual change in weather normal summer peak is 560 MW (2.7%) from 1994-2004.

The all time electrical peak electric load for New England is 25,348 MW (occurring at 93.5 degrees Fahrenheit) and was experienced on August 14, 2002. Last summer's actual peak of 24,116 MW occurred on August 30 with much cooler than expected weather (82.3 degrees Fahrenheit).

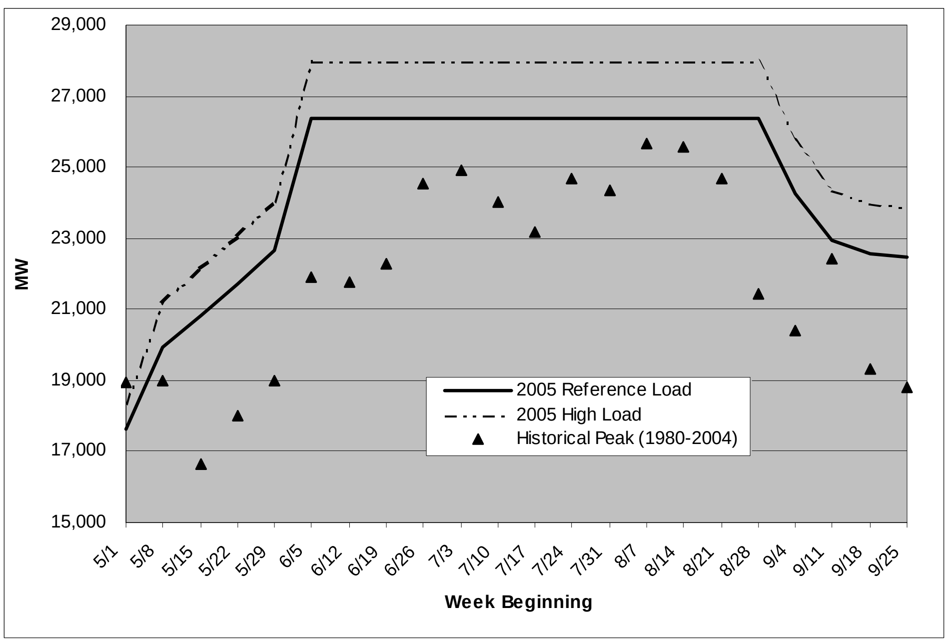
The demand forecast for New England is based on weekly weather distributions. The weekly weather distributions were built using 30 years of Temperature Humidity Index (THI) data at the time of daily peaks (for non-holiday weekdays). The reference load forecast is based on a 50/50 probability of occurrence. While this temperature sampling is used to project temperature sensitive loads, a complete process of sampling and econometric models are used to project the overall aggregate demand. A reasonable approximation for "normal weather" associated with this projection is 90 degrees

Fahrenheit (32 degreed Celsius) and a dew point of 70 degrees. At these forecasted load levels, a one-degree increase in the THI will result in approximately 700 MW of additional load. The amount of additional load depends on the total deviation from the "normal weather" approximation.

The reference case forecast of 26,355 MW has a 50% chance of being exceeded. New England also produces a load forecast that has only a 10% chance of being exceeded. The peak electric load for this forecast is 27,985 MW. This would be equivalent to an increase in the 50% load forecast of approximately 1,630 MW.

The following graph illustrates the range of potential peak demands that ISO-NE may experience this summer and compares them to historical peaks. It should be noted that the historical peak values illustrated below are the peak loads reconstituted to reflect power system invoked load relief procedures (Operating Procedures) that may have been implemented at such times.

Figure 1: New England 2005 Summer Operating Period Load Profiles

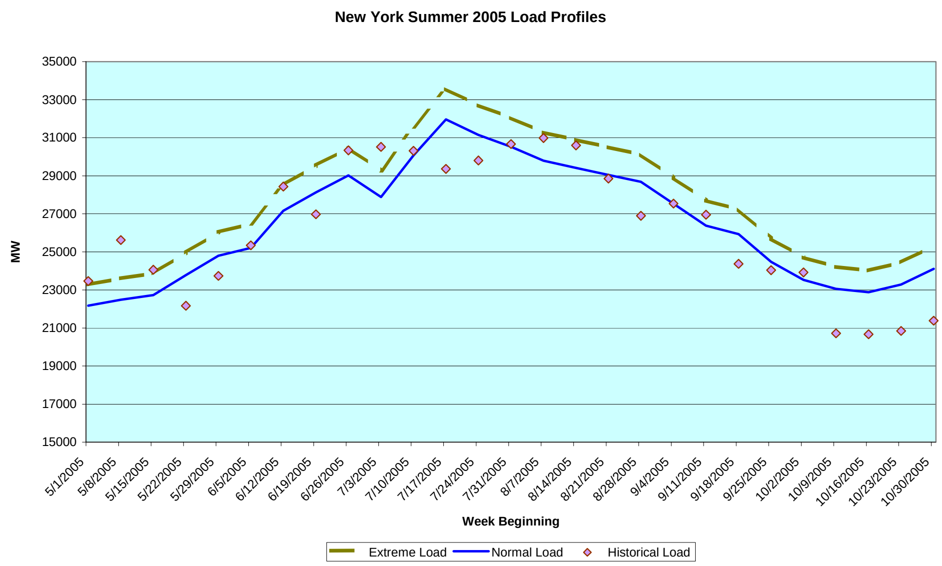


New York

The forecast peak for the New York Control Area is 31,962 MW, which is 162 MW higher than last year's forecast of 31,800 MW. This forecast is 3.2 % higher than the all time peak of 30,982 MW that occurred on August 9, 2001. The forecast is developed by the NYISO using a Temperature-Humidity Index (THI) value of 81.31 degrees, which is representative of weather conditions during peak load conditions. At forecast load levels, a one-degree Fahrenheit increase in the THI will result in approximately 500 MW additional load.

The following illustration provides the range of potential peak demands that New York may experience this summer.

Figure 2: New York 2005 Summer Operating Period Load Profiles



Ontario

The forecasted weather normal, summer hourly peak demand for 2005 is 23,897 MW. This hourly peak is forecasted to occur during the week beginning July 10, 2005. The weather normal forecast is derived from an analysis of the average demands using 30 years of historical weather based on a weekly resolution. The normal weather equates to an approximate average daily temperature of 28 degrees Celsius (82 degrees Fahrenheit) and 65% relative humidity and represents the average weather that can be expected during any given week during the assessment period.

The load model and resultant demands have been updated to reflect the latest economic growth forecasts for Ontario for 2005.

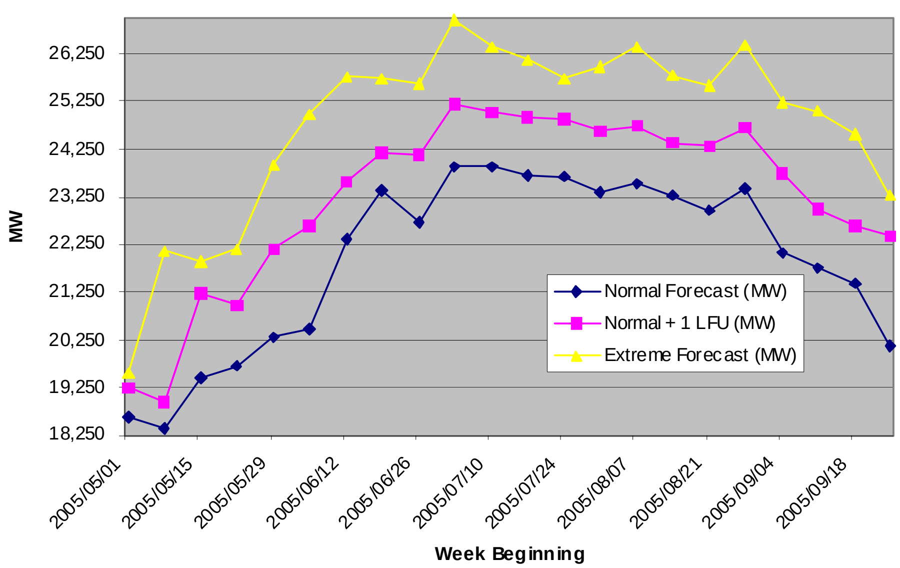
As was seen in 2001 and 2002, weather extremes can propel the demands significantly higher than the weather normal values. Since peak demands are highly weather sensitive, the impacts of additional weather scenarios need to be understood as part of the assessment.

Load Forecast Uncertainty (LFU) is used to capture, in MW, the impact of these variations from weather normal predictions. Therefore demands can be derived and given a probability of occurring based on the likelihood of observing the normal weather. For this forecast, there is a 50% chance the peak demand in any given week will exceed the weather normal demands. LFU represents the impact on the peak demand of one standard deviation in the weather elements. The values of LFU associated with this analysis ranges from about 3% to 10.5% of the predicted weather normal demands during the Summer Operating Period. The highest values of LFU for Ontario appear during those weeks just prior to and after the traditional summer vacation periods of July and August. LFU equates to a potential increase in demand of about 1,125 MW over the weather normal for the peak week.

Lastly, the summer period can experience extreme weather driven demands where the system is likely to be under duress. For any given week, the IESO forecasts extreme weather demand by using the hottest day in the past thirty years as the reference point. Depending upon the week in this assessment period, the values that could be experienced under extreme weather conditions can be between 8.5% and 22% higher than the weather normal prediction. This equates to a potential increase of approximately 2,485 MW over the normal weather prediction on the peak week. During the shoulder months of May and September, the impact of extreme weather over normal weather forecasted demand can reach as high as approximately 4,500 MW.

The following graph indicates the range of possible demands that Ontario may experience over the assessment period.

Figure 3: Ontario 2005 Summer Operating Period Forecast Demands



Quebec

The forecasted summer peak demand for the Quebec Control Area in 2005 is 22,083 MW. This is 134 MW (0.6%) higher than last summer's actual peak demand of 21,949 MW which happened on May 4, an unseasonably cold day for the season with temperatures around 3 degrees Celsius (37 degrees Fahrenheit) at the major load centers.

The forecast is based on 35 years of historical weather with an offset of ±3 days for every date, which amounts to the equivalent of 245 years of sampling. Being exposed over the year to all kinds of extremes in weather, TransÉnergie (transmission operations division of Hydro-Quebec) uses three different load forecasting models (autumn, winter and spring). For the purpose of this assessment, the spring model is used up to the middle of August and the autumn model is used for the remainder of the period. The boundaries of the parameters of these models are regularly calibrated by comparing the results to the last two years of historical weather to reflect any new tendencies. Finally, TransÉnergie defines load forecast uncertainty (LFU) as a percentage calculated on a monthly resolution. The value for LFU is approximately 3% for the summer months, which represents about 600 MW. This value is accounted for in the Load and Capacity table provided in this assessment.

4. Resource Adequacy

NPCC Summary for 2005

The following assessment of resource adequacy indicates the week with the highest overall NPCC demand is July 10, 2005[4].

During the peak week for NPCC the overall spare operable capacity is forecasted to be approximately 13,000 MW. However, a portion of this spare operable capacity is in the Quebec and Maritimes Area. If conditions materialize as forecasted, transmission transfer capability between these Areas and the remainder of the NPCC Areas will limit the usage of all of these resources.

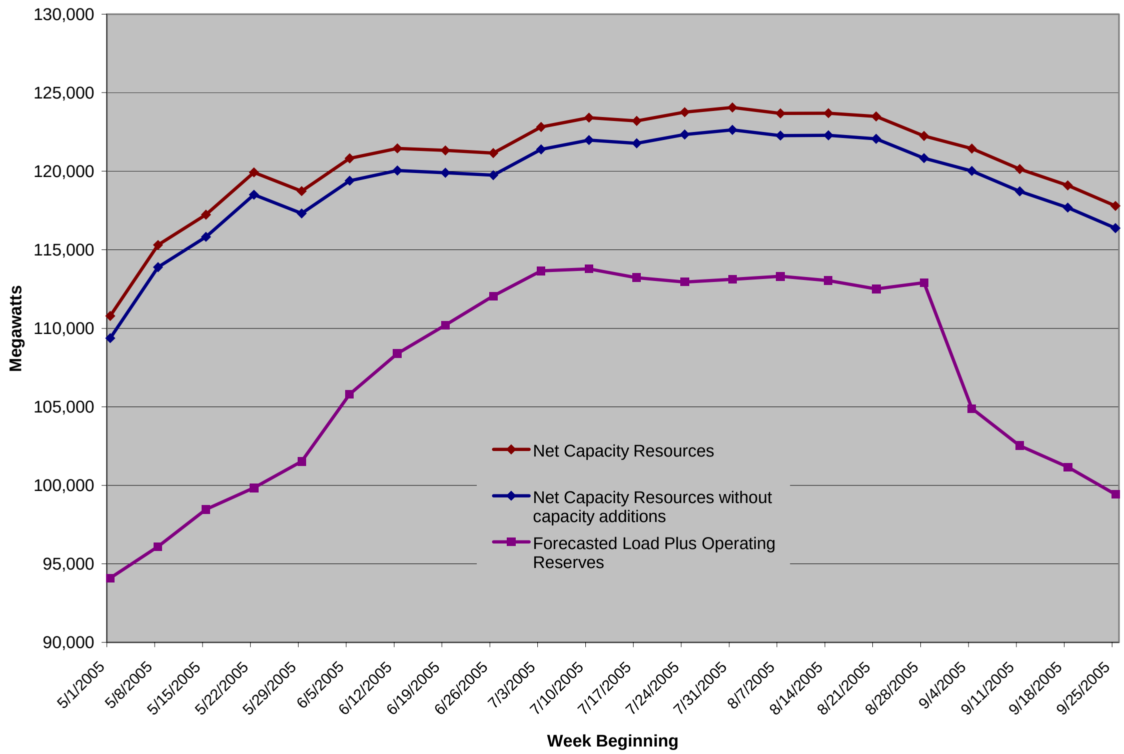
Additionally, under conditions of high transfers from New Brunswick to New England up to 400 MW of resources may become bottled north of the Maine - New Hampshire border due to possible transmission constraints.

The overall net margins for NPCC have been reduced by approximately 1,380 MW to 5,110 MW during the period of mid June to late August to account for this bottled capacity. After accounting for possible transmission constraints within NPCC, approximately 9,100 MW of spare operable capacity is forecasted for the week beginning June 26 which is forecasted to be the week with the lowest spare operable capacity.

The following graph highlights the projection of NPCC Demands, a Projected Resources Scenario and an Existing Resource Scenario for the Summer Operating Period. The projection of NPCC Demand is a summation of each Areas projected demand plus operating reserves on a weekly basis. The Projected Resources Scenario is a summation of each Areas; Projected Installed Capacity plus a projection of Interruptible Demands less Operating Reserve requirements, a projection of Known Outages, a projection of Unknown Outages, Bottled Resources and the Net of Firm Imports / Exports to NPCC. The Existing Resource Scenario uses the same elements as the Projected Resources Scenario but assumes that none of the resources that are currently undergoing commissioning or are forecast to be in service will be available at any time for the summer.

[4] Detailed Projected Load and Capacity Forecast Summaries specific to NPCC and each Area are included in Appendix I.

Figure 4: Projection of NPCC Net Capacity and Peak Demand Plus Operating Reserves - 2005 Summer Operating Period



The assessment was performed on the basis of projected available capacity. Inadequate fuel supply; lower than normal water reservoirs; higher than anticipated forced outages; or delays in anticipated new facilities can have an adverse impact on these capacity projections.

The following are the Area assessments supporting this overall resource adequacy assessment.

Projected Load and Capacity Analysis by Area

Maritimes

When allowances for unplanned outages (based on a discrete MW value representing a typical forced outage) are considered, the Maritimes Area is projecting more than adequate capacity margins for the Summer 2005 assessment period. Net margins ranging from 20% to 42% are projected over the period May through September 2005.

New England

Operable capacity within New England is forecasted to be sufficient to meet load plus operating reserve requirements during the 2005 Summer Operating Period under the reference load forecast (50% chance of being exceeded). The lowest projected operable capacity margin of -31 MW is expected to occur during the week beginning June 19, 2005 while the highest projected capacity margin of 5,189 MW is expected to occur during the week beginning May 22, 2005 if all assumed system conditions materialize. Available operable capacity is based on known outages, an allowance for unplanned outages[5], anticipated generation additions and retirements, projected firm purchases and sales, and the impact of expected Demand Response Programs.

Under the high load forecast (10% chance of being exceeded), the lowest projected operable capacity margin of –1,661 MW is expected to occur during the week beginning June 19, 2005. If this load or higher than expected resource unavailability occurs, ISO-NE will have to implement ISO New England Operating Procedure No. 4 – Action During a Capacity Deficiency (OP-4). OP-4 is designed to provide additional generation and load relief needed to balance electric demand and supply while striving to maintain appropriate operating reserves.

As it has been in past years, the Connecticut region may face reliability problems due to transmission constraints into and within that region. Pursuant to planning studies conducted for the 2003 and 2004 Regional Transmission Expansion Plans, ISO-NE has identified concerns regarding electric transmission reliability in the southwestern Connecticut sub-area. Under certain conditions, the electric load in these areas could exceed the combined ability of the electric generating resources in the area and the available transmission capacity to import electric energy into the region to meet the demand. Under these conditions, the generation and transmission systems within the region may not be able to supply the electric load without extremely low transmission system voltages and/or overloading lines. In order to address this reliability concern, ISO-NE issued a Request For Proposal (RFP) in December 2003 for quick-start capacity through the combination of generation resources, demand response resources, or peak-load reducing Conservation and Load Management (CL&M) projects. Under this RFP, approximately 218 MW of capacity is available for the summer of 2005. These MWs are accounted for in the Load and Capacity tables located in Appendix I.

ISO-NE is also mindful of the reliability of the Boston area -- a major demand center in New England -- during the 2005 Summer Operating Period. If higher than expected loads and/or higher than expected resource unavailability occurs, then ISO-NE is prepared to utilize established operating procedures to help balance supply and demand and maintain system reliability.

New York

NYISO forecasts available capacity of 39,237 MW for the peak week resulting in a capacity margin of 4,057 MW.

[5] The allowance for unplanned outages is based on historical trends and is estimated to be between 2,100 MW and 3,400 MW during the summer.

These resources represent all generation capability located physically within the New York Control Area (NYCA) and are able to participate in NYISO ICAP market. In addition to these generation resources within the NYCA, generation resources external to the NYCA can also participate in the NYISO ICAP market. Resources within the NYCA that provide firm capacity to an entity external to the NYCA are not qualified to participate in the ICAP market.

NYISO conducts semi-annual and monthly Installed Capability (ICAP) auctions. Based on the forecast load for 2005, the ICAP requirement is 37,715 MW based on the 18% installed reserve margin requirement. When allowances are taken for unplanned outages (based on historical performance of 8.68 % unavailable capacity), the net available resources will be 34,441 MW, which will be sufficient to meet the New York Control Area (NYCA) load and operating reserve requirement during the peak load hours, with a reserve margin of approximately 679 MW expected at peak conditions.

NYISO expects approximately 700 MW of load relief from emergency operating procedures that include internal load curtailment by the transmission owners, public appeals and 5% system wide voltage reductions. Participation in the Emergency Demand Response Program and Special Case Resources programs represents an additional 1,166 MW available through the market. NYISO Emergency Demand Response Program (EDRP) and Special Case Resources (SCR) are emergency procedures involving committed market resources but are not considered as interruptible load in the Load & Capacity table calculations of net margin.

Resource additions, totaling 810 MW are expected to be available for service prior to the summer peak. The new Bethlehem Energy Center is a 750 MW natural gas-fired combined-cycle plant. This project includes the retirement of the existing Albany Steam station at the same site, which removes 356 MW of capacity for a net increase of 394 MW installed capacity in the NYCA. Two new 144 MW gas turbines will be located in New York City (NYC); and the remaining 128 MW are two simple-cycle combustion turbines in the Long Island zone; all are expected to be in-service by July.

Ontario

All new resources that were projected to be in service for the Summer 2004 and Winter 2004 / 2005 assessments have been declared in service and the IESO is anticipating positive spare operable capacity margin of approximately 740 MW on the peak week based on the expected weather normal demand forecast. This represents a decrease of spare operable capacity from what was experienced during the summer of 2004. The majority of this decrease is a result of the removal of four coal-fired units at Lakeview, which represents a net loss of 1,148 MW. The shutdown of the facility is expected before April 30, 2005

The IESO is anticipating an additional 25 MW of new generating capacity to become available during the 2005 summer operating period. This increase is due to the upgrading of an existing unit and is expected to be complete by early June.

This forecast of spare operable capacity is based on the assumption that the uprated generating resources will meet its in service projections, known outages will proceed as planned, and the projections of unknown outages, or price responsive loads are accurate.

Known outages include the following; those resources that are scheduled to be on planned outages, transmission constrained resources and the difference between the installed capacity and the dependable capacity. For example, hydroelectric capacity is reduced by varying amounts through portions of the study period to account for the energy available under median water conditions.

Unknown outages represent the average value of forced outages experienced in a similar study period.

The IESO has seen a steady growth in the dispatchable load available since the summer of 2004. Based on participant projected commitments, a value of between 400 MW to 430 MW of price responsive load has been assumed to be available for this forecast period.

The net capacity margins, in Table 5 of Appendix I, depicts an estimate of the operable capacity margin that does not consider all the additional off-market control actions available to the IESO. For example, the IESO can institute a 3% or 5% voltage reduction. These control actions have the effect of reducing the demand by 1.7% to 2.6%, which, equates to reductions of approximately 400 MW for 3% reductions and 620 MW for 5% reductions based on the weather normal demands for the peak week.

The risks associated with this analysis are that demands may be heavier than expected due to extreme weather, units on outage may not return to service as scheduled or there are delays to new and returning units. The IESO will monitor the capacity balance and take appropriate actions where necessary.

Quebec

TransÉnergie is projecting more than adequate capacity margins for the Quebec Control Area during the Summer Operating Period. Being a winter peaking region, the summer is the season during which maintenance work is performed, but margins in the range of 1,900 MW to 7,400 MW above load and firm sales projections are nevertheless expected.

The Sainte Marguerite-3 hydro plant (900 MW) continues to be restricted by a problem with its turbines and its total output continues to be limited to 580 MW. No correction to this condition is expected in 2005.

Delays to In-service of New Generation Resources

Maritimes

The Maritimes Area has no new generation resources scheduled for commercial operation during the summer period May through September 2005.

New England

Approximately 8 MW of new generating resources are expected to be in-service in New England for the Summer Operating Period. If this capacity is not operational in time for the peak demand period, it will only have a marginal effect on net capacity margins.

New York

As in previous years as part of the peak period capacity assessment, the NYISO determines the locational installed capacity requirements for the NYC and Long Island load zones in addition to the statewide ICAP requirement. For the Summer 2005, based on the locational ICAP installed capacity as of February 2005, there were projected negative margins of 116 MW for the NYC load zone (before including 288 MW of expected additional new capacity or the expected SCR total of 158 MW), and 10 MW for the Long Island load zone (before including new generation of 128 MW or expected SCR 90 MW). Both locational margins are expected to be covered when the SCR totals are finalized, and the commercial availability of the new generators. Unexpected delays to these units would require the load zones to procure enough SCR to cover any projected deficiency to meet NYISO and New York State Reliability Council requirements. The ability to meet the statewide ICAP requirement would not be impacted by any delays to proposed generation.

Ontario

Given the minimal change to the resource scenario for this Summer Operating Period, delays to the in service of new generation will not dramatically impact the resource adequacy scenario.

Quebec

A new hydroelectric power plant located east of the Manicouagan power complex will be put in service in 2005. The Toulnustouc plant will have a total output of 526 MW. The first of its two generators (263 MW) is planned to be commissioned at the beginning of May and the second one at the beginning of July. No delays have been announced.

Also, about 100 MW (nameplate capacities) of wind power generators shall be put in service this summer. These are the first of at least 1,300 MW of wind power generators planned until 2012 in Quebec

Fuel Infrastructure by Area

The following is a self-assessment by each Area of the expected fuel supply infrastructure.

Maritimes

The fuel supply in the Maritimes Area is very diverse and includes Nuclear, Natural Gas, Coal, Oil (both light and residual), Orimulsion^{tm}, Petroleum Coke, Hydro, Tidal, Municipal Waste, and Wood.

The Maritimes Area does not anticipate any restrictions in capacity due to fuel supply. Units that have been converted to the Orimulsion^{tm} fuel retain their full capability on oil. Moreover, the Area anticipates normal hydro conditions and the reservoirs are expected to be full.

New England

Historically, traditional fuel supply and delivery options have been readily available to generators within New England during the summer months. For the summer of 2005, ISO New England does not foresee any fuel supply or delivery constraints.

New York

Traditionally, the New York Control Area generation mix has been dependent on fossil fuels for the largest portion of the installed capacity. Recent capacity additions or enhancements now available use natural gas as the primary fuel. While some existing units in southeastern New York have dual-fuel capability, use of residual or distillate oil as an alternate may be limited by environmental regulations. Adequate supplies of all fuel types are expected to be available for the summer period.

Ontario

The majority of generation facilities operating on the IESO-controlled grid are represented by three basic types of fuel (Hydroelectric, Nuclear and Fossil). The fossil-fueled facilities are predominately fired by coal. A portion of the fossil-fired resources is fueled by natural gas or oil. A majority of the oil-fired capability is dual fueled by natural gas and oil. Adequate supplies of these all of these fuels are expected to be available and there is no expectation of fuel delivery infrastructure problems for the Summer Operating Period.

While there are storage lakes associated with most hydroelectric facilities, the ability to predict hydroelectric energy is difficult as water flow conditions are primarily influenced by precipitation. To counter this, the hydroelectric installed capacity is reduced through portions of the study period to account for reductions in capacity when the available water falls below the dependable value. For the purposes of this assessment, dependable hydroelectric capacity is the capacity that is sustainable for a minimum of one hour per day, five days per week. This reduction is one of the components of the Known Maint. / Derating column in Table 5 of Appendix I.

Quebec

Most of the generation resources in the Quebec Control Area are hydroelectric (95%) and hydraulic conditions are adequate. For the Summer Operating Period of 2005, TransÉnergie does not foresee any problems in meeting both its internal demand and full responsibility sales while still being able to assist neighboring Areas as needed.

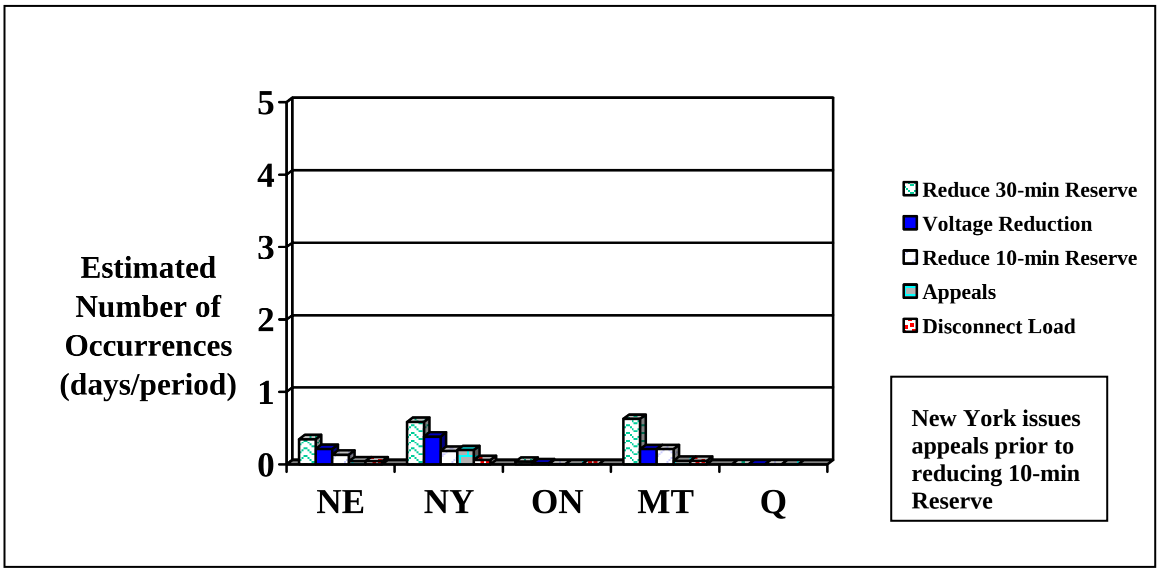
5. Potential Usage of Operating Procedures

The NPCC CP-8 Working Group has performed a probabilistic analysis to estimate the annual Loss of Load Expectation (LOLE) and projected use of Area Operating Procedures designed to mitigate resource shortages for the summer of 2005 under various conditions. This section is based on the CP-8 Study results. Detailed study results for each of these scenarios can be obtained from the *NPCC CP-8 Working Group - Summer 2005 Multi-Area Probabilistic Reliability Assessment*.

All NPCC Areas demonstrated an annual LOLE of 0.1 days/year or less, under the Base Case assumptions for the expected load (the expected load is the weighted average of seven load levels, weighted by the probabilities assumed for each).

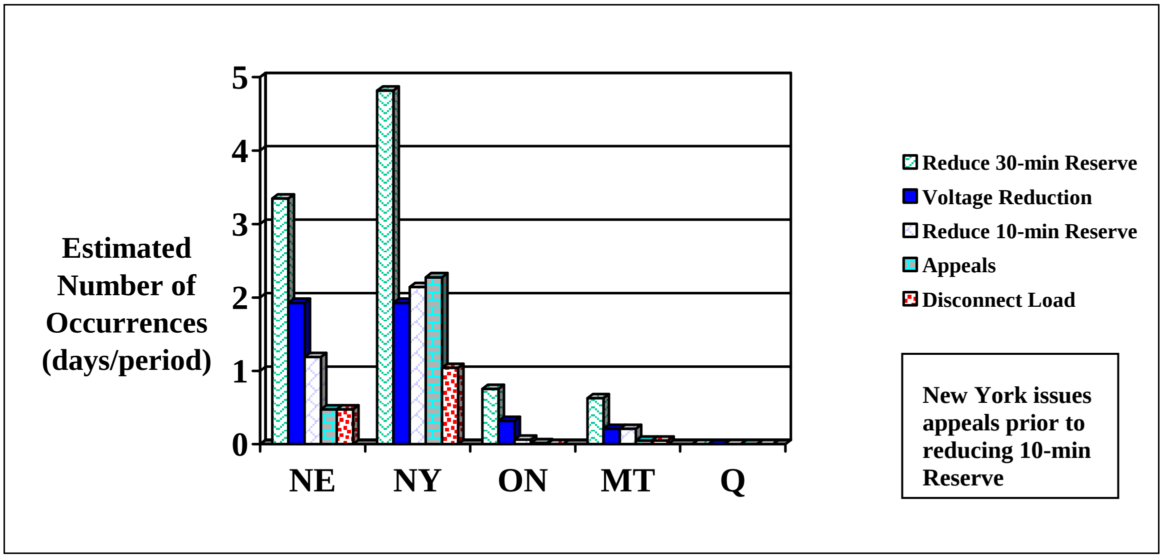
For the May - September 2005 period, Figure 5 shows the estimated potential range of use of the indicated operating procedures under Base Case assumptions. Figure 5 displays the range of results for the expected load level (the expected load level results were based on the probability-weighted average of the seven load levels simulated) and the extreme load level (represents the second to highest load level, having approximately a 6% chance of being exceeded).

Figure 5
Potential Range of Use of Indicated Operating Procedures for Summer 2005 Considering Base Case Assumptions (May – September)
(Expected and Extreme Load Levels)



For the May - September 2005 period, Figure 6 shows the estimated use of the indicated operating procedures under the Severe Case assumptions for the extreme load level (represents the second to highest load level, having approximately a 6% chance of being exceeded).

Figure 6
Summer 2005 – Estimated Use of the Indicated Operating Procedures
Severe Case Assumptions, Extreme Load Level
(May – September)



As shown in Figure 5, use of the indicated operating procedures designed to mitigate resource shortages (specifically, reducing 30-minute reserve, voltage reduction, reducing 10-minute reserve, and public appeals) is not expected (risk significantly less than one occurrence) for the NPCC Areas during the 2005 summer period under the Base Case conditions. Recent capacity added in the NPCC Areas, in addition to the Demand Response Programs planned to be available this year are contributing factors that tend to reduce the need for the use of these operating procedures in 2005.

As shown in Figure 6, if reductions in anticipated resources and/or additional transmission limitations into NPCC materialize coincident with higher than expected loads, New England and New York may experience conditions during the summer of 2005 that require the use of their operating procedures designed to mitigate resource shortages. The potential use of these operating procedures is more likely to be required in southwestern Connecticut, New York City and Long Island, New York, under the Severe Case conditions.

6. Transmission Adequacy

Many Inter-Regional and Intra-Area transmission studies are in the preliminary stages of assessment. Therefore, the transmission adequacy assessment for this report was made utilizing assumptions based on consultation with the staff in the appropriate area of expertise for Inter-Regional transfer capability, supplemented by Intra-Area Transmission assessment of each Control Area and a review of the actual operating experience during the summer of 2004. The following is a transmission adequacy assessment from the perspective of the ability to support energy transfers for the differing levels, Inter-Region, Inter-Area and Intra-Area.

Inter-Regional Transmission Adequacy

The third phase angle regulator on the Michigan - Ontario Interface (Lambton PS4) associated with 345 kV circuit L4D (Lambton - St Clair) was placed in service in February 2005. All counter parties to the project are working to complete a joint instruction that adheres to the principle of schedule equals flow. Pending completion of the joint instruction, the phase angle regulators will only be operated off neutral as a last resort to prevent load shedding.

A tower on the 230 kV circuit B3N (Bunce Creek - Scott) between Ontario and Michigan was damaged in April of 2003, with the associated phase angle regulator failing a month earlier. This circuit will remain out of service through this summer operating period.

Therefore until the joint instruction is completed, the ability to transfer energy into / out of Ontario on the Ontario-Michigan Interface is assumed to be the same as experienced last summer, until the phase shifter agreement can be completed. It is expected that the transmission system is adequate to support the anticipated Inter-Regional transfers.

Inter-Regional Transfers Inter Area Transmission Adequacy

The transfer capability between the NPCC sub-Area containing the Quebec Control Area and the Maritimes Area with the remainder of NPCC is less than the surplus capacity in this sub-Area. The estimated transfer capabilities used in the CP-8 probabilistic assessment were used to calculate the remaining transfer capability after known transactions are taken into account.

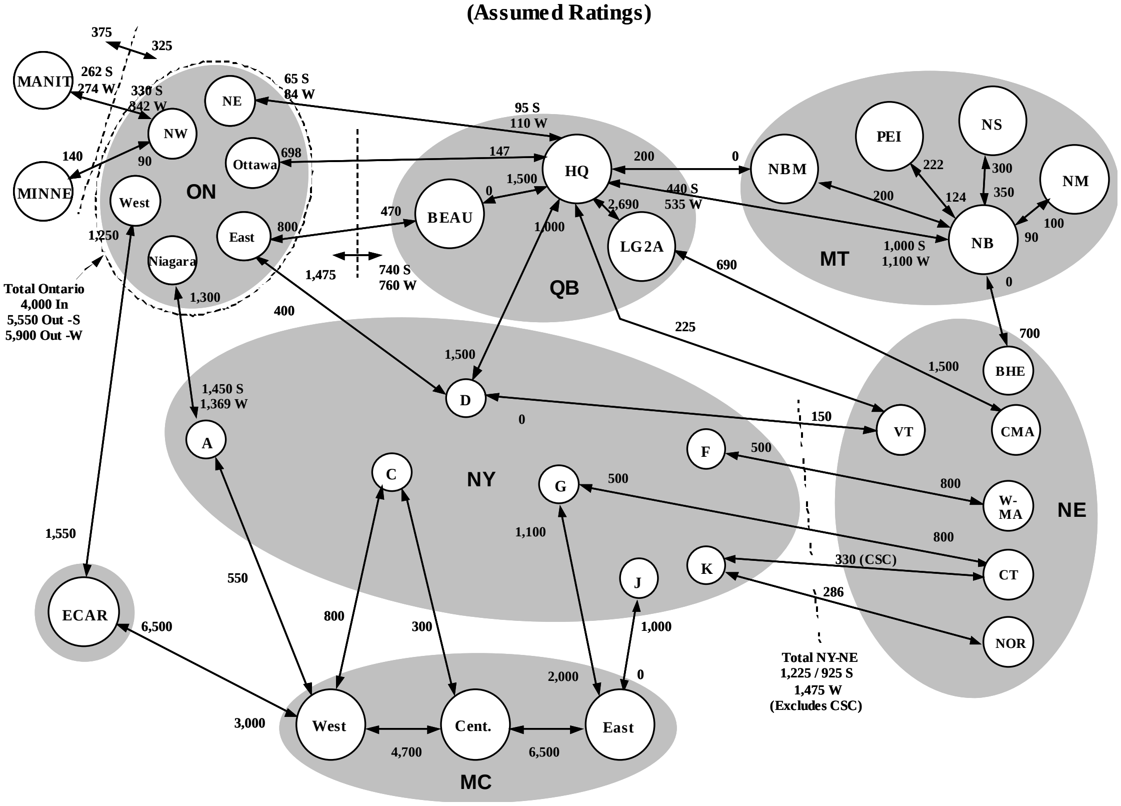
Above this restrictive condition, high transfer conditions from New Brunswick to New England can bottle up to an additional 400 MW of operable spare capacity north of the Maine - New Hampshire border. This accounts for the adjustment to the Net NPCC Margins in the Resource Adequacy assessment (Section 4).

The following diagram indicates the assumed transfer capability used in the CP-8 Summer 2005 Probabilistic Assessment. These same transfer capabilities were used in this report for the determination of Inter-Area / Inter-Region transmission adequacy and the calculation of bottled resources within NPCC.

Figure 7

Assumed Transfer Limits Between Areas at Time of Peak

NPCC Transfer Limits – CP-8 2005 Summer Assessment – Base Case
(Assumed Ratings)



Transmission Adequacy Assessment by Area

Maritimes

There have been no major additions to the Maritimes bulk transmission system. Interconnection capability remains unchanged and is capable of delivering up to 700 MW to New England and is capable of delivering up to 750 MW to Quebec.

New England

The 2004 Regional Transmission Expansion Plan[6] (RTEP04) outlines a number of the ongoing transmission planning studies and projects that are taking place. The report continues to describe the various areas of the region where transmission projects are needed for reliability.

[6] The RTEP04 summary report can be found on the ISO-NE website at: http://www.iso-ne.com/committees/planning_advisory_committee/RTEP04/

For the summer 2005, ISO-NE anticipates the addition of the 345 kV regulating shunt reactor at North Cambridge. This is planned to help the operation of the Boston area system during light load conditions. A number of smaller projects are proposed for the summer 2005 that includes bus-work, re-rating of various lines and the addition of 115 kV lines and breakers. ISO-NE does not anticipate any of the new transmission projects will have an adverse affect on operation of the electric system.

New York

There are no major transmission facility additions to the New York bulk power system expected for the 2005 Summer Operating Period.

Ontario

Several transmission upgrades were required to mitigate the impact of the removal of Lakeview generation station from service. These upgrades included the installation of over 1,350 Mvar in the Toronto and surrounding areas. Also required, was the addition of 500 kV to 230 kV transformation facilities. The first stage of increasing the transformation capability, includes the installation of a 500 / 230 kV transformer at the new Parkway TS. The transformer will be connected via 2 230 kV lines to the existing Claireville transformer station. All transmission upgrades that were identified to be in place for the Summer Operating Period to facilitate the removal of Lakeview generation were completed by the end of March 2005.

While the concerns may be eased by the installation of these transmission upgrades, maintaining acceptable voltage profiles in the Greater Toronto Area will still require diligent assessment of outage plans, and dispatch/deployment of reactive resources under certain extreme demand scenarios.

Quebec

The 100 MW Variable Frequency Transformer (VFT) at the Langlois substation near the Les Cedres generating plant was commissioned in January 2005. An official request has been filed by TransÉnergie to NYISO to change the status of the interconnection between Quebec and the Niagara Mohawk Company in New York so that it would become an open path and every marketer could have access to the market. Once the new market rules are in place, it will also be possible to import up to 100 MW from New York to Quebec. Currently, imports via this interconnection are prohibited except during emergencies.

The transmission capacity from Quebec to New Brunswick will be reduced during much of the month of August to about 700 to 800 MW, instead of 1,050 MW normally, due to busbars displacements on the 735 kV part of the Lévis substation. Capability from New Brunswick to Quebec will not be impacted by these outages.

During the Summer Operating Period, no other major maintenance outages are scheduled on the interconnections with neighboring Areas. Transfer capabilities will be at their maximum throughout the summer. Internal transmission outage plans are assessed to meet load, firm sales, expected additional sales plus additional uncertainty margins.

7. Operational Readiness for 2005

The Resource and Transmission adequacy assessments are key elements in determining NPCC's ability to meet the demands of the summer, but they are mere "snapshots in time" or simulations of conditions based on predictions of specific configurations. To mitigate the uncertainty surrounding load forecasts, forced outages, and other conditions that cannot be controlled or predicted, the Control Areas of NPCC need to be prepared to deal with contingencies in real time.

The following is a synopsis of some of the most prevalent uncertainties affecting the ability to handle the projected demand and the mitigating actions NPCC Control Areas can take to diminish their impact during the 2005 Summer Operating Period.

Reactive Capability of Generating Units

Heavy demand during the summer period requires that the transmission system voltages and the end-use reactive loads be supported by substantial reactive resources in relation to the real power requirements. While static VAR devices and shunt capacitors provide a known quantity of support based on design rating, the actual reactive capabilities of generators can vary significantly from the design capability.

The following is a discussion of each Areas methodology to monitor reactive capability.

Maritimes

The Maritimes Area, in addition to the reactive capability of the generating units, employs a number of capacitors and reactors in order to provide local area voltage control. The Area employs Static VAR Compensators and several synchronous condensers in key load centers to provide high-speed reactive power control. Further, the Maritimes Area is a winter peaking system and the loading of the transmission lines in summer is, in general, lower resulting in lower VAR consumption.

New England

ISO-NE and its satellite control centers continually monitor voltage and VAR conditions throughout the system to ensure reliability of the bulk power grid in New England. Major generating stations throughout New England have specified voltage scheduled, which are maintained as closely as possible in system operations. In addition to voltage schedules, minimum and maximum voltage limits at several key generating or transmission stations have been established to promote system reliability during adverse voltage/reactive conditions. Also, a Tariff has been in place since August of 2001 that compensate New England generators for VAR support.

New York

Each generator providing voltage support service under the NYISO Tariff to the New York market is required to perform annual testing of reactive capability within 90% of its claimed operating capability. The NYISO staff reviews the test data and, if necessary, will perform appropriate voltage analysis to determine operating limits based on the reactive capability testing. In preparation for the summer peak period, the NYISO staff has been reviewing the test data to ensure that all voltage support service providers are in compliance with the testing and reporting requirements for this ancillary service. The NYISO staff has also requested Transmission Owners and Generation Owners to identify local (in plant or station) issues that might limit a particular generator's voltage support capability.

Ontario

The IESO has the authority to test the declared reactive capabilities of generating units. Testing of generating units, critical to the support of key portions of the IESO-controlled grid will be completed before the end of April 2005. The results of the tests will be compared to the capability assumptions used in studies for the summer.

Quebec

Being a winter peaking area, TransÉnergie does not expect to encounter voltage collapse problems during the summer. On the contrary, controlling overvoltages on the 735kV network during off-peak hours is the concern. This is accomplished mainly with ample provision of shunt reactors. Most shunt capacitors, at any voltage level, are disconnected during the summer.

Environmental Impacts

The major Federal rules that apply to electric generating sources in the northeastern United States are the Acid Rain regulations, New Source Performance Standards (NSPS) and State Implementation Plans (SIPs). The Acid Rain regulations require power plants to reduce both SO2 and NOx emissions on a year round basis. The NSPS regulations set regulations for new power plants and States develop SIPs to meet National Ambient Air Quality Standards (NAAQS). In the northeast U. S., the NAAQS of most concern is the ozone NAAQS. In order to meet the NAAQS, states in the northeast have developed a summer time NOx Budget Trading Program that has been in effect for the last three summers.

Short-term impacts on individual unit operation during 2005 summer are more influenced by the summer time regulations as opposed to annual regulations because these regulations are more stringent. For the NOx Budget Program, sources may either install NOx control technologies or buy allowances from sources that have been overcontrolled. It is possible that fuel switching between oil and gas can be a problem. Quick start-up of mothballed units is also allowed under the rules.

Overall, it is not expected that EPA rules will have a major impact on electric system reliability through its environmental programs during 2005 summer. State, provincial and local environmental rules are expected to have more of an impact on electric system reliability that is described in more detail by Control Area.

The following are the Area assessments discussing environmental related issues.

Maritimes

The Maritimes Area closely monitors air emissions and other environmental discharges to ensure compliance with standards and limits set forth by Canadian Federal and Provincial environmental regulations. For the Summer 2005 period, there may be occasions when some units are required to be de-rated in order to meet these regulations. However, these occasions are expected to be infrequent and of short duration.

New England

ISO-NE is mindful of environmental restrictions and constraints on New England's generating capacity, however it is the responsibility of the resource owners to monitor their compliance with state or federal standards. In order to mitigate the impact that these restrictions may have on the availability of generating units within New England, generator owners are encouraged to pursue temporary waivers to their environmental permits especially during periods of extreme capacity deficiencies.

New York

There is a limited possibility that there may be a shortage of available capacity in the New York City metropolitan area due to environmental constraints. An extended period of high temperatures and high humidity leading to an unacceptable level of ozone in the region may limit the allowable dispatch of generation to meet load. In 2001 the NYISO obtained a waiver from the New York State Department of Environmental Conservation (DEC) to address such an air quality emergency and is continuing to work with the DEC staff on this concern. Should such a situation arise, it is incumbent on the NYISO to maximize the availability of generation outside the effected area and insure that all other steps are taken in accordance with the capacity emergency procedures (NYISO Emergency Operations Manual). After this the DEC would allow operation outside of emission limits to avoid curtailment of firm load in New York.

Ontario

There are many environmental issues that specifically affect the operation of facilities in Ontario during the Summer Operating Period. Compliance with these standards is strictly monitored by the facility owner.

Some facilities have annual energy limitations to observe permissible emission limits. These annual limits are not expected to impact the overall energy and capacity projections for the Summer Operating Period.

It is also recognized that there is a potential to restrict generation to respect environmental regulations due to cooling water temperatures etc. The timing and the overall impact of any restrictions are unpredictable.

Currently it is the facility owner that would request the appropriate authority to permit a variance from these obligations to assist in a capacity deficiency. Experience gained in 2002 was utilized to revise procedures where the IESO requests the facility owner to obtain variances to environmental obligations under emergency procedures.

Quebec

The bulk of generation in Quebec is hydroelectric based therefore the environmental concerns, with respect to air emissions, is not of concern.

Geomagnetically Induced Currents (GICs)

Past experiences have shown the serious effect that geomagnetic disturbances can have on the NPCC bulk power system. Quasi-DC currents induced in power lines flow to ground through transformer neutral connections. This can result in saturation of the transformer core leading to a variety of problems, including increased heating that has resulted in transformer failures. In addition, the harmonics generated in the transformer, as a result of the saturation, may produce unanticipated relay operations, such as sudden tripping of transmission lines or shunt capacitors.

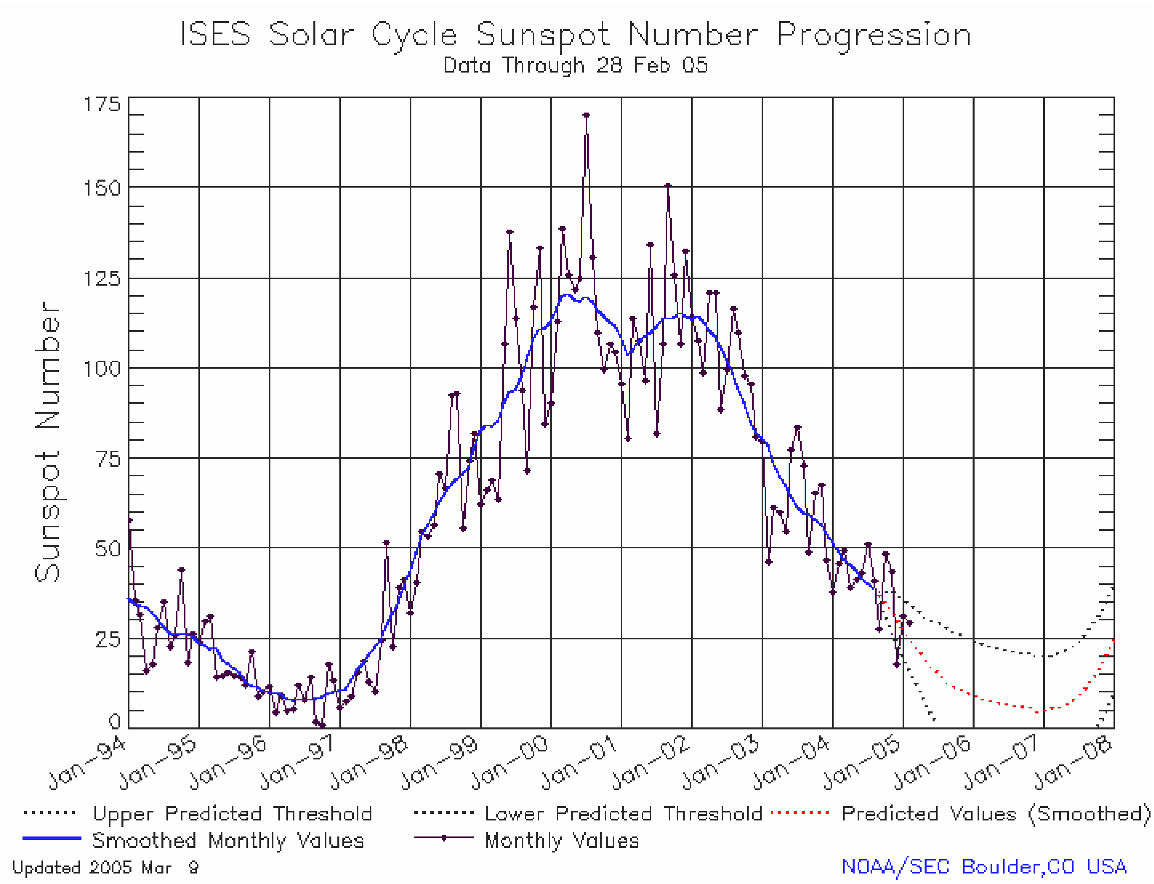
GICs are produced by the magnetic field variations that occur when a mass of electrically charged particles from a solar coronal mass ejection impacts the earth’s magnetic field. Because of the low frequency compared to the AC frequency, the geomagnetically induced currents appear to a transformer as a slowly varying DC current.

GIC flowing through the transformer winding produces extra magnetization, during the half-cycles when the AC magnetization is in the same direction this effect can saturate the core of the transformer. This also results in severe distortion of the AC waveform with increased harmonic levels that can cause incorrect operation of relays and other equipment on the system and may lead to problems ranging from trip-outs of individual lines, transformers or shunt capacitors to collapse of the whole system.

GIC activity correlates to 11-year sunspot cycles. We are presently in Cycle 24, which began in 1996 and is predicted to end about January 2007. During the portion of the solar cycle that has greater sunspot activity, there is a higher probability of GICs occurring, which could impact the NPCC system. Observations of sunspot activity only provide insights as to the timing of the release of energy; it is the solar winds that ultimately determine the intensity and duration of a geomagnetic storm and those areas of the earth that will be ultimately affected. A satellite positioned between the earth and the sun is capable of determining the intensity of the storm. The timing between when this satellite senses the magnitude of the storm and when the effects are noted on the earth is less than 1 hour.

The CO-8 Operations Managers Working Group explored ways to obtain accurate and timely forecasts of solar magnetic disturbances and the resulting GICs for the NPCC Control Areas. As a result, NPCC contracted for GIC forecasting services from Solar Terrestrial Dispatch (STD) for a three-year period that began mid-2003. Forecast information is provided directly to the control centers in the NPCC Areas.

The following chart indicates the solar activity through February 28, 2005.



Monthly updates to this chart and further information can be found at www.sec.noaa.gov/.

Sunspot numbers continue their inexorable decline toward an anticipated minimum in late 2006 or early 2007. The peak in the geomagnetic activity maximum occurred in July and August 2003. We continue to feel the effects of coronal hole based disturbance activity which has been quite stable and predictable in producing dominantly minor to major geomagnetic storm activity once a month, with brief severe-storm level excursions (K-indices of 7) at isolated locations.

In early 2005, weak to brief moderate GIC activity during these coronal hole disturbances have been reported from the NPCC. This coronal hole disturbance could persist into the summer months and bring continued recurrent geomagnetic storm conditions. Assuming the size and boundaries of the coronal hole do not change appreciably during the next 6 months or so, the impact dates for the disturbed activity are currently projected for very early April, very late April, late May, mid-to-late June, mid July, mid-August, early-to-mid September and early October.

STD's regular daily forecasts will always provide NPCC staff with at least 72 hours of advanced notice concerning the arrival of those disturbed periods. K-indices during the coronal hole disturbances should be expected to reach a minimum of 4 to 5 in the NPCC region, with slightly higher K-indices of 5 to 6 being common over the more northern reaches of the NPCC region during the local evening and night hours. Brief severe-storm level excursions (K-indices as high as 7) have been observed with previous apparitions of activity. Thus, NPCC operators should be aware of the potential for brief (6 to 12 hour) K=7 alerts (and perhaps 24 hour-duration K=6 alerts as well) during the height of the disturbed activity, perhaps once a month. Coronal-hole based disturbances will continue to be a rather common feature of space weather activity during the next year.

Coronal mass ejections (associated with solar flare activity) will continue to slowly subside in frequency over the next year. However, the occurrence of unusually strong coronal mass ejections capable of producing strong geomagnetic activity at the Earth (and potentially strong GIC activity) will remain possible through the next year. Virtually every solar cycle on record since geomagnetic activity has been closely monitored has shown such rogue events to be a problem sometime during the months immediately preceding the minimum phase of the solar cycle. For example, very strong (K-indices of7 to 9) geomagnetic storms occurred in August 1943 (3 months prior to the solar minimum), September 1953 (6 months prior to the minimum), September 1963 (13 months prior to the minimum), March 1976 (the same month that solar minimum occurred), February 1986 (7 months before the minimum) and April 1995 (13 months prior to the minimum). These were all strong disturbances with A-indices of between about 80 and 200. We expect to see several strong events during the next 2 years and at least one very large event prior to the next solar minimum that will probably be unrelated to the coronal holes. It is, of course, impossible to predict when that next very large event will take place, but it could occur anytime commencing from this coming summer and fall through to the winter of 2006.

Overall, most of the days associated with this summer and fall will be fairly quiet with respect to geomagnetic activity and therefore should be associated with very minimal risk for GIC activity. During the periods of concern noted above, weak GIC activity will become possible, with an outside chance for brief periods of moderate GIC activity. Should a rogue event occur, strong GIC activity would be possible.

The following is a summary of each Area's experiences of GIC activity and actions/procedures in place to reduce the impact on the transmission system. The resultant impact observed in the NPCC Control Areas indicates that the control actions that are in place appear to reasonably reduce the impact of GIC.

Maritimes

The Maritimes Area did not experience any significant disturbances in 2004 and no major problems are anticipated for 2005. The Maritimes Area did perform some limited control actions reducing exports on interconnections with New England and Hydro Quebec, as well as, internally on the interconnection between New Brunswick and Nova Scotia. The Maritimes Area Operating Procedures are consistent with NPCC Operating Procedures for GIC activity.

New England

In 2004, New England experienced some solar activity that affected the transmission system operations. Specifically, loadings with inter-area ties were brought to 40% - 90% of normal ratings. No major problems occurred as a result of these storms. Other minor storms were experienced in January 2005 but no special actions were taken and no operating problems occurred.

New York

In 2004, the NYISO experienced one interval of GIC activity high enough that it required actions to be taken. During the days of November 7 through November 10, 2004 two periods of elevated solar activity occurred, causing the NYISO to declare the Alert state twice during the four days. In anticipation of potential impacts from the storms on the power system, transfer limits were reduced to 95 %. There were no incidents on the bulk power system in the NYCA attributed to the GIC activity.

Ontario

The procedures that were in place throughout the period of high activity, from 2001 into 2003 and subsequent periods, proved to be adequate to mitigate the impact of GIC. Recent severe solar storms in November 2004 and January 2005 have reinforced that these procedures remain valid. During these events, the IESO reduced certain transfer limit by 10% and maintained low reactive outputs on certain generating units with no specific power system operations being directly attributed to the solar storm.

Quebec

In 2004, there were only two occurrences of GICs severe enough so that special operating procedures had to be applied. The first one happened on August 30 which caused voltage asymmetries as high as 2.6 % on the TransÉnergie network. Maximum transfer limits were lowered on internal paths and DC links were operated between 40% and 90% of their capacity for four hours, as recommended by the NPCC C-15 Operating Procedure. There was no impact on equipment, customers or commercial activities.

The second occurrence happened on November 7 and was of equivalent severity to the August occurrence but lasted only one hour. During this time, transactions to NEPOOL via the Phase-2 tie had to be curtailed from 500 MW to 0 MW because this was below

40% of the capacity of this DC link which is 2,000 MW. Everything else remained normal.

Operating Procedures

Detailed NPCC Operating Criteria, Procedures, Guides and Reference Documents provide the Areas with the necessary material to develop and maintain a concise set of operating procedures that are relevant to maintaining the security of the Control Area by observing local operating parameters. Listings and descriptions of the documents related to operational readiness for the Summer Operating Period are summarized in Appendix III.

The TFCO is systematically replacing the existing operations-related “B” and “C” documents by adding the requirement language from these documents to “A” documents and maintaining the non-requirements language in existing or new “C” documents. It is anticipated that by the end of year 2005 all Reference Documents will be re-designated as new “C” documents. Thus far, the RD-01 “NPCC Emergency Preparedness Conference Call Procedure”, RD-03 “Procedures for Communication During Emergencies”, RD-04 “Operating Procedures for ACE Diversity Interchange”, RD-05 “Monitoring Procedures for Operating Reserve Assistance” and RD-09 “Procedures for Solar Magnetic Disturbances Which Affect Electric Power Systems” Reference Documents have been converted to “C” documents C-01, C-36, C-37, C-38 and C-15, respectively. The RD-02 “NPCC inter-Control Area Power System Restoration Reference Document” is scheduled for conversion by the CO-11 inter-Control Area Restoration Working Group later during 2005. Since the Reliability Assessment for Summer 2004, the following revisions to NPCC documentation have occurred:

At the time when the 2004 Summer Assessment was being completed NPCC membership approval was being sought for the A-2 Document, “Basic Criteria for Design and Operation of Interconnected Power Systems” document. This document received approval of the full NPCC membership and was fully adopted during Spring 2004.

Changes recommended by the SS-38 Working Group on Inter-Area Dynamic Analysis to the A-3 “Emergency Operation Criteria” had been implemented in the document to increase the operating time requirement for under-frequency load shedding relays in NPCC. Additional changes recommended by SS-38 to clarify the language on generator under-frequency tripping restrictions and other changes on critical facility testing have been adopted by the TFCO Reliability Coordinating Committee and NPCC membership approval will be sought during the second and third quarters of 2005.

Within NPCC the CO-1 Working Group on Control Performance is working to implement reserve sharing. This will require changes to some of the existing documents. The C-19 “Procedures During shortages of Operating Reserve” and C-20 “Procedures During Abnormal Operating Conditions” are being merged into a revised C-20 document. The C-12 and C-38 documents may also need some revisions to accommodate reserve sharing. These changes are expected during the second quarter of 2005.

To be prepared to deal with the constantly changing conditions on the power system, NPCC routinely conducts weekly operational planning calls between Reliability Coordinators to coordinate short-term system operations. NPCC has also refined and expanded its emergency conference call mechanism to enable operational security entities in NPCC and neighboring regions to communicate current operating conditions and facilitate the procurement of assistance under emergency conditions. These calls may be initiated upon the request of any Reliability Coordinator and is coordinated by NPCC Staff. Due to the commercially sensitive real-time nature of the material discussed, only signatories to the NERC Confidentiality Agreement for Electric System Security Data may be party to these calls. Because of moderate weather and no severe, extended equipment outages only six of these emergency preparedness conference calls were conducted during 2004.

Each Control Area has complemented the NPCC Procedures and Guidelines with instructions as they apply to their local conditions. The following is a summary of activity that Areas have taken to ensure that instructions remain current.

Maritimes

The Maritimes Area Operating Procedures are in compliance with the NPCC Operating Procedures and are supplemented with local procedures.

New England

Since the implementation of the Standard Market Design (SMD) in March 2003, ISO-NE has placed a considerable amount of effort reviewing, and revising as necessary, New England's Market Rules and Operating Procedures. New England's Operating Procedures are in compliance with the NPCC Operating Procedures and are supplemented with local procedures. There are no special procedures in place for the operation of the power system during shoulder months.

New York

The NYISO continues to review and refine operating and market processes based on experience gained through the sustained peak load periods of previous summers. The positive experience with the initial implementation of the Emergency Demand Response Program during that period means that program will continue and expand. Staff will continue the review of Normal and Emergency Operating Procedures to improve the implementation and usefulness of that and other programs. There continue to be refinements to the NYISO Market operation based on the experience gained during peak load period operation, and new products and facilities are being added.

Ontario

The IESO continuously reviews and revises all operating procedures to ensure that they are consistent with both NERC and NPCC requirements as well as with the Market Rules for Ontario.

Throughout the Summer Operating Period, additional NERC Certified System Operators will be available to supplement Control Room Operations staff as conditions dictate.

Quebec

In the event of a capacity deficiency, TransÉnergie would first ask Hydro-Quebec Marketing to find additional generation in or out of the Control Area. After this step, Emergency Operating Procedures, compliant with NERC and NPCC are implemented.

Operating Procedures in Shoulder Months

The uncertainties associated with weather variability and maintenance overruns in the spring months can quickly lead to resource shortfalls. Past history has indicated that resource assessment procedures need special attention during this time frame. As a result of these capacity shortfalls, many of the Areas have taken actions to prevent a reoccurrence and are described below.

Maritimes

The Maritimes Area Operating Procedures for the shoulder and summer period are essentially the same as for the summer of 2004 and no changes are anticipated for the summer of 2005.

New England

ISO-NE's Outage Coordination staff has reviewed the proposed maintenance schedules for generators in the Control Area and, where appropriate, has worked with the owners to adjust their outages in anticipation of load levels that may be experienced in the weeks prior to or following the summer peak load exposure period. However, there is a significant amount of capacity scheduled out-of-service in May. If there is a delay in the return to service date of these MW, the forecasted reserve margin will be affected.

New York

NYISO Scheduling staff has reviewed the proposed maintenance outage schedules for generators in the Control Area and, where appropriate, have worked with the generator owners to adjust the outage schedules in anticipation of load levels that may be experienced in the weeks prior to or following the peak load exposure period.

Ontario

As stated above, the IESO performs extensive reviews of reliability procedures on a regular basis. This includes the procedure for maintaining reserve margins and rectifying negative margins. These procedures are enforced during the shoulder months to ensure that the necessary control actions are taken in the appropriate time frame if needed to ensure that planning obligations are met.

Quebec

The TransÉnergie Operating Procedures are updated on a continuous basis to reflect changes in the regulations, market rules and local procedures. There is not, however, any special Operating Procedures in the summer or shoulder months because TransÉnergie is a winter peaking system.

Load Response Programs

Each Area utilizes various methods of demand management. In those Areas where market based structures have been implemented or are evolving, there has been a shift in contractual obligations of the interruptible loads. The move is an attempt to manage load interruption, as a result of demand exceeding resources, by giving industrial and commercial customers the ability to respond to price signals in the wholesale electricity marketplace. Many of these programs are in varying degrees of development. The following is a summary of each Control Area's current load response programs available or in development to be available for the Summer Operating Period.

Maritimes

The Maritimes Area is a winter peaking area and does not have any Load Response Programs. Interruptible and Dispatchable loads are available for use when corrective action is required within the Control Area.

New England

During times of capacity deficiencies, ISO New England declares ISO New England Operating Procedure No. 4 – Actions During a Capacity Deficiency (OP-4) that includes; public appeals for conservation, purchasing emergency energy from the neighboring control areas, interrupting real time demand response providers, and implementing voltage reductions.

Interrupting real-time demand response providers is accomplished through the New England Load Response Program (LRP). Through the LRP, Market Participants or Demand Response Providers enrolled directly with ISO New England can enter into agreements with retail customers to encourage them to reduce their electricity consumption during periods of high prices or peak demand.

Within the LRP, an asset can reside in one of four distinct programs:

- Day-Ahead Demand Response Program
- Real-Time Demand Response Program
- Real-Time Price Response Program
- Real-Time Profiled Response Program

Participants in the Day-Ahead Demand Response Program will offer an amount of energy into the Day-Ahead market and, if cleared, will be required to interrupt as offered. Those participants that do not clear in the Day-Ahead Demand Response Program have the option to participate in the Real-Time Price Response Program. Within this program, participants will have the option to voluntarily reduce energy consumption in real time when the zonal price is or is forecasted to be greater than or equal to $100/MWh.

Participants within the Real-Time Demand Response Program will be involved in one of two sub-programs based on their response time. Each sub-program will require the participant to interrupt during pre-specified actions of OP-4.

Participants in the Real-time Profiled Response Program will also be required to respond during certain action of OP-4.

As of April 1, 2005, 233.5 MW was enrolled in the Day-Ahead Demand, Real-Time Demand, and Real-Time Profiled Response Program. It should be noted that the amount of MW available from the LRP, as represented in the Load and Capacity table for New England (Appendix I), is an estimate of what will be available for the Summer Operating Period and does not equal that currently enrolled.

New York

The NYISO introduced two load response programs for the New York Market in May 2001. The Emergency Demand Response Program (EDRP) is a program in which Customers would be paid to reduce their consumption by either interrupting load or switching to emergency standby generation when requested by the NYISO. During the Summer 2004 period the NYISO did not experience peak conditions that required activation of the EDRP.

The Emergency Demand Response Program is continuing for Summer 2005, and NYISO estimates 269 MW of load relief during peak conditions that is considered "reliable." This load relief will be available to support the New York State power system during capacity emergency periods. This program is in addition to the relief obtained through the emergency procedures for Operating Reserve Peak Forecast Shortage (Section 4.4.1 NYISO Emergency Operations Manual) or in response to the major emergency state (Section 3.2 NYISO Emergency Operations Manual). Additionally Special Case Resources (SCR) are expected to provide 897 MW of load relief under peak conditions

Ontario

Through out 2004, the IESO-Administered Market saw increases in the number of load facilities that are willing to be treated as a resource that would be dispatched off the system by the IESO once the price of energy in the real time market has exceeded the bid (to Buy) price submitted by the load. The subject load must then reduce their demand according to the dispatch instructions. Based on indications of additional facilities desire to become dispatchable, the values have been increased from last years 300 MW to projected values of between 400 and 430 MW for this assessment period.

In 2002, the IESO instituted an Emergency Demand Response Program to provide additional demand relief under emergency conditions. The program involves 16 different customer sites with approximately 400 MW of load contracted in this ancillary service. When requested, the customers would reduce their demand on a voluntary basis. This demand response program would be implemented just prior to the interruption of firm load. The effectiveness of the program has been reviewed and approvals have been received to extend the program to October 31, 2005.

Quebec

The Quebec Area is a winter peaking system and does not usually need to resort to the load response programs during the summer, although, of the 1,593 MW of interruptible power available in winter, 935 MW could be called on if needed during the summer.

Communications Systems with Operators and Customers

There is normally some time lag for control actions to take effect to rectify a resource deficiency. In the evolving market places there are now many players in Control Areas where at one time, there were only a few. As a result, simultaneous communications need to be timely and efficient for multiple resources to respond to directions by the Reliability Coordinator and quickly mitigate the need for emergency control actions, including the shedding of load.

Below is a summary of the communication medium that each Control Area utilizes to communicate emergency situations with generators, transmitters and customers.

Maritimes

The individual Control Centers within the Maritimes Area provide timely and accurate information regarding the status of the power system to customers via websites, news releases, high volume Interactive Voice Response System and telephone contact through Public Affairs and Customer Services departments or Call Centers.

New England

In the event of a capacity deficiency, ISO-NE's website provides real-time information to stakeholders and the general public regarding the status of the power system and the amount of Emergency Energy Transactions requested during peak periods. In addition, Control Room operations will convey the necessary information to ISO-NE's Customer Service and Corporate Communications Departments so that they can make the necessary communications to federal and state regulatory agencies and the media. Operations personnel convey the details of any capacity deficiency to the Satellite Control Centers and neighboring Control Areas as appropriate.

In addition, ISO-NE creates a seven-day forecast that is posted to the ISO-NE web site. This posting includes a capacity analysis for the peak hour of each day, detailing the forecasted amount of surplus/deficient capacity for each future day to illustrate anticipated system conditions.

New York

The NYISO is continuing implementation of its Inter-Control Center Communications Protocol communications system (ICCP) allowing bi-directional data communication directly from the NYISO control center systems to the generating plants. In normal operation this facilitates the transmitting of schedules and base-points from the NYISO dispatch system to the generators, and improves the accuracy and timeliness of generator real and reactive power metering.

The NYISO website now displays information including actual Control Area load in addition to the real-time zonal pricing information and transmission outage schedules. Market Participants may also access a "dispatcher notes" page that provides information on current NYISO system operating conditions.

Ontario

On a daily and weekly basis the IESO issues Security and Adequacy Assessments (SAA). These supply the Market Participants with detailed adequacy projections on an hourly resolution for a period of 14 days into the future and on a weekly resolution for the following two weeks.

The IESO also publishes to Market Participants a System Status Report (SSR) three times daily by Market Forecasts and Integration during the pre-dispatch period outlining deviations from the SAA published for days one and two.

The SSR has capability to identify to Market Participants the following Advisories:

- Major Change Advisory, System Advisory and,
- System Emergency Advisory.

To address global adequacy concerns when there is insufficient energy or capacity available to the IESO-controlled grid or when there are insufficient offers in the real-time dispatch of the IESO-administered markets, the IESO shift staff can also issue a SSR. The SSR can be prepared on very short notice. A notice is sent to Market Participants via their dispatch workstations notifying them that a new SSR has been issued with the details of the SSR being published to the IESO Public Web site.

To address local area adequacy concerns, the IESO will direct Market Participants to submit offers, either via the Market Participant's dispatch workstation or telephone.

While the phone systems and associated infrastructure worked adequately during the blackout of 2003, the IESO recognized a number of areas of improvement. At the time of the blackout a Request for Proposal (RFP) was in place to replace the IESO phone system. This RFP was subsequently revised to include additional requirements, and the upgraded phone system was place in service prior to the summer 2004 operating period.

The IESO also recognizes the need to communicate with the general public at times when there might be supply shortfalls. To achieve this, the IESO created a public communications process to ensure that consumers and industries in the general public were given all the information they need to make informed choices. This process for communicating to the general public on resource issues proved to be an effective tool in 2003 for managing the resource shortfalls during the post blackout period.

Quebec

To satisfy demands in Quebec, TransÉnergie solicits additional capacity requirements it may need through Hydro Quebec Marketing (HQM). If HQM cannot secure the additional capacity required or there is not sufficient time to fulfill the need identified, TransÉnergie would take actions including the securing of emergency energy from neighboring systems, cutting of available interruptible loads, and instituting voltage reductions. If these measures are deemed to be insufficient and there is adequate time, a public appeal would be instituted through commercial media. The probability of resorting to these measures during the summer is very low.

Acquisition of Emergency Energy between Areas

While all Control Areas are resolved to let the marketplace solve operational deficiencies, there may be occasions where market forces cannot respond in the appropriate manner or time frame. The following is a summary of ability to transact emergency energy between adjacent Areas.

Maritimes

The Maritimes Area, through existing agreements with neighboring Control Areas, namely, ISO-NE and TransÉnergie, has established procedures for the acquisition of emergency energy.

New England

When the New England control area experiences or is forecasted to experience a shortage of operating capacity, ISO-NE will request Market Participants to submit Emergency Energy Transactions (EETs) through the Market System. Through this bid based energy market, procedures are in place to determine the availability of the emergency assistance from its neighboring control areas when necessary.

New York

During 2002, the NYISO completed the process to review and update the emergency energy provisions in the interconnection agreements with the Control Areas neighboring New York.

Ontario

The IESO negotiated new operating agreements with the adjacent Reliability Authorities in 2002 as part of the steps to the new Market in Ontario. These operating agreements contain provisions for the transaction of emergency energy into and out of Ontario and are only implemented in the event that market based solutions are not available.

With the opening of the Midwest ISO (MISO) market on April 1, 2005, new arrangements are required for scheduling and dispatching emergency energy between Ontario and neighboring entities in Michigan, Minnesota and Manitoba. While the joint procedure between IESO and MISO has not been approved and implemented, a draft version was placed in the IESO and MISO control rooms to assist in facilitating the transaction of emergency energy between entities. IESO and MISO will discuss the agreement with all involved parties to ensure a common understanding of responsibilities. Approval and implementation of the final procedure is anticipated prior to the Summer Operating Period.

Quebec

TransÉnergie has agreements with all the Control Areas neighboring Quebec that detail the conditions and procedures for acquiring emergency energy.

Training Programs

The Control Area operators routinely receive training as a regular part of their regime.

NPCC will be conducting a dispatcher and schedulers seminar in Saratoga Springs, NY on May 4 and 5, 2005, for dispatchers and schedulers from each of the Control Areas in NPCC to share views and experiences. It is also a presentation vehicle for issues of concern to all NPCC Area operations staff. The seminar will include the summer outlook for each Area, significant recent developments in NPCC and NERC, an update on NPCC criteria and procedures, and a review of recent events in the industry. The schedulers in attendance will review the intricacies of their system and the impact of other areas on their system.

Maritimes

The Member companies that comprise the Maritimes Area routinely conduct their own operator training sessions and participate in NPCC Operators training seminars. The operators in the New Brunswick Control Center are NERC certified. The Maritimes Area participates in the CO-2 Dispatcher Training Working Group.

New England

Throughout the year, ISO-NE Operators and satellite control center personnel participate in training session in preparation for both the summer and winter peak load period. During the training sessions, applicable NPCC procedures and ISO New England emergency operating procedures are reviewed in detail. The summer capacity assessment is also reviewed as well as area-specific voltage control issues and intra-area communication procedures. The NERC certification program at ISO-NE is a NERC accredited training program.

New York

NYISO Dispatcher Training staff will be conducting two weeks of in-house training for each crew of NYISO dispatchers prior to the summer of 2005. These sessions will address operations issues, updates on NERC activities (Policy 9, Infrastructure Protection Initiative, E-tag, etc.), NPCC policy changes, updates on NYISO market operations and market design, updates to NYISO applications and procedures.

NYISO Dispatcher Training staff will also present one week System Operator Training Seminars for a combined audience of the NYISO and New York Transmission Owner (TO) dispatcher crews. This program will review selected NYISO operating policies, recent system events, the system outlook for the Summer 2005, and address issues of mutual concern to both TO and NYISO dispatchers. NYISO emergency operation procedures (Back-up Dispatch System, Alternate Control Center operation, and Restoration) will be reviewed in preparation for the spring drills.

Ontario

The IESO continuously operates a training program to ensure that the control room staff maintains awareness of current and new NERC, NPCC and local operating procedures.

In preparation for the summer operating period, the IESO has set aside time in the training program for Shift Operations staff to review results of the IESO summer capability assessments, review reactive dispatching techniques as well as, a review of the changes to emergency procedures.

Additionally, the IESO plans and participates in drills and exercises on a regular basis to hone emergency preparedness skills and test procedures by simulating real events.

In 2004 the IESO led six reliability Training sessions followed by extensive table top restoration drills at locations across the province. The objective was to enhance participants understanding of reliability requirements and improve the response capabilities of the IESO and Market Participants during restoration situations. The training and drills successfully met all objectives. Two similar drills are planned for late May and early June in preparation for a full-scale restoration drill in the fall of 2005.

Lastly, each shift at the IESO will perform a Rotational Load Shedding simulation exercise prior to the summer operating market commencement. This exercise will test procedures and training as well as verify communication methodologies and validate revised load shedding schedules.

Quebec

Aside from the continual training of the operations personnel of TransÉnergie, there are monthly and seasonal meetings where anticipated conditions are discussed and new procedures are explained.

8. 2004 Post-Seasonal Assessment and Historical Review

Summer 2004 Post-Seasonal Assessment

The following summarizes some highlights of the review. Please refer to the NPCC Reliability Assessment for Summer 2004 for details on projections.

NPCC

The actual NPCC coincident peak demand during the 2004 Summer Operating Period was 97,296 MW at hour 16:00 on July 22. This was 5,144 MW (5%) lower than the 102,440 MW 2003 summer NPCC coincident peak and was relatively low because of the moderate weather experienced during the 2004 summer.

Maritimes

The peak load experienced by the Maritimes Area during the 2004 Summer Operating Period was 3,635 MW on May 25, which was approximately 287 MW (-7.3%) lower than last year's forecast of 3,922 MW. This is due to the peak occurring in May, a shoulder month, and the Area was experiencing above normal temperatures resulting in less heating load than was forecasted. The forecast of 4,000 MW for 2005 is expected to occur the first week of May, a month where heating load is forecasted.

The Maritimes Area did not anticipate, nor did it experience, any capacity shortages during the summer of 2004. In fact, it was able to supply up to 700 MW (interconnection limit) to New England. However, transmission constraints due to excess generation in Northern New England sometimes reduced the power that could be transmitted.

New England

The peak demand for the summer of 2004 was 24,116 MW and occurred hour ending 1600 on August 30. This was 1,232 MW less than the all time summer peak demand of 25,358 MW that was experienced during the summer of 2002.

Overall, the weather during the 2004 Summer Operating Period was near normal with average New England temperatures exceeding 90 degrees F (32 degrees Celsius) on one day. ISO New England Operating Procedure No. 4 – Actions During a Capacity Deficiency (OP-4) was only called at one time during 2004. This occurred on August 20, 2004 and was confined to the Boston area. OP-4 was called on during that day due to a severe lightning storm that caused multiple trips in that area. No other significant events occurred over the 2004 Summer Operating Period.

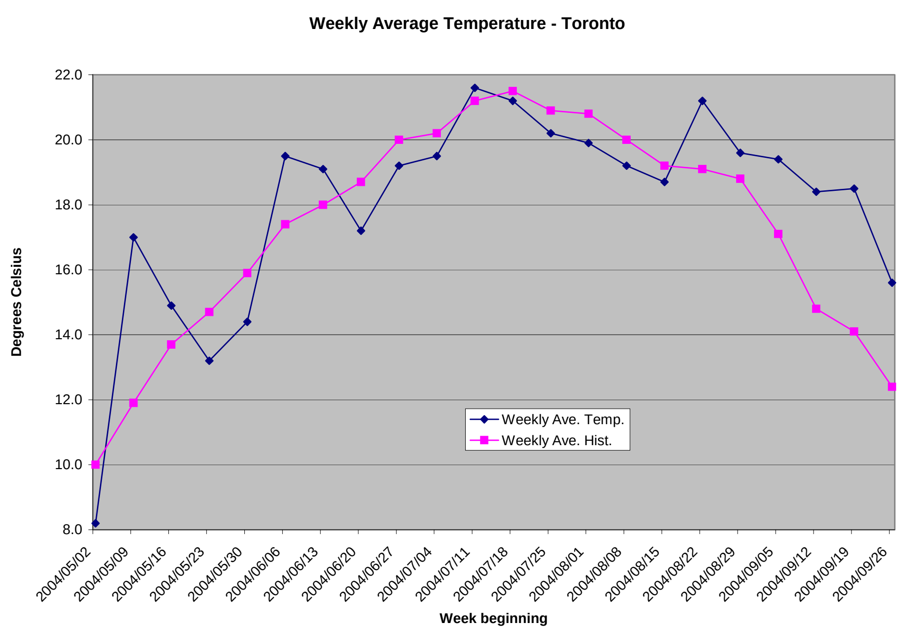
New York

The New York Control Area did not experience the above-average temperatures associated with design conditions during the summer of 2004, and therefore did not realize the forecast peak of 31,800 MW. The summer 2004 NYISO peak load of 28,433 MW occurred on June 9. The NYCA summer peak loads that achieve or surpass the forecast peak loads typically occur during July and August during extended periods (3 to 4 days) of above-average temperatures and humidity levels. During the summer 2004 temperatures rarely exceeded historic average levels, and these moderate temperatures account for the 3,367 MW difference between the peak load and the forecast. The NYISO ICAP requirement of 37,524 MW for the summer period was sufficient to meet load and reserve requirements.

Ontario

The peak demand for the summer of 2004 was 23,976 MW and occurred on July 22, 2004. The weekly demands experienced during the summer of 2004 are reflective of the near normal or cooler than normal weather Ontario saw through most of the summer. As a result of the mild temperatures, no significant reliability issues were observed, and the demands were easily met.

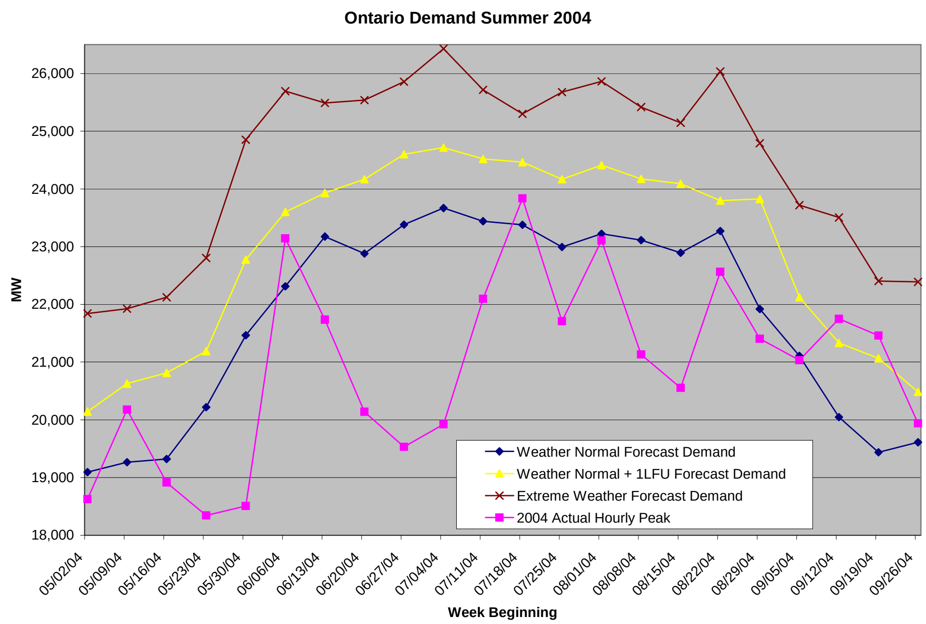
Comparing the average weekly temperature in Toronto for the summer of 2004 with the historical average weekly temperature and the demands experienced, illustrates the correlation between the weather and demands.



The following chart is reflective of the number of days the maximum daily temperature exceeded the historical average maximum. This also notes that while May and June were near normal, July and August were cooler than normal with September generally being warmer than normal but not an extreme.

		May	June	July	August	September
Days Max Temperature above 20°c	Historical	11.8	23.6	30.1	28.8	16.7
	2004	12	22	30	29	26
Days Max Temperature above 30°c	Historical	0.43	2.3	5.7	3.2	0.8
	2004	0	2	1	0	0

The following chart shows the actual Ontario hourly peak demands for each week against the demand curves forecasted in the NPCC Reliability Assessment for Summer Operating Period of 2004. It can be noted that the lower than normal demands in June and July and early August are consistent with the temperatures experienced for the weeks in question while the higher than normal demands in September relate directly to the higher than normal temperatures experienced at that time of the year.



Quebec

The 2004 Quebec summer peak load was 21,949 MW which occurred on May 4, 2004. This was 432 MW above the expected peak load. On this day, the temperatures were below normal all over the province.

The summer of 2004 in Quebec was mild compared to recent years with no major heat waves. The hottest day of the summer was on August 26 when the heat and humidity index only reached 33 degrees Celsius (92 degrees Fahrenheit) and the peak load on this day was 19,948 MW. In previous years, the heat and humidity index reached as much as 42 degrees Celsius (108 degrees Fahrenheit) on a few days every summer.

Winter 2004/2005 Post-Seasonal Assessment

The following summarizes some highlights of the review. Please refer to the NPCC Reliability Assessment for Winter 2004/2005 for details on projections.

Maritimes

The coincident peak load experienced by the Maritimes Area during the December 2004 – January 31, 2005 period was 5,418 MW, which was approximately 5 MW (-0.1%) lower than the forecast of 5,423 MW. For the period between November 28, 2004 and January 31, 2005, the difference between forecasted load verses the actual load ranged from 0.4% to –10.2%. This was due to above normal temperatures which resulted in a lower electric heating load than would normally be the case.

The Maritimes Area did not anticipate, nor did it experience, any capacity shortages during the 2004/2005 Winter Operating Period.

137 MW of new capacity was added during the Winter.

New England

As of February 1, 2005, the peak demand for the 2004-2005 Winter Operating Period was 22,524 MW (preliminary peak demand) and occurred hour ending 1800 on December 20, 2004. This was 154 MW higher than the forecast for this period of 22,370 MW and 294 MW less than the all time winter peak demand of 22,818 MW that was experienced during the 2003-2004 winter.

The first cold weather of the 2004-2005 winter was experienced on December 6, 2004 where temperatures were in the 20's (Fahrenheit) during the time of the evening peak load. Due to the cold weather and forecast deviations in load, external transactions, and outages and reductions, ISO-NE implemented OP-4 beginning 1706. ISO-NE received the appropriate response from the procedure and cancelled OP-4 at 1910 that evening. No other major operating events have occurred thus far during the 2004-2005 Winter Operating Period.

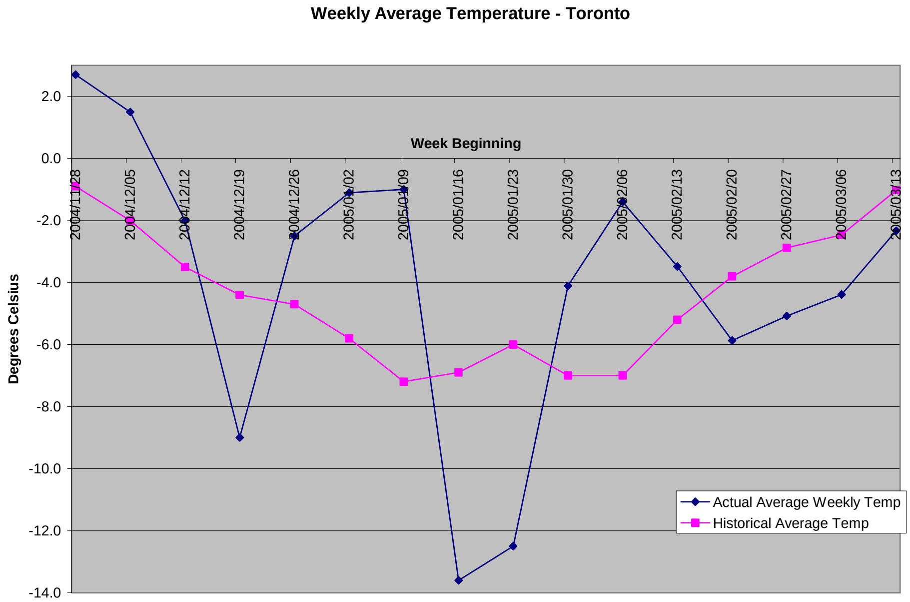
New York

The New York Control Area experienced its all-time winter peak load of 25,541 MW on December 20, 2004. The combination of below average temperatures and the high point of the holiday lighting period contributed to reaching the peak load. The Winter 2004-05 forecast peak load was 25,620 MW, or 79 MW higher than the actual peak load. Since the NYCA is summer peaking the ICAP requirement of 37,524 MW for this capability period was more than sufficient to meet load and reserve requirements during the peak.

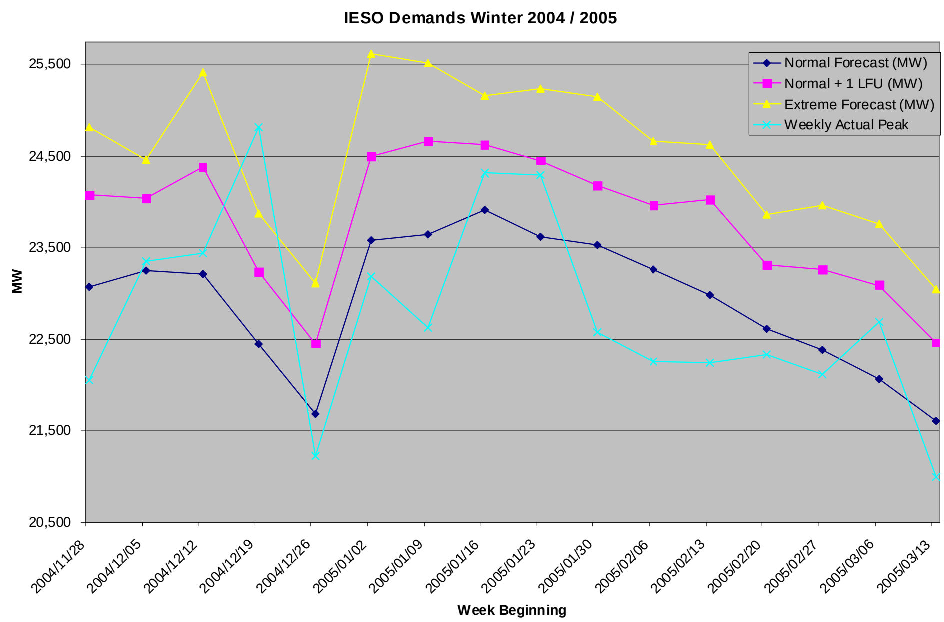
Ontario

The peak demand for the Winter operating period 2004 / 2005 was 24,979 MW and occurred on December 20, 2004. The weekly demands experienced during the Winter Operating Period of 2004 / 2005 are reflective of the temperatures observed.

Comparing the average weekly temperature in Toronto for the Winter Operating period with the historical average weekly temperature and the demands experienced, illustrates the correlation between the weather and demands.



The following chart shows the actual Ontario hourly peak demands for each week against the demand curves forecasted in the NPCC Reliability Assessment for Winter 2004 / 2005. The demands observed are consistent with the temperatures experienced for the weeks in question. For example, the higher demands observed in 1 week in December and 2 weeks in January are consistent with the lower than normal temperatures.



During each of these three "cold" weeks, the temperature was forecasted to drop below -20 degrees Celsius (-4 degrees Fahrenheit) in Southern Ontario. In each case, the IESO implemented procedures designed to safeguard the reliability of the bulk electrical system during periods of extreme cold weather. During the "cold" period in January, low-density alarms on certain SF6 insulated equipment was received, as well some as reductions in generation capacity were experienced. The reductions in generation capacity were mainly due to coal handling problems and ice blockages at hydroelectric facilities. None of these generation or transmission problems required the implementation of extraordinary actions.

A Geomagnetic storm of K8 intensity was forecasted for January 21, 2005. The IESO, as part of their procedures for GICs, reduced certain transmission limits by 10%. No problems, other than elevated GIC currents, were experienced.

Quebec

For the Winter 2004/2005, the peak demand occurred at 6:00 p.m. on monday December 20, 2004 and reached 34,956 MW. This is 1,312 MW (3.6 %) lower than the all-time historical peak of 36,268 MW which happened on January 15, 2004.

The 2004/2005 winter peak occurred when an unexpected cold snap hit the province. The temperature in Montreal dropped to -25 degrees Celsius with winds of 26 km/hr (-13 degrees Fahrenheit with winds of 16 mph) which could be felt as a wind chill factor of -38 degrees Celsius (-36 degrees Fahrenheit). The cold snap had begun the day before, a Sunday, and had been going on for more than 24 hours when the peak load was reached. This fact, combined with daylight being at its minimum during this time of year and the added effect of Christmas lights, contributed to the increase in total load that made it higher than it would have been in January for the same temperature and wind conditions.

During the hours surrounding the peak demand, Hydro-Québec used up to 3,316 MW of load balance management procedures (675 MW of purchases from independent Producers, 969 MW of load response programs, 327 MW of imports, 745 MW of gas-turbine units and 600 MW of export recalls) and managed to sustain the total of its operating reserves without resorting to any Energy Emergency Alert level.

In the middle of January 2005, another cold snap occurred and lasted for almost a week. During this period, the demand reached 34,850 MW on January 18, just 106 MW below the peak reached in December.

Historical Review (Pre-2004)

The historical non-coincident peaks for each NPCC Area, the forecasted 2005 summer peak for each NPCC Area, and the forecasted NPCC Coincident peak for 2005 are summarized in the table below.

Table 1

Historical Peak Demands by Area Occurring May to September (MW)

Year	Ontario[7]	Maritimes	New England	New York	Quebec	Total NPCC Non-Coincident Demand
1993	20,883	2,773	19,570	25,998	17,500	86,724
1994	20,918	2,797	20,519	27,062	17,562	88,858
1995	21,674	2,958	20,499	27,206	17,960	90,297
1996	21,378	2,937	19,507	25,587	18,193	87,602
1997	21,613	3,252	20,569	28,700	17,983	92,117
1998	22,443	3,314	21,406	28,166	18,463	93,792
1999	23,435	3,249	22,544	30,311	18,965	98,504
2000	23,222	3,630	22,049	28,138	20,600	97,639
2001	25,269	3,640	24,967	30,982	20,052	104,910
2002	25,414	3,731	25,348	30,664	20,525	105,682
2003	24,753	3,901	24,685	30,333	20,551	104,223
2004 Forecast	23,668	3,922	25,735	31,800	21,517	106,642
2004 Actual	23,976	3,635	24,116	28,433	21,949	102,109
2005 Forecast	23,897[8]	4,000	26,355	31,962	22,083	108,297[9]

[7] 20 minute Peak Demand 1993 to 2001, peak hourly demand thereafter

[8] This value is the weather normal demand used for the base case analysis. A graph in Section 4 represents the ranges of potential demands that the IESO could experience as a result of weather variables.

[9] The forecast coincident peak demand for NPCC is 106,618 MW which is expected to occur during the week beginning July 10, 2005

9. 2005 Reliability Assessments of Neighboring Regions

East Central Area Reliability Coordination Agreement (ECAR)

Demand and Energy

ECAR's total internal demand forecast for the summer of 2005 is 103,679 MW. This is 1,125 MW higher than the peak demand projected for summer 2004. This demand forecast is derived from the aggregate demand forecasts of the ECAR member companies, based on expected summer weather. Demand side management programs and interruptible demand contracts that could be curtailed, if necessary, are expected to total 2,508 MW at the time of the summer peak. At the present time, members have arranged for 1,600 MW of power sales to entities outside the ECAR region. There is also 62 MW of capacity owned by a company outside of the region, resulting in a total export of 1,662 MW.

Resource Assessment

Net capacity resources to serve demand within ECAR are projected to be 127,684 MW (net seasonal capability), which is 673 MW higher than in last summer's assessment. ECAR's capacity margin is projected to be 20.8%, compared to 21.3% expected last summer.

At this time, members have made arrangements to purchase 1,974 MW. An additional 1,445 MW of member owned capacity is located outside of the region, for a total expected import of 3,419 MW.

Of the 571 MW of new capacity expected to meet the 2005 summer peak, 567 MW is expected to be placed in service prior to the start of the summer. Only 4 MW is expected to go in service during the summer.

The ECAR region does not anticipate any fuel delivery problems this summer. The most likely impact of extreme summer weather on fuel supplies would be restricted barge travel on some rivers due to low water levels from a prolonged drought. The fuel stockpiles at effected coal plants would mitigate the effects of any reduced deliveries by water.

Based on the projections of connected demand, generation, and interchange power contracts, ECAR calculates a probability of exceeding the margin available for contingencies (capacity resources minus the sum of peak demand, expected maintenance, and operating reserve requirements). For this summer, ECAR projects a 22% likelihood that it will exceed the margin for contingencies and need to rely on supplemental capacity resources at the time of the summer peak demand. Supplemental capacity resources may include additional purchases of power, curtailment of contractually interruptible loads, and curtailment of demand-side management (DSM) loads. ECAR does not anticipate any reliance on supplemental resources for average daily conditions this summer.

ECAR members recognize that there are combinations of adverse conditions that could make it necessary to curtail demand beyond contractually interruptible loads and demand-side management. Such extreme conditions include, but are not limited to: abnormally hot, humid weather; unexpected low generator availability; an inability to purchase additional power; and transmission constraints that limit the deliverability of capacity resources. A combination of adverse conditions that would make it necessary to curtail firm load is not expected.

Reliance on Outside Resources

No analysis was conducted to determine an expected amount of external resources that would be needed this summer, since the ECAR region does not have an established regional reserve requirement. The 1,757 MW of net import listed above could be increased by an additional 2,743 MW of import based on regional studies of simultaneous import from three out of five adjacent export areas. This total import of 4,500 MW is the minimum expected to be deliverable if and when it is necessary to import power.

Fuel Supply Interruptions

The impact of potential fuel supply interruptions are not explicitly calculated or included in the ECAR 2005 Summer Assessment of Load and Capacity. Nuclear and coal fueled generation accounts for 70% of ECAR capacity. Approximately 26% of the ECAR capacity is fueled with oil or gas. The fuel inventories maintained at coal plants would mitigate any short-term coal supply interruptions. The gas-fired units are predominately peaking units. Due to the reduced heating demand in the summer, overall use of natural gas during the summer is much lower. Because of the reduced demand for gas and the peaking duty cycle of most regional gas generation, ECAR expects minimal impact from any gas supply interruption during the summer.

Deliverability of Generation

An analysis of simultaneous import into ECAR from three of the five adjacent external areas (three regions and two sub-regions) has resulted in the minimum expected deliverable import of 4,500 MW used in ECAR's 2005 Summer Assessment of Load and Capacity. A load flow analysis of the ability to move power within ECAR from one area to another has identified numerous potential limitations based on first contingency transfer capability. By factoring the availability of generating units into the load flow analysis, the amount of capacity that would not be available due to deliverability limitations is expected to be 2,050 MW.

Transmission Assessment

Transmission operators and Reliability Coordinators must remain diligent to monitor, communicate, and coordinate their actions to preserve the reliability of the ECAR transmission system for the summer 2005 period.

Historically, ECAR has experienced widely varying power flows due to transactions and prevailing weather conditions across the Midwest. As a result, the ECAR transmission system could become constrained during peak periods as a result of unit unavailability and unplanned transmission outages concurrent to large power transactions. For the first time this summer, a large portion of the ECAR area will be operating in a real time energy market. Consequently, market redispatch has the potential to mitigate some of these potential constraints. Notwithstanding the benefit of market redispatch, should these conditions occur, local operating procedures, as well as the NERC TLR procedure, will be required to maintain adequate transmission system reliability. As long as the Reliability Coordinators and transmission operators recognize transmission limitations in "real time" operations so that operating procedures may be implemented in a timely manner, no cascading events are anticipated.

No significant transmission facility additions have been placed in service prior to the summer peak load period since last summer. However, two new protective schemes are planned to be in-service before this summer. FirstEnergy plans to install an under voltage load shed (UVLS) scheme in the northern Ohio and western Pennsylvania area. This scheme will have the capability to shed a total of about 1,300 MW and is to provide an effective method to prevent uncontrolled loss-of-load following extreme outages. Also, Allegheny Power plans to install a Special Protection System (SPS) to alleviate an excessive amount of TLRs from being called in the West Virginia panhandle area.

Certain critical flowgates that have experienced TLRs in previous summers continue to be identified as heavily loaded in various reliability assessments and might require operator intervention to ensure adequate reliability levels are maintained.

To prepare for this summer, ECAR has analyzed more than 360 study scenarios and over two-dozen voltage scenarios in its transmission seasonal assessment process. These voltage analyses include the most critical contingencies from each ECAR transmission owner. In addition, the assessment includes a ranking of circuits that frequently appear as a constraint, a tabulation of reactive resources within the ECAR Region, and additional results of voltage performance for identified contingencies.

To ensure that ECAR's transmission owners have conducted sufficient analyses and to complement the Regional efforts, ECAR has conducted peer reviews of member transmission assessments for both this summer and long-term time frames. The seasonal assessments include both thermal and voltage analyses for a base case and stressed case conditions with single, double, and if warranted, extreme contingencies. The results of these assessments are communicated to ECAR's Reliability Coordinators and transmission operators.

ECAR actively participates in the MAAC-ECAR-NPCC (MEN), MAIN-ECAR-TVA (MET), and VACAR-ECAR-MAAC (VEM) interregional seasonal transmission assessment efforts. Transfer capability results for ECAR are shown in the map included in this report and are also included in each of the interregional seasonal reports.

Operational Issues

As a result of the August 14, 2003 blackout, ECAR has addressed all of the operational concerns stated in both the NERC and ECAR recommendations that were due by the summer of 2005. In conjunction with NERC, ECAR has performed operation readiness audits on nine of the twelve ECAR Control Areas and two of the three Reliability Coordinators that are responsible for ECAR Control Areas. The remaining Control Area readiness audits will be completed by year-end 2005. The remaining Reliability Coordinator readiness audit will be completed in 2006.

MISO started their market operations on April 1, 2005. This may result in different generation being used to satisfy load within the ECAR region during the summer of 2005 from what was used during the summer of 2004.

In addition to the NERC TLR procedure, other operating procedures are available to maintain reliable system operations. These include:

A multiregional agreement involving Control Areas around Lake Erie to use generation redispatch to mitigate emergency TLR procedures and curtailments in situations where the affected system(s) is about to curtail firm demand.

Operating procedures will be used to reduce the risks of potential widespread interruptions that may result from EHV outages overloading the stability-limited Kanawha-Matt Funk 345 kV circuit until AEP’s Wyoming-Jacksons Ferry 765 kV line is completed, which is scheduled for June of 2006.

The Voltage Coordination Plan may be used in Eastern ECAR, MAAC and the VACAR subregion of SERC to curtail or limit west-to-east transfers to ensure adequate reliability in that part of the system.

Additional details on the demand and capacity assessment, ECAR report 05-GRP-33, is available on the ECAR website (www.ecar.org). Detailed information on the transmission assessment, report 05-TSPP-3, is available by contacting the ECAR office.

Mid-Atlantic Area Council (MAAC)

Demand and Energy

The Mid-Atlantic Area Council (MAAC) 2005 summer forecast net peak demand is 56,817 MW. This forecast includes the effects of interruptible demand and load management capabilities, which are estimated to be 813 MW. The forecast peak assumes normal summer weather conditions. This forecast is 1,248 MW higher than the actual MAAC all-time summer peak of 55,569 MW that occurred on August 14, 2002.

Resource Assessment

Between June 1, 2004, and mid-July 2005, MAAC's summer generating capacity is expected to increase by a net of 3,001 MW to 68,188 MW. 2,009 MW of the expected increase is already in service. All nuclear units should be in service and at full capacity (13,472 MW) at the time of the peak. MAAC also has 59 MW of external capacity purchases under contract through the summer peak period. With the planned new generation, existing internal generation, and external capacity purchases included, the MAAC capacity margin is forecasted to be 16.7% at the time of the forecasted peak. The MAAC reserve margin is expected to be 20.1% at the time of the forecasted peak.

Transmission Assessment

In addition to the required level of capacity reserves, MAAC requires that the capacity resources be able to be delivered to the load. There have been additional generation retirements since last summer. Even with the installation of the third 500/230 kV transformer bank at Branchburg and additional facilities as defined in the PJM Regional Transmission Expansion Planning process, reliability must-run contracts have been negotiated to the overall MAAC generation and transmission combined Loss of Load Event probability remains above the MAAC adequacy requirement of one occurrence in ten years.

Operational Issues

MAAC expects to have sufficient generating capacity to serve the 2005 forecast summer peak demand. When MAAC served its all-time summer peak on August 14, 2002, no emergency procedures were implemented.

The bulk transmission system is expected to perform adequately over a wide range of system conditions. PJM, the Regional Transmission Organization (RTO) for the MAAC Region, is well prepared for operating emergencies. Practice drills are being regularly conducted in preparation should there be an extremely hot summer.

Reliance on Outside Assistance

With a net reliance on outside capacity of only 59 MW, MAAC has no great reliance on outside capacity. External units that are considered capacity in MAAC must sign an agreement that if a PJM capacity emergency is called, that unit's capacity must flow to

PJM. Transmission availability is secured before an external unit can be called MAAC capacity.

MAAC has a net of 826 MW of long-term firm transmission service in place for energy sales out of MAAC through the summer peak period. Presently, these transactions are not capacity backed and therefore can be curtailed in the event of a PJM capacity emergency. Historically, approximately 1,100 MW of internal capacity has been transferred out of MAAC on peak summer days.

Fuel Supply Interruptions

Fuel supply interruptions were not considered in our summer assessment because historically fuel interruptions have not been a problem in the summer. MAAC has a diverse fuel mix with no great reliance on any one fuel. MAAC's highest primary fuel percentage is coal at 31%. Our hydro component, which is typically the type of generator that is interrupted in the summer, is only 5%.

Regional Deliverability Procedures

The delivery of energy from the aggregate of available capacity resources in one PJM electrical area and adjacent non-PJM areas to another PJM electrical area experiencing a capacity deficiency is the Load Deliverability test that has been utilized within PJM for some time. It is often discussed in the context of demonstrating the "deliverability to the load" as opposed to the "deliverability of individual generation resources". This ensures that, within accepted probabilities, energy will be able to be delivered to applicable PJM area load, regardless of cost, from the aggregate of capacity resources available to PJM. PJM determines the Regional Capacity Requirement to achieve this reliability objective assuming sufficient network transfer capability will exist. The energy from generating facilities that are ultimately committed to meet this capacity requirement must be deliverable to wherever they are needed in a capacity emergency. Therefore, there must be sufficient transmission network transfer capability within PJM. PJM determines sufficiency of network transfer capability through a series of Deliverability tests.

It is important to point out that deliverability ensures, only, that the aggregate of capacity resources can be utilized to deliver energy to the aggregate of load. Deliverability guarantees a generator the status of a "certified" capacity resource with respect to the installed capacity obligations imposed under the Reliability Assurance Agreement. It does not guarantee any rights to specific generators to deliver energy to specific loads within PJM. Nor does it guarantee any rights to generators to produce energy during any particular set of operational circumstances. Deliverability ensures that PJM can be operated within applicable Reliability Criteria and, guarantees within those criteria that regional load will receive energy, with no guarantee as to price, from the aggregate of capacity resources available to PJM.

The specific procedures utilized to test deliverability involve the calculation of Capacity Emergency Transfer Objectives (CETO) and Capacity Emergency Transfer Limits (CETL) for various electrical sub-areas of PJM. A CETO represents the amount of energy that a given sub-area must be able to import in order to remain within an LOLE of 1/25 when that sub-area is experiencing a localized capacity emergency. A CETL represents the ability of the transmission system to support deliveries of energy to an electrical sub-area experiencing such a capacity emergency. Providing that the CETL for a given area exceeds the CETO for that area, the test is passed and, on a probabilistic level, the area will be able to import sufficient energy during emergencies. The transmission system is tested at a LOLE of 1/25 so that the transmission risk is significantly less than the loss of load due to the inadequacy of generation resources. The transmission risk was accepted as 1/25 so as not to unacceptably degrade the overall PJM loss of load probability.

Appendix I – 2004 Expected Load and Capacity Forecasts

Table 1 - NPCC Summary

Week Beginning Sundays	Installed Capacity MW	Purchases MW	Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW	Bottled Resources MW	Revised Net Margin MW
1-May-05	146,309	1,300	176	147,433	87,159	2,271	29,101	6,927	9,817	16,699	0	16,699
8-May-05	146,209	1,300	176	147,333	89,178	2,274	24,451	6,927	9,816	19,234	31	19,203
15-May-05	146,309	1,300	176	147,433	91,218	2,275	21,696	7,256	9,816	19,722	959	18,762
22-May-05	146,309	1,300	176	147,433	92,588	2,275	18,095	7,256	9,817	21,951	1,875	20,076
29-May-05	143,418	1,300	176	144,542	94,419	2,257	17,274	7,106	9,217	18,782	1,577	17,206
5-Jun-05	143,443	1,300	176	144,567	98,695	2,255	15,211	7,106	9,220	16,591	1,578	15,013
12-Jun-05	143,443	1,300	176	144,567	101,282	2,267	13,445	7,106	9,220	15,780	2,708	13,072
19-Jun-05	143,443	1,300	176	144,567	103,101	2,266	13,840	7,106	9,220	13,566	2,451	11,115
26-Jun-05	143,452	1,300	176	144,576	104,952	2,269	13,079	7,106	9,220	12,488	3,387	9,100
3-Jul-05	143,831	1,300	176	144,955	106,498	2,274	13,496	7,156	8,512	11,568	2,412	9,156
10-Jul-05	143,831	1,300	176	144,955	106,618	2,271	11,934	7,156	8,512	13,006	3,375	9,631
17-Jul-05	143,831	1,300	176	144,955	106,065	2,257	11,619	7,156	8,512	13,860	3,882	9,978
24-Jul-05	143,831	1,300	176	144,955	105,794	2,267	10,309	7,156	8,512	15,451	4,645	10,806
31-Jul-05	143,822	1,300	176	144,946	105,954	2,259	9,528	7,156	8,512	16,055	5,109	10,946
7-Aug-05	143,822	1,300	176	144,946	106,153	2,269	10,186	7,156	8,512	15,208	4,831	10,377
14-Aug-05	143,822	1,300	176	144,946	105,883	2,271	13,624	7,156	8,512	12,042	1,385	10,657
21-Aug-05	143,822	1,300	176	144,946	105,344	2,275	11,907	7,156	8,512	14,302	3,321	10,982
28-Aug-05	143,828	1,300	176	144,952	105,749	2,272	14,008	7,156	8,512	11,799	2,456	9,343
4-Sep-05	143,828	1,300	176	144,952	97,738	2,257	14,084	7,156	8,512	19,719	3,173	16,546
11-Sep-05	143,828	1,300	176	144,952	95,367	2,278	17,667	7,156	8,512	18,527	912	17,615
18-Sep-05	143,828	1,300	176	144,952	94,009	2,277	17,859	7,156	8,512	19,692	1,754	17,938
25-Sep-05	143,828	1,300	176	144,952	92,268	2,274	19,753	7,156	8,512	19,537	1,171	18,366

Table 2 – Maritimes

Week Beginning Sundays	Installed Capacity[1] MW	Firm Purchases MW	Firm Sales[2] MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
1-May-05	6,320	0	400	5,920	4,000	610	952	525	265	788
8-May-05	6,320	0	400	5,920	3,941	613	971	525	263	832
15-May-05	6,420	0	400	6,020	3,875	614	455	854	263	1,186
22-May-05	6,420	0	400	6,020	3,812	614	646	854	265	1,057
29-May-05	6,420	0	450	5,970	3,705	596	855	704	265	1,037
5-Jun-05	6,420	0	450	5,970	3,667	594	745	704	267	1,181
12-Jun-05	6,420	0	450	5,970	3,627	597	671	704	267	1,297
19-Jun-05	6,420	0	450	5,970	3,605	596	671	704	267	1,318
26-Jun-05	6,420	0	450	5,970	3,561	599	808	704	267	1,227
3-Jul-05	6,420	0	450	5,970	3,553	604	759	754	267	1,241
10-Jul-05	6,420	0	450	5,970	3,561	601	792	754	267	1,196
17-Jul-05	6,420	0	450	5,970	3,599	587	792	754	267	1,144
24-Jul-05	6,420	0	450	5,970	3,575	597	792	754	267	1,179
31-Jul-05	6,420	0	450	5,970	3,570	589	856	754	267	1,111
7-Aug-05	6,420	0	450	5,970	3,521	599	804	754	267	1,223
14-Aug-05	6,420	0	450	5,970	3,529	601	1,023	754	267	998
21-Aug-05	6,420	0	450	5,970	3,423	605	693	754	267	1,438
28-Aug-05	6,427	0	450	5,977	3,374	602	1,044	754	267	1,140
4-Sep-05	6,427	0	400	6,027	3,356	587	892	754	267	1,345
11-Sep-05	6,427	0	400	6,027	3,427	594	857	754	267	1,314
18-Sep-05	6,427	0	400	6,027	3,535	593	826	754	267	1,237
25-Sep-05	6,427	0	400	6,027	3,711	590	807	754	267	1,077

Table 3 – New England

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
1-May-05	33,371	537	508	33,400	17,644	317	6,403	1,700	3,400	4,570
8-May-05	33,371	537	508	33,400	19,911	317	5,657	1,700	3,400	3,049
15-May-05	33,371	537	508	33,400	20,836	317	4,090	1,700	3,400	3,691
22-May-05	33,371	537	508	33,400	21,695	317	1,733	1,700	3,400	5,189
29-May-05	30,880	537	508	30,909	22,639	317	1,148	1,700	2,800	2,940
5-Jun-05	30,880	587	508	30,959	26,355	317	221	1,700	2,800	201
12-Jun-05	30,880	587	508	30,959	26,355	317	251	1,700	2,800	170
19-Jun-05	30,880	587	508	30,959	26,355	317	452	1,700	2,800	-31
26-Jun-05	30,889	587	508	30,968	26,355	317	191	1,700	2,800	240
3-Jul-05	30,889	537	0	31,426	26,355	317	166	1,700	2,100	1,422
10-Jul-05	30,889	537	0	31,426	26,355	317	229	1,700	2,100	1,359
17-Jul-05	30,889	537	0	31,426	26,355	317	289	1,700	2,100	1,300
24-Jul-05	30,889	537	0	31,426	26,355	317	207	1,700	2,100	1,382
31-Jul-05	30,880	537	0	31,417	26,355	317	197	1,700	2,100	1,382
7-Aug-05	30,880	537	0	31,417	26,355	317	215	1,700	2,100	1,364
14-Aug-05	30,880	537	0	31,417	26,355	317	181	1,700	2,100	1,398
21-Aug-05	30,880	537	0	31,417	26,355	317	202	1,700	2,100	1,377
28-Aug-05	30,879	537	0	31,416	26,355	317	317	1,700	2,100	1,262
4-Sep-05	30,879	537	0	31,416	24,236	317	117	1,700	2,100	3,580
11-Sep-05	30,879	537	0	31,416	22,926	317	1,103	1,700	2,100	3,904
18-Sep-05	30,879	537	0	31,416	22,578	317	1,774	1,700	2,100	3,581
25-Sep-05	30,879	537	0	31,416	22,491	317	2,381	1,700	2,100	3,061

Table 4 – New York

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
1-May-05	39,109	2,700	303	41,506	24,784	0	4,895	1,800	3,603	6,424
8-May-05	39,109	2,700	303	41,506	25,451	0	2,621	1,800	3,603	8,031
15-May-05	39,109	2,700	303	41,506	26,117	0	1,413	1,800	3,603	8,573
22-May-05	39,109	2,700	303	41,506	26,784	0	1,655	1,800	3,603	7,664
29-May-05	39,109	2,700	303	41,506	27,452	0	289	1,800	3,603	8,363
5-Jun-05	39,109	2,700	303	41,506	28,118	0	173	1,800	3,603	7,812
12-Jun-05	39,109	2,700	303	41,506	28,785	0	112	1,800	3,603	7,207
19-Jun-05	39,109	2,700	303	41,506	29,452	0	0	1,800	3,603	6,651
26-Jun-05	39,109	2,700	303	41,506	31,962	0	0	1,800	3,603	4,141
3-Jul-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
10-Jul-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
17-Jul-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
24-Jul-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
31-Jul-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
7-Aug-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
14-Aug-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
21-Aug-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
28-Aug-05	39,237	2,480	303	41,414	31,962	0	0	1,800	3,595	4,057
4-Sep-05	39,237	2,480	303	41,414	27,655	0	108	1,800	3,595	8,256
11-Sep-05	39,237	2,480	303	41,414	26,655	0	484	1,800	3,595	8,880
18-Sep-05	39,237	2,480	303	41,414	25,656	0	613	1,800	3,595	9,751
25-Sep-05	39,237	2,480	303	41,414	24,655	0	633	1,800	3,595	10,731

Table 5 – Ontario

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
1-May-05	30,016	0	0	30,016	18,648	409	6,288	1,402	1,350	2,737
8-May-05	30,016	0	0	30,016	18,400	409	4,913	1,402	1,350	4,360
15-May-05	30,016	0	0	30,016	19,449	409	5,489	1,402	1,350	2,735
22-May-05	30,016	0	0	30,016	19,686	409	4,527	1,402	1,350	3,460
29-May-05	30,016	0	0	30,016	20,306	409	5,277	1,402	1,350	2,090
5-Jun-05	30,041	0	0	30,041	20,490	409	3,971	1,402	1,350	3,237
12-Jun-05	30,041	0	0	30,041	22,344	418	3,431	1,402	1,350	1,932
19-Jun-05	30,041	0	0	30,041	23,403	418	3,573	1,402	1,350	731
26-Jun-05	30,041	0	0	30,041	22,709	418	4,042	1,402	1,350	956
3-Jul-05	30,041	0	0	30,041	23,871	418	3,635	1,402	1,350	201
10-Jul-05	30,041	0	0	30,041	23,897	418	3,071	1,402	1,350	739
17-Jul-05	30,041	0	0	30,041	23,708	418	2,853	1,402	1,350	1,146
24-Jul-05	30,041	0	0	30,041	23,657	418	2,158	1,402	1,350	1,892
31-Jul-05	30,041	0	0	30,041	23,364	418	2,312	1,402	1,350	2,031
7-Aug-05	30,041	0	0	30,041	23,532	418	2,694	1,402	1,350	1,481
14-Aug-05	30,041	0	0	30,041	23,277	418	2,703	1,402	1,350	1,727
21-Aug-05	30,041	0	0	30,041	22,964	418	2,671	1,402	1,350	2,072
28-Aug-05	30,041	0	0	30,041	23,434	418	3,724	1,402	1,350	549
4-Sep-05	30,041	0	0	30,041	22,067	418	4,405	1,402	1,350	1,235
11-Sep-05	30,041	0	0	30,041	21,741	432	4,624	1,402	1,350	1,356
18-Sep-05	30,041	0	0	30,041	21,440	432	5,150	1,402	1,350	1,131
25-Sep-05	30,041	0	0	30,041	20,133	432	6,490	1,402	1,350	1,098

Table 6 – Quebec

Week Beginning Sundays	Installed Capacity[1] MW	Firm Purchases MW	Firm Sales[2] MW	Total Capacity MW	Load Forecast[3] MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages[4] MW	Net Margin MW
1-May-05	37,493	300	1,490	36,303	22,083	935	10,563	1,500	1,200	1,892
8-May-05	37,393	300	1,490	36,203	21,475	935	10,289	1,500	1,200	2,674
15-May-05	37,393	300	1,490	36,203	20,941	935	10,249	1,500	1,200	3,248
22-May-05	37,393	300	1,490	36,203	20,611	935	9,534	1,500	1,200	4,293
29-May-05	36,993	300	1,490	35,803	20,318	935	9,705	1,500	1,200	4,015
5-Jun-05	36,993	300	1,490	35,803	20,065	935	10,101	1,500	1,200	3,872
12-Jun-05	36,993	300	1,490	35,803	20,172	935	8,980	1,500	1,200	4,886
19-Jun-05	36,993	300	1,490	35,803	20,286	935	9,144	1,500	1,200	4,608
26-Jun-05	36,993	300	1,490	35,803	20,365	935	8,038	1,500	1,200	5,635
3-Jul-05	37,244	350	1,490	36,104	20,757	935	8,936	1,500	1,200	4,646
10-Jul-05	37,244	350	1,490	36,104	20,843	935	7,842	1,500	1,200	5,654
17-Jul-05	37,244	350	1,490	36,104	20,441	935	7,685	1,500	1,200	6,213
24-Jul-05	37,244	350	1,490	36,104	20,245	935	7,153	1,500	1,200	6,941
31-Jul-05	37,244	350	1,490	36,104	20,703	935	6,163	1,500	1,200	7,473
7-Aug-05	37,244	350	1,490	36,104	20,783	935	6,473	1,500	1,200	7,083
14-Aug-05	37,244	350	1,490	36,104	20,760	935	9,717	1,500	1,200	3,862
21-Aug-05	37,244	350	1,490	36,104	20,640	935	8,341	1,500	1,200	5,358
28-Aug-05	37,244	350	1,490	36,104	20,624	935	8,924	1,500	1,200	4,791
4-Sep-05	37,244	300	1,490	36,054	20,424	935	8,562	1,500	1,200	5,303
11-Sep-05	37,244	300	1,490	36,054	20,617	935	10,599	1,500	1,200	3,073
18-Sep-05	37,244	300	1,490	36,054	20,801	935	9,496	1,500	1,200	3,992
25-Sep-05	37,244	300	1,490	36,054	21,278	935	9,442	1,500	1,200	3,569

Notes

1) Includes IPP and other known generation (Churchill Falls & Labrador Co.).

2) Includes transmission losses of 6%. Does not include firm sale of 45 MW to Cornwall Ontario - Load is supplied radially from Quebec Control Area

3) Load forecast is expected weekly peak (Hourly) and includes the firm sale of 45 MW to Cornwall, Ontario.

4) This value also includes a load forecast uncertainty (LFU) of 3%.

Please note that the information in this spreadsheet is commercially sensitive, therefore highly confidential.

Table 7 - NPCC Bottled Capacity Calculations

CP-8 Assumed Transfer Capability at Peak		**Existing Transactions**	
Path	**MW**	**Path**	**MW**
Que. to Ont.	1,540	Que. to Ont.	0
Que. to NY	1,500	Que. to NY	1,180
Que. to NE	1,725	Que. to NE	310
NB to NE	700	NB to NE	100
Total Transfer MW	**5,465**	**Total**	**1,590**
	1,590	Transactions between TE/Maritimes and Remainder of NPCC	
	3,875	Total Transfer with Remaining NPCC after accounting for transactions	

Week Beginning Sundays	Quebec Margin	Maritimes Margin	Total Net Margin	Available Transfer Capability	Bottled NE Resources	Total Bottled Resources
1-May-05	1,892	788	2,680	3,875	400	0
8-May-05	2,674	832	3,506	3,875	400	31
15-May-05	3,248	1,186	4,434	3,875	400	959
22-May-05	4,293	1,057	5,350	3,875	400	1,875
29-May-05	4,015	1,037	5,052	3,875	400	1,577
5-Jun-05	3,872	1,181	5,053	3,875	400	1,578
12-Jun-05	4,886	1,297	6,183	3,875	400	2,708
19-Jun-05	4,608	1,318	5,926	3,875	400	2,451
26-Jun-05	5,635	1,227	6,862	3,875	400	3,387
3-Jul-05	4,646	1,241	5,887	3,875	400	2,412
10-Jul-05	5,654	1,196	6,850	3,875	400	3,375
17-Jul-05	6,213	1,144	7,357	3,875	400	3,882
24-Jul-05	6,941	1,179	8,120	3,875	400	4,645
31-Jul-05	7,473	1,111	8,584	3,875	400	5,109
7-Aug-05	7,083	1,223	8,306	3,875	400	4,831
14-Aug-05	3,862	998	4,860	3,875	400	1,385
21-Aug-05	5,358	1,438	6,796	3,875	400	3,321
28-Aug-05	4,791	1,140	5,931	3,875	400	2,456
4-Sep-05	5,303	1,345	6,648	3,875	400	3,173
11-Sep-05	3,073	1,314	4,387	3,875	400	912
18-Sep-05	3,992	1,237	5,229	3,875	400	1,754
25-Sep-05	3,569	1,077	4,646	3,875	400	1,171

Appendix II – Summary of Normal and Expected Feasible Transfer Capability Under Peak Conditions

The following table is intended to show how transfer limits between Areas may range depending on system conditions. The values represent an expected value under the different scenarios and it should be noted that real-time transfer limits may change depending on the operation of the system at any moment. For more information on the Available Transfer Capability (ATC) and Total Transfer Capabilities (TTC) between Areas, please reference http://www.nerro.org/.

Transfers from Maritimes to

Interconnection Point	**Normal Transfer Capability at Interconnection Points (MW)**	**Feasible Transfer Capability under Peak Conditions (MW)**	**Rationale for Constraint**
Quebec			
NBM / HQ	200	200	
NB / HQ	550	440	Madawaska HVDC de-rated to 350 MW due to temperature (50 MW reduction) and the total import at Eel River being 290 MW (summer rating of line 2101) in the event that line 2102 trips (60 MW reduction)
Total	750	640	
New England			
NB / BHE	700	700	
Total	700	700	

Transfers from New England to

Interconnection Point	**Normal Transfer Capability at Interconnection Points (MW)**	**Feasible Transfer Capability under Peak Conditions (MW)**	**Rationale for Constraint**
Maritimes			
BHE / NB	300	0	Transfers into the Maritimes Area are dependant on operating conditions in Northern Maine.
Total	300	0	
New York			
VT / D	0		
WMA / F	800		
CT / G	800		
NOR / K	286		
Sub Total (simultaneous limit)	**1,600**	**925**	Feasible simultaneous transfer to New York excluding Cross Sound Cable
CT (CSC) / K	330	330	The Cross Sound Cable is a DC tie and is not included in the feasible simultaneous transfer capability with New York
Total	2,116	1,255	

Quebec			
LGA2A/ CMA	690	690	
HQ / VT	225	225	
Total	915	915	

Transfers from New York to

Interconnection Point	**Normal Transfer Capability at Interconnection Points (MW)**	**Feasible Transfer Capability under Peak Conditions (MW)**	**Rationale for Constraint**
New England			
K / VT	150		
F / WMA	800		
G / CT	800		
K / NOR	286		
Sub Total (simultaneous limit)	1,600	1,225	Feasible simultaneous transfer to New England excluding Cross Sound Cable
K / CT (CSC)	330	330	The Cross Sound Cable is a DC tie and is not included in the feasible simultaneous transfer capability with New York

Total	1,930	1,555	
Ontario			
D / East	400	400	
A / Niagara	1,800	1,300	Simultaneous transfers between NY and Ontario may be impacted by loop flows assuming instructions to use the phase shifter capability of the Michigan - Ontario interface is not available. Additionally, thermal limits on the QFW interface may restrict imports to lesser values when the generation in the Niagara area is taken into account.
Total	2,200	1,700	
PJM			
A / West	550	550	
C / West	800	800	
C / Cent.	300	300	
G / East	2,000	2,000	
J / East	0	0	
Total (simultaneous limit)	2,500	2,500	

Quebec			
D / HQ	1,000	1,000	
Total	1,000	1,000	Emergency use of VFT is possible. VFT has the potential of increasing transfer to Quebec by 100 MW in addition to the Cornwall load.

Transfers from Ontario to

Interconnection Point	**Normal Transfer Capability at Interconnection Points (MW)**	**Feasible Transfer Capability under Peak Conditions (MW)**	**Rationale for Constraint**
New York			
East / D	400	400	
Niagara / A	1,800	1,450	Simultaneous transfers between NY and Ontario may be impacted by loop flows assuming instructions to use the phase shifter capability of the Michigan - Ontario interface is not available.
Total	2,200	1,850	
ECAR	1,550	1,550	Simultaneous transfers between Michigan and Ontario may be impacted by loop flows assuming instructions to use the phase shifter capability of the Michigan - Ontario interface is not available.
Total	1,550	1,550	

Quebec			
NE / HQ	95	95	The tie line facilities are thermally restricted in the summer.
Ottawa / HQ	320	147	Circuit Q4C is capable of 120 MW less 1/2 the Chats Falls that are considered in the in the Quebec Installed capacity (120-88=32). In addition, stability limits allow 200 MW to be transferred over the Ottawa-Brascan tie, but connectivity will only allow 115 MW load to be connected on the Quebec end
East / Beau	470	470	
Total	885	712	
MAPP			
NW / MAN	262		
NW / MIN	140		
Total	402	375	Feasible Simultaneous transfer to MAPP

Transfers from Quebec to

Interconnection Point	**Normal Transfer Capability at Interconnection Points (MW)**	**Feasible Transfer Capability under Peak Conditions (MW)**	**Rationale for Constraint**

Maritimes			
HQ / NBM		0	
HQ / NB	1,050	1,000	Except during August where capability will be between 700 and 800 MW due to busbars displacements on the 735 kV part of the Levis substation..
Total	1,050	1,000	
New England			
LG2A / CMA	2,000	1,500	NE is limited to 1,500 MW.
HQ / VT	295	225	
Total	2,000	1,725	
New York			
HQ / D	1,500	1,500	NY is limited to 1500 MW. The maximum delivery from Quebec to the NYCA is 1,200 MW, however the FCTTC over the Chateauguay-Massena 765 kV interconnection #7040 is 1,500 MW (with 300 MW delivered as a wheel-though to another Control Area)
CRT / D	325	180	Transfer limit is 325 MW less projected peak Cornwall load of 145 MW.
Total	1,825	1,680	

Ontario			
HQ / NE	65	65	Some limitation may occur depending on hydro conditions.
HQ / Ottawa	698	618	Transfers to Ontario on D5A are limited to 200 MW, 88 MW at Chats Falls, 65 MW on X2Y. Thermal limitations may reduce deliveries on P33C from 345 MW to 265 MW. Some limitation may occur depending on hydro conditions.
Beau / East	800	800	Some limitation may occur depending on hydro conditions.
Total	1,563	1,483	

Transfers from Regions External to NPCC

Interconnection Point	**Normal Transfer Capability at Interconnection Points (MW)**	**Feasible Transfer Capability under Peak Conditions (MW)**	**Rationale for Constraint**
ECAR / West	1,250	1,250	Simultaneous transfers between Michigan and Ontario may be impacted by loop flows assuming instructions to use the phase shifter capability of the Michigan - Ontario interface is not available
Total	1,250	1,250	
MAPP / ONT			
MANIT /	330		
MINNE / NW	90		

Total	420	325	Feasible Simultaneous transfer from MAPP
PJM / New York			
West / A	550	550	
West / C	800	800	
Cent / C	300	300	
East / G	1,100	1,100	
East / J	1,000	1,000	
Total (simultaneous limit)	2,500	2,500	

Appendix III - NPCC Operational Criteria and Procedures

A-2 Basic Criteria for Design and Operation of Interconnected Power Systems

Description: This Criteria establishes the basic principles and requirements for the design and the operation of the NPCC **bulk power system**.

A-3 Emergency Operation Criteria

Description: Objectives, principles and requirements are presented to assist the NPCC **Areas** in formulating plans and procedures to be followed in an **emergency** or during conditions which could lead to an **emergency**.

A-6 Operating Reserve Criteria

Description: This Criteria establishes standard terminology and minimum requirements governing the amount, availability and distribution of operating reserve. Procedures are included for corrective action and mutual assistance in case of operating reserve shortages. The objective is to ensure a high level of reliability in the NPCC Region that is, as a minimum, consistent with the standards specified by the North American Electric Reliability Council (NERC).

B-3 Guidelines for Inter-Area Voltage Control

Description: This document establishes procedures and principles to be considered for occasions where a deficiency or an excess of reactive power can affect **bulk power system** voltage levels in a large portion of an **Area** or in two adjacent **Areas**.

B-12 Guidelines for On-Line Computer System Performance During Disturbances

Description: Establishes guidelines for the performance of NPCC **Area** on-line computer systems during a power system disturbance.

B-20 Guidelines for Identifying Key Facilities and Their Critical Components for System Restoration"

Description: Establishes requirements and guidelines for the identification of Key Facilities and their Critical Components that are required for restoration of the power system following a partial or total system blackout.

C-01 NPCC Emergency Preparedness Conference Call Procedures-NPCC Security Conference Call Procedures

C-4 Monitoring Procedures for Guidelines for Inter-Area Voltage Control

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Guidelines for Inter-AREA Voltage Control (Document B-3).

C-5 Monitoring Procedures for Emergency Operation Criteria

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Emergency Operation Criteria (Document A-3).

C-7 Monitoring Procedures for Guide for Rating Generating Capability

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC, Guide for Rating Generating Capability (Document B-9).

C-8 Monitoring Procedures for Control Performance Guide During Normal Conditions

Description: This procedural document establishes a performance measure for NPCC **Areas** and systems and outlines the reporting function for NPCC Control Performance Guide During Normal Conditions (Document B-2)

C-9 Monitoring Procedures for Operating Reserve Criteria

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC Operating Reserve Criteria (Document A-6)

C-11 Monitoring Procedures for Interconnected System Frequency Response (This Document has recently been revised and will have a new designation as Reference Document RD-10)

Description: This procedural document defines procedures for monitoring frequency responses to large generation losses.

C-12 Procedures for Shared Activation of Ten Minute Reserve

Description: This procedural document outlines procedures to share the activation of ten-minute reserve on an Area basis. The methods prescribed by the procedure are intended to ensure that lost generation or energy purchases are quickly replaced by several areas simultaneously loading generation in the few minutes immediately following a loss.

C-13 Operational Planning Coordination

Appendix D - NPCC Critical Facilities List

Description: This document coordinates the notification of planned facility outages among the **Areas**. It also establishes formal procedures for **Area** communications in advance of a period of likely capacity shortages as well as for weekly and emergency NPCC conference call among the **Areas**.

C-15 Procedures for Solar Magnetic Disturbances on Electrical Power Systems

Description: This procedural document clarifies the reporting channels and information available to the operator during solar alerts and suggests measures that may be taken to mitigate the impact of a solar magnetic disturbance.

C-19 Procedures During Shortages of Operating Reserve

Description: This procedure is intended to provide specific instructions for the redistribution of Operating Reserve among the Areas when one or more **Area**(s) are experiencing an Operating Reserve deficiency.

C-20 Procedures During Abnormal Operating Conditions

Description: This procedure is intended to complement the Emergency Operation Criteria (Document A-3) by providing specific instructions to the System Operator during such conditions in an NPCC Area or Areas.

C-36 Procedures for Communications During Emergencies

Description: This procedure outlines how communications be conducted for various situations.

C-37 Operating Procedures for ACE diversity Interchange

Description: This procedure is intended to spell out how to utilize Area Control Error Diversity Interchange among NPCC entities and PJM.

C-38 Procedure for Operating Reserve Assistance

Description: This procedure is intended to provide the structure for NPCC Areas to assist each other in meeting 10 minute reserve.

RD-02 NPCC Inter-Control Area Power System Restoration Refernce Document

Appendix IV - Web Sites

ECAR

http://www.ecar.org/

Independent Electricity System Operator

http://www.ieso.ca/

ISO- New England

http://www.iso-ne.com

LEER Members

http://www.npcc.org/leer_members.htm

MAAC

http://www.maac-ca.com/

MAPP

http://www.mapp.org/

Maritimes

Maritimes Electric Company Ltd.

http://www.maritimeelectric.com

New Brunswick System Operator

http://www.nbso.ca/

Nova Scotia Power

http://www.nspower.ca/

Northern Maine Independent System Administrator

http://www.nmisa.com

New York ISO

http://www.nyiso.com/

North East Power Coordinating Council

http://www.npcc.org/

TransEnergie

http://www.hydro.qc.ca/transenergie/en/index.html

Drought Predictors

Canadian

http://gfx.weatheroffice.ec.gc.ca/saisons/data/images/ccapcpn_06_s.gif

United States

http://www.cpc.ncep.noaa.gov/products/expert_assessment/seasonal_drought.html

Appendix V - References

NPCC Summer 2005 Multi-Area Probabilistic Reliability Assessment – April 2005

NPCC Reliability Assessment for Summer 2004 - May 1, 2004

Draft 2005 Summer MEN Interregional Transmission System Reliability Assessment

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-20

Question NYISO/IESO 1-5:

Related To the Hydro One PAR on the L4D line that went out of service on December 17, 2011:

a. Please explain why that Hydro One PAR failed.

IESO Response:

The IESO understands that the PAR on the L4D line was removed from service by Hydro One (the asset owner) as a result of a bad oil sample. The exact cause of the bad sample remains unknown at this time.

b. Please explain how long it will take to return that Hydro One PAR to service.

IESO Response:

The expected return to service of the PAR on the L4D is not know at this time.

c. Please provide a schedule of the outages that have occurred over the past 3 years for any of the Hydro One PARs, including the duration of each outage and whether the outage was scheduled (maintenance) or unscheduled (forced).

IESO Response:

The following is the schedule of outages for the Hydro One PARS for the period of January 2009 – December 2011inclusive:

PAR	Line	Start Date	End Date	Duration (Hours)	Outage Type
PSR5	J5D	2009-03-09	2009-03-09	14	Maintenance
PSR5	J5D	2009-09-21	2009-10-21	732	Maintenance
PSR5	J5D	2011-04-10	2010-01-10	4	Forced
PS51	L51D	2010-08-23	2010-09-06	348	Maintenance
PS51	L51D	2011-09-19	2011-09-23	106	Maintenance
PS51	L51D	2011-12-04	2011-12-04	8	Maintenance
PS4	L4D	2009-12-07	2009-12-07	7	Maintenance

PAR	Line	Start Date	End Date	Duration (Hours)	Outage Type
PS4	L4D	2010-05-11	2010-05-14	80	Maintenance
PS4	L4D	2011-05-24	2011-06-03	251	Maintenance
PS4	L4D	2011-10-11	2011-10-14	85	Maintenance
PS4	L4D	2011-12-17			Forced

Response Provided by: Nicholas Ingman, Manager, Operational Excellence

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-21

Michigan-Ontario Interface Phase Angle Regulators

In March 2003, the ITC*Transmission (“ITC”)* Bunce Creek (“B3N”) Phase Angle Regulator (“PAR”) was retired and has been out of service. The B3N PAR was one of four PAR’s on the Michigan-Ontario interface which, when operated together, was designed to help mitigate loop flow in the Lake Erie region by controlling electrical flow across the Michigan-Ontario interface. The other three PARs, owned and operated by Hydro One, are located at Lambton (L4D and L51D) and Keith (J5D).

The retired B3N transformer has been replaced by two PARs (connected in series). Installation of the transformers was complete in December 2009 and protective system work, in coordination with Hydro One, was completed in July 2010.

As an international facility, regulatory authorization (Presidential Permit) from the U.S. Department of Energy (“DOE”) is required prior to commissioning and operating the B3N PAR. All contractual and operational agreements between ITC and Hydro One were filed with the DOE and ITC took receipt of the amended Presidential Permit on February 24, 2012. With operational agreements between MISO and the IESO also in place, all requirements necessary to commission and operate the ITC B3N PAR have been fulfilled. ITC has started the process of energizing and testing the B3N PAR, which is scheduled to be completed by EOD, April 4, 2012.

In late 2011, Hydro One removed the L4D from service due to early indications of an electrical issue with the PAR. Testing on the L4D PAR will continue through mid-May, and the L4D PAR is not expected to be available for use prior to the commissioning of the B3N PAR.

MISO, IESO, ITC and Hydro One have formally set ***1000 hours EDT Thursday April 5, 2012*** as the target for starting coordinated operation of PARs on the Michigan-Ontario interface. The objective of coordinated operations is to help mitigate loop flows in the Lake Erie region by conforming actual electrical flows across the interface to scheduled electrical flows, to the maximum extent practical.

Coordinated interface operations without the L4D PAR in service will reduce the overall capability to control loop flow by an estimated 40-50%, which significantly reduces the time that the interface will be fully regulated (loop flow exceeds collective ability of remaining PARs to control flow). As a result, MISO ***does not*** intend to change the methodology for pricing transactions scheduled across the Michigan-Ontario interface in conjunction with the start of coordinated operations (April 5th) as originally planned. The existing pricing methodology will remain in place until further notice.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-22

Question NYISO/IESO 4-1:

When does IESO expect the L4D PAR to be placed back in service?

IESO Response:

The current scheduled return date for the L4D PAR is May 18, 2012.

Response Provided by: Nicholas Ingman, Manager, Operational Excellence

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-23

Summary of Scheduled Return Date Announcements

for the L4D PAR

Posted in System Advisory/Summary Reports on IESO's Website[1]

Date IESO Posted for End of L4D PAR Bypass	**Link to System Advisory/Summary Report**
February 15, 2012	http://reports.ieso.ca/public/SSR/PUB_SSR_20120208_v7.htm
March 2, 2012	http://reports.ieso.ca/public/SSR/PUB_SSR_20120216_v7.htm
March 31, 2012	http://reports.ieso.ca/public/SSR/PUB_SSR_20120313_v7.htm
April 5, 2012	http://reports.ieso.ca/public/SSR/PUB_SSR_20120401_v7.htm
May 1, 2012	http://reports.ieso.ca/public/SSR/PUB_SSR_20120409_v12.htm

[1] IESO's website for System Advisory/Summary Reports, http://www.ieso.ca/imoweb/marketdata/ssrsaa.asp.

Urgent SSR Report for 2012/02/08 generated on 2012/02/08 07:15

System Advisory/Summary

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply Energy(MWhr)	Forecast Demand Energy(MWhr)	Forecast Excess(Shortfall) Energy(MWhr)	Energy Shortfall Hours(Yes/No)
575218	428629	149181	No

System Advisory Notices-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
Major Change Advisory - generation	2012/02/08 07:14	2012/02/08 07:00	2012/02/08 10:00	A generating unit of 250 MW or greater has been forced from service.

Hourly Details H1-12

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
Energy(MWhr)	23150	22662	22463	22483	22909	23202	24096	24166	24338	24200	24134	23979
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	71	71	71	71	71	71	71	71	71	71	71	71
Self-Sched (MWhr/hr)	835	834	835	835	836	839	848	874	878	878	872	877
Energy Limit'd (MWhr)	3149	2649	2449	2469	2869	3189	4074	4865	5188	5050	4990	4790
Energy Limit'd Cap (MW)	6672	6672	6672	6672	6672	6672	6672	6672	6650	6650	6650	6650
Imports - Est'd (MW)	700	700	700	700	700	700	700	0	0	0	0	0
Intermittent Capacity (MW)	212	212	212	212	212	212	212	212	212	212	212	212
Self-Sched Capacity (MW)	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)	6218	6178	6177	6177	6151	6178	6169	6190	6363	6363	6369	6324
Outages West(MW)	346	374	374	374	374	374	374	374	374	374	374	374
Total Outages	6564	6552	6551	6551	6525	6552	6543	6564	6737	6737	6743	6698
Forecast Demand												
Primary Demand	15352	14706	14263	14282	14560	15216	17556	18319	18509	18413	18337	18237

East(MW)													
Primary Demand West(MW)		537	560	561	555	552	553	553	508	518	517	511	499
Primary Demand Total(MW)		15889	15266	14824	14837	15112	15769	18109	18827	19027	18930	18848	18736
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
Min. 10-Minute OR		945	945	945	945	945	945	945	945	945	945	945	945
Min. 10-Minute Spin OR		236	236	236	236	236	236	236	236	236	236	236	236
Load Forecast Uncertainty		0	0	0	0	0	0	0	0	0	0	0	0
Add. Cont. Allowance		0	0	0	0	0	0	0	0	0	0	0	0
Intrahour Margin (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)													
Energy(MWhr)		7369	7504	7747	7754	7905	7541	6095	5447	5419	5378	5394	5351
Capacity(MW)		9474	10109	10552	10539	10290	9606	7275	5836	5463	5560	5636	5793
Ancillary Services													
AGC Range Required (MW)		100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)		50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)		200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements													
East(MW)		0	0	0	0	0	0	0	0	0	0	0	0
West(MW)		0	0	0	0	0	0	0	0	0	0	0	0

Hourly Details H13-24

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H13	H14	H15	H16	H17	H18	H19	H20	H21	H22	H23	H24
Energy(MWhr)	24207	23878	23694	23880	24912	25354	25642	25434	25146	24189	23766	23334
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	71	71	71	71	71	71	71	71	71	71	71	71
Self-Sched (MWhr/hr)	880	879	880	878	882	885	886	886	887	886	885	851
Energy Limit'd (MWhr)	4490	4167	4107	4190	5218	5658	5758	5650	5361	4405	3834	3272
Energy Limit'd Cap (MW)	6650	6650	6650	6650	6650	6672	6672	6745	6745	6745	6745	6745
Imports - Est'd (MW)	0	0	0	0	0	0	100	0	0	0	24	188
Intermittent Capacity (MW)	212	212	212	212	212	212	212	212	212	212	212	212
Self-Sched Capacity (MW)	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)	5796	5802	5926	5823	5819	5795	5707	5634	5633	5634	5510	5544
Outages West(MW)	374	374	374	374	374	374	374	374	374	374	374	374
Total Outages	6170	6176	6300	6197	6193	6169	6081	6008	6007	6008	5884	5918
Forecast Demand												
Primary Demand East(MW)	18069	17893	17692	17730	18000	18890	19844	19698	19052	18181	17086	15889
Primary Demand West(MW)	492	486	484	484	484	489	510	595	596	632	611	568
Primary Demand Total(MW)	18561	18379	18176	18214	18484	19379	20354	20293	19648	18813	17697	16457
Dispatchable Load (MW)	108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW) Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
Add. Cont.	0	0	0	0	0	0	0	0	0	0	0	0

Allowance												
Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)												
Energy(MWhr)	5754	5607	5626	5774	6536	6083	5396	5249	5606	5484	6177	6985
Capacity(MW)	6496	6672	6751	6816	6550	5679	4892	4926	5572	6406	7670	9040
Ancillary Services												
AGC Range Required (MW)	100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)	50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)	200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements												
East(MW)	0	0	0	0	0	0	0	0	0	0	0	0
West(MW)	0	0	0	0	0	0	0	0	0	0	0	0

SAA Notes

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Security and Adequacy Assesment Notes-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
System note	2012/02/02 10:35	2012/02/05 15:00	2012/02/09 16:00	Generation Biasing may be required to support switching activities.

Transmission Interfaces

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Internal Transmission Interface Limitations					
Facility	**Penalty Applied**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Negative BLIP - Negative Buchanan Longwood Input	500	2012/01/16 16:48	2012/01/16 16:45	2012/02/20 23:59	Based on unit configuration.
TEK - Transfer East of Kenora	50	2012/01/17 15:02	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
TEM - Transfer East of Mackenzie	225	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
TWM - Transfer West of Mackenzie	200	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
EWTE - East-West Transfer East	75	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
EWTW - East-West Transfer West	50	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
FID - Flow Into Dobbin	20	2012/01/30 17:21	2012/02/05 15:00	2012/02/09 16:00	B1S O/S
Madawaska Generation - Madawaska 115 kV generation	40	2012/01/30 17:22	2012/02/05 15:00	2012/02/09 16:00	B1S O/S
Miss(Ecct)W - Mississagi East Circuits Flow West	0	2012/02/05 08:43	2012/02/07 08:00	2012/02/10 17:00	X27A O/S Miss(Ecct)W limit = 400MW
Other	0	2012/02/07 02:55	2012/02/07 08:00	2012/02/10 17:00	X27A O/S SFE Global limit = 350 MW
SFW Global - Sudbury Flow West Global	0	2012/02/05 08:43	2012/02/07 08:00	2012/02/10 17:00	X27A O/S SFW Global limit = 590MW
WMFE - Wawa-Mackay Flow East		2012/02/03 10:06	2012/02/08 07:30	2012/02/08 18:00	WAWAFE < 350 MW, W23K O\S

Intertie Transmission Interface Limitations					
Facility	**Penalty Applied**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Ontario - Michigan Export Winter	0	2012/01/27 10:46	2011/11/01 00:00	2012/05/01 00:00	The base ON to MI export limit is 1775MW. LxD phase shifters on neutral tap.
Ontario - Michigan Import Winter	0	2012/01/27 10:47	2011/11/01 00:00	2012/05/01 00:00	The base MI to ON import limit is 1400MW. LxD phase shifters on neutral tap.

Ontario Niagara - New York Export Winter	0	2012/01/19 14:55	2012/01/19 14:44	2012/12/31 14:44	The base ON to NY export limit is 1650MW. BP76 os.
Ontario Niagara - New York Import Winter	0	2012/01/19 14:55	2012/01/19 14:45	2012/12/31 14:45	The base NY to ON import limit is 1050MW. BP76 os.
Ontario - Michigan Export Winter	0	2012/01/24 10:36	2012/01/25 17:30	2012/02/15 16:00	The ON to IM export limit is 1880MW. L4D Par Byp.
Ontario - Michigan Import Winter	0	2012/01/24 13:58	2012/01/25 17:30	2012/02/15 16:00	The IM to ON import limit is 1450MW. L4D Par Byp.
Ontario - Michigan Export Winter	0	2012/01/27 15:08	2012/01/30 06:00	2012/02/10 18:00	The ON to IM export limit is 1730MW. L4D Par Byp + Keith T11os.
Ontario - Michigan Import Winter	0	2012/01/27 15:08	2012/01/30 06:00	2012/02/10 18:00	The IM to ON import limit is 1300MW. L4D Par Byp + Keith T11os.
OMTW - Ontario-Manitoba Transfer West	250	2012/01/17 15:01	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
OMTE - Ontario-Manitoba Transfer East	70	2012/01/17 15:01	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
MPFN - Ontario-Minnesota Transfer North	50	2012/02/01 18:54	2012/01/30 08:00	2012/03/16 19:00	F25A with other equipment O/S ***extended***
MPFN - Ontario-Minnesota Transfer North	25	2012/01/17 16:37	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
MPFS - Ontario-Minnesota Transfer South	140	2012/02/01 18:54	2012/01/30 08:00	2012/03/16 19:00	F25A with other equipment O/S ***extended***
MPFS - Ontario-Minnesota Transfer South	90	2012/01/17 16:37	2012/01/30 08:00	2012/03/16 19:00	F25A O/S

Urgent SSR Report for 2012/02/16 generated on 2012/02/16 11:44

System Advisory/Summary

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply Energy(MWhr)	Forecast Demand Energy(MWhr)	Forecast Excess(Shortfall) Energy(MWhr)	Energy Shortfall Hours(Yes/No)
545557	405109	143040	No

System Advisory Notices-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
Major Change Advisory	2012/02/16 11:44	2012/02/16 13:25	2012/02/16 13:45	IESO "Market Tool" Outage results in the "Automated Message Exchange Dispatch Instruction" being unavailable. The IESO will manually dispatch via telephone if necessary.
Major Change Advisory - load	2012/02/16 02:42	2012/02/16 02:41	2012/02/16 02:41	Hourly peak demand forecasting is being used for HE06 to HE07 for reliability concerns. Primary demand forecast has been decreased by greater than 1.5% in HE03 - HE06.

Hourly Details H1-12

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
Energy(MWhr)	21991	21629	21496	21496	21619	21614	22567	23240	23271	23324	23035	22859
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	98	98	98	98	98	98	98	98	98	98	98	98
Self-Sched (MWhr/hr)	832	810	817	817	820	815	827	857	856	864	855	843
Energy Limit'd (MWhr)	3648	3308	3168	3168	3288	3288	4229	4872	4904	4904	4624	4504
Energy Limit'd Cap (MW)	6781	6781	6781	6781	6781	6781	6781	6781	6781	6736	6736	6734
Imports - Est'd (MW)	0	0	0	0	0	0	0	0	0	0	0	0

Intermittent Capacity (MW)	212	212	212	212	212	212	212	212	212	212	212	212
Self-Sched Capacity (MW)	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)	7027	7049	7042	7042	7039	7044	7032	7002	7003	6995	7004	7062
Outages West(MW)	386	386	386	386	386	386	386	386	386	386	386	386
Total Outages	7413	7435	7428	7428	7425	7430	7418	7388	7389	7381	7390	7448
Forecast Demand												
Primary Demand East(MW)	14315	13803	13414	13386	13584	14256	15801	17303	17593	17533	17520	17477
Primary Demand West(MW)	467	483	506	506	491	489	486	449	464	458	455	447
Primary Demand Total(MW)	14782	14286	13920	13892	14075	14745	16287	17752	18057	17991	17975	17924
Dispatchable Load (MW)	108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW) Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
Add. Cont. Allowance	0	0	0	0	0	0	0	0	0	0	0	0
Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)												
Energy(MWhr)	7317	7451	7684	7712	7652	6977	6388	5596	5322	5441	5168	5043
Capacity(MW)	9032	9506	9879	9907	9727	9052	7522	6087	5781	5855	5862	5855
Ancillary Services												
AGC Range Required (MW)	100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)	50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)	200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements												
East(MW)	0	0	0	0	0	0	0	0	0	0	0	0

West(MW)	0	0	0	0	0	0	0	0	0	0	0	0

Hourly Details H13-24

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply		**H13**	**H14**	**H15**	**H16**	**H17**	**H18**	**H19**	**H20**	**H21**	**H22**	**H23**	**H24**
Energy(MWhr)		22906	22874	22952	23148	23586	23956	24038	23791	23573	22695	22097	21800
Capacity(MW)		32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)		98	98	98	98	98	98	98	98	98	98	98	98
Self-Sched (MWhr/hr)		850	867	866	871	871	871	873	874	876	877	874	839
Energy Limit'd (MWhr)		4544	4495	4584	4767	5155	5515	5595	5347	5127	4248	3653	3391
Energy Limit'd Cap (MW)		6734	6734	6734	6736	6736	6791	6791	6791	6791	6791	6791	6836
Imports - Est'd (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Intermittent Capacity (MW)		212	212	212	212	212	212	212	212	212	212	212	212
Self-Sched Capacity (MW)		1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)		7055	7038	7049	7034	6984	6919	6917	6916	6914	6913	6916	6906
Outages West(MW)		386	386	386	386	386	386	386	386	386	386	386	386
Total Outages		7441	7424	7435	7420	7370	7305	7303	7302	7300	7299	7302	7292
Forecast Demand													
Primary Demand East(MW)		17361	17243	17134	17202	17497	18050	18674	18645	17951	17114	16006	14781
Primary Demand West(MW)		443	435	439	440	440	458	479	484	533	547	543	524
Primary Demand Total(MW)		17804	17678	17573	17642	17937	18508	19153	19129	18484	17661	16549	15305
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
	Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
	Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
	Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
	Add. Cont.	0	0	0	0	0	0	0	0	0	0	0	0

Allowance												
Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)												
Energy(MWhr)	5210	5304	5487	5614	5757	5556	4993	4770	5197	5142	5656	6603
Capacity(MW)	5982	6125	6219	6165	5920	5414	4771	4796	5443	6267	7376	8630
Ancillary Services												
AGC Range Required (MW)	100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)	50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)	200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements												
East(MW)	0	0	0	0	0	0	0	0	0	0	0	0
West(MW)	0	0	0	0	0	0	0	0	0	0	0	0

SAA Notes

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Security and Adequacy Assesment Notes-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment

Transmission Interfaces

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Internal Transmission Interface Limitations					
Facility	**Penalty Applied**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Negative BLIP - Negative Buchanan Longwood Input	500	2012/01/16 16:48	2012/01/16 16:45	2012/02/20 23:59	Based on unit configuration.
TEK - Transfer East of Kenora	50	2012/01/17 15:02	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
TEM - Transfer East of Mackenzie	225	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
TWM - Transfer West of Mackenzie	200	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
EWTE - East-West Transfer East	75	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
EWTW - East-West Transfer West	50	2012/01/17 15:03	2012/01/30 08:00	2012/03/16 18:00	F25A O/S
FIO - Flow Into Ottawa	450	2012/02/14 14:32	2012/02/14 15:00	2012/04/13 17:00	Hawthorne T3 O/S, HTP1 + HT4 Bus open as C/A

Intertie Transmission Interface Limitations					
Facility	**Penalty Applied**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Ontario - Michigan Export Winter	0	2012/01/27 10:46	2011/11/01 00:00	2012/05/01 00:00	The base ON to MI export limit is 1775MW. LxD phase shifters on neutral tap.
Ontario - Michigan Import Winter	0	2012/01/27 10:47	2011/11/01 00:00	2012/05/01 00:00	The base MI to ON import limit is 1400MW. LxD phase shifters on neutral tap.
Ontario Niagara - New York Export Winter	0	2012/01/19 14:55	2012/01/19 14:44	2012/12/31 14:44	The base ON to NY export limit is 1650MW. BP76 os.
Ontario Niagara - New York Import Winter	0	2012/01/19 14:55	2012/01/19 14:45	2012/12/31 14:45	The base NY to ON import limit is 1050MW. BP76 os.
OMTW - Ontario-Manitoba Transfer West	250	2012/01/17 15:01	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
OMTE - Ontario-Manitoba Transfer East	70	2012/01/17 15:01	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
MPFN - Ontario-Minnesota Transfer North	50	2012/02/01 18:54	2012/01/30 08:00	2012/03/16 19:00	F25A with other equipment O/S ***extended***

MPFN - Ontario-Minnesota Transfer North	25	2012/01/17 16:37	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
MPFS - Ontario-Minnesota Transfer South	140	2012/02/01 18:54	2012/01/30 08:00	2012/03/16 19:00	F25A with other equipment O/S ***extended***
MPFS - Ontario-Minnesota Transfer South	90	2012/01/17 16:37	2012/01/30 08:00	2012/03/16 19:00	F25A O/S
Ontario - Michigan Export Winter	0	2012/02/09 11:47	2012/02/13 04:30	2012/03/02 17:00	The ON to IM export limit is 1700MW. L4D PAR byp + Keith T22os.
Ontario - Michigan Import Winter	0	2012/02/09 11:47	2012/02/13 04:30	2012/03/02 17:00	The IM to ON import limit is 1350MW. L4D PAR byp + Keith T22os.

Urgent SSR Report for 2012/03/13 generated on 2012/03/13 09:58

System Advisory/Summary

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply Energy(MWhr)	Forecast Demand Energy(MWhr)	Forecast Excess(Shortfall) Energy(MWhr)	Energy Shortfall Hours(Yes/No)
533061	369770	165883	No

System Advisory Notices-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
Major Change Advisory - generation	2012/03/13 09:58	2012/03/13 12:00	2012/03/13 16:00	Generating capacity of 250 MW or greater has been forced from service.

Hourly Details H1-12

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
Energy(MWhr)	21002	20761	20704	20761	20919	22101	23048	22303	22212	22150	22369	22107
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	575	575	575	575	575	575	575	575	575	575	575	575
Self-Sched (MWhr/hr)	798	797	800	797	795	797	801	837	842	840	839	837
Energy Limit'd (MWhr)	3126	2886	2826	2886	3046	4226	5169	4612	4564	4424	4324	4064
Energy Limit'd Cap (MW)	6916	6916	6916	6916	6916	6916	6916	6793	6793	6793	6793	6793
Imports - Est'd (MW)	0	0	0	0	0	0	0	0	0	0	320	320
Intermittent Capacity (MW)	696	696	696	696	696	696	696	696	696	696	696	696
Self-Sched Capacity (MW)	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)	7200	7201	7198	7201	7203	7201	7197	7508	7551	7473	7474	7476
Outages West(MW)	545	545	545	545	545	545	545	545	545	545	545	545
Total Outages	7745	7746	7743	7746	7748	7746	7742	8053	8096	8018	8019	8021
Forecast Demand												
Primary Demand	12470	12175	12021	12334	12867	14932	15665	15777	15935	15841	15791	15721

East(MW)													
Primary Demand West(MW)		545	533	505	496	494	502	485	500	512	511	509	501
Primary Demand Total(MW)		13015	12708	12526	12830	13361	15434	16150	16277	16447	16352	16300	16222
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
	Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
	Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
	Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
	Add. Cont. Allowance	0	0	0	0	0	0	0	0	0	0	0	0
	Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)													
Energy(MWhr)		8095	8161	8286	8039	7666	6775	7006	6134	5873	5906	6177	5993
Capacity(MW)		10467	10773	10958	10651	10118	8047	7335	6897	6684	6857	7228	7304
Ancillary Services													
AGC Range Required (MW)		100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)		50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)		200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements													
East(MW)		0	0	0	0	0	0	0	0	0	0	0	0
West(MW)		0	0	0	0	0	0	0	0	0	0	0	0

Hourly Details H13-24

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H13	H14	H15	H16	H17	H18	H19	H20	H21	H22	H23	H24
Energy(MWhr)	22589	22749	22849	22993	23307	23788	23985	23952	23291	19151	22291	21679
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	575	575	575	575	575	575	575	575	575	575	575	575
Self-Sched (MWhr/hr)	839	839	839	840	839	839	842	847	846	846	844	802
Energy Limit'd (MWhr)	4544	4704	4804	4967	5235	5055	5055	4767	4307	317	3709	3089
Energy Limit'd Cap (MW)	6793	6793	6793	6793	6793	6840	6846	6846	6846	6846	6846	6846
Imports - Est'd (MW)	320	320	320	300	300	300	400	650	450	300	50	100
Intermittent Capacity (MW)	696	696	696	696	696	696	696	696	696	696	696	696
Self-Sched Capacity (MW)	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)	7474	7474	7474	7473	7427	6719	6616	6611	6612	6612	6614	6656
Outages West(MW)	545	545	545	545	545	545	545	545	545	545	545	545
Total Outages	8019	8019	8019	8018	7972	7264	7161	7156	7157	7157	7159	7201
Forecast Demand												
Primary Demand East(MW)	15638	15526	15371	15569	15864	15941	16460	16679	16175	15365	14302	13408
Primary Demand West(MW)	491	485	474	462	461	467	488	502	497	516	517	490
Primary Demand Total(MW)	16129	16011	15845	16031	16325	16408	16948	17181	16672	15881	14819	13898
Dispatchable Load (MW)	108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW) Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
Add. Cont.	0	0	0	0	0	0	0	0	0	0	0	0

Allowance												
Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)												
Energy(MWhr)	6568	6846	7112	7070	7090	7488	7145	6879	6727	3378	7580	7889
Capacity(MW)	7399	7517	7683	7478	7230	7855	7518	7540	7848	8489	9299	10228
Ancillary Services												
AGC Range Required (MW)	100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)	50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)	200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements												
East(MW)	0	0	0	0	0	0	0	0	0	0	0	0
West(MW)	0	0	0	0	0	0	0	0	0	0	0	0

SAA Notes

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Security and Adequacy Assessment Notes-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment

Transmission Interfaces

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Internal Transmission Interface Limitations					
Facility	**Operating Limit**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
TEK - Transfer East of Kenora	300	2012/03/07 10:52	2012/01/30 08:00	2012/03/16 18:00	F25A o/s.
TEM - Transfer East of Mackenzie	250	2012/03/07 10:52	2012/01/30 08:00	2012/03/16 18:00	F25A o/s.
EWTE - East-West Transfer East	250	2012/03/07 10:52	2012/01/30 08:00	2012/03/16 18:00	F25A o/s.
EWTW - East-West Transfer West	300	2012/03/07 10:53	2012/01/30 08:00	2012/03/16 18:00	F25A o/s.
TWM - Transfer West of Mackenzie	150	2012/03/07 10:52	2012/01/30 08:00	2012/03/16 18:00	F25A o/s.
FIO - Flow Into Ottawa	2400	2012/03/07 10:53	2012/02/14 15:00	2012/04/13 17:00	Hawthorne T3 o/s, HT1P1 + HT4 Bus open as C/A.
FIO - Flow Into Ottawa	1600	2012/03/07 10:53	2012/03/05 04:00	2012/03/15 16:00	Hawthorne T3 and M29C o/s (Hawth HT1P1 cosed - NO C/A).
FIO - Flow Into Ottawa	2300	2012/03/12 14:59	2012/03/05 04:00	2012/03/15 16:00	Hawthorne T3 and M29C o/s (Hawth HT1P1 and HT4 Bus o/s - C/A).
Madawaska Generation - Madawaska 115 kV generation	400	2012/03/07 14:33	2012/03/07 10:16	2012/12/31 23:59	All i/s. Assumed 25 MW G/R armed.
Flow North - flow north on circuits X503E, X504E and D5H	1900	2012/03/07 11:12	2012/03/07 11:10	2012/12/31 23:00	All i/s.
Flow South - flow south on circuits X503E, X504E and D5H	1550	2012/03/07 11:13	2012/03/07 11:12	2012/12/31 23:00	All i/s.
WMFE - Wawa-Mackay Flow East	590	2012/03/07 11:14	2012/03/07 11:13	2012/12/31 23:00	WMFE-230-115 < 590 MW. All i/s.
TEK - Transfer East of Kenora	350	2012/03/07 10:42	2012/03/07 14:00	2012/12/31 23:59	All i/s.
SFW Global - Sudbury Flow West Global	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
FID - Flow Into Dobbin	390	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.

FIO - Flow Into Ottawa	2900	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Miss(Ecct)E - Mississagi East Circuits Flow East	550	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Miss(Ecct)W - Mississagi East Circuits Flow West	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
EWTW - East-West Transfer West	350	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
EWTE - East-West Transfer East	325	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
TEM - Transfer East of Mackenzie	475	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
TWM - Transfer West of Mackenzie	350	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Lakehead(Ecct)E - Lakehead East Circuit Flow East	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Chats Falls Area Generation - Chats Falls GS 230 kV Area Generation	650	2012/03/07 14:29	2012/03/07 14:26	2012/12/31 23:59	All i/s.
P33C Inflow - P33C Chats Falls Inflow	335	2012/03/07 15:16	2012/03/07 14:28	2012/12/31 23:59	All i/s.
Beauharnois Delivery	790	2012/03/07 15:16	2012/03/07 14:32	2012/12/31 23:59	All i/s. Assumed maximum G/R armed.
D5A Import - D5A Import From Maclaren	240	2012/03/07 14:55	2012/03/07 14:34	2012/12/31 23:59	All i/s.
D5A Export - D5A Export From Maclaren	190	2012/03/07 14:55	2012/03/07 14:35	2012/12/31 23:59	All i/s.
FABCW - Flow Away From Bruce Complex plus wind generation in the Bruce Area	5800	2012/03/08 10:51	2012/03/08 10:51	2012/12/31 23:59	All i/s.
Positive BLIP - Positive Buchanan Longwood Input	3000	2012/03/08 10:52	2012/03/08 10:51	2012/12/31 23:59	All i/s.
Negative BLIP - Negative Buchanan Longwood Input	1500	2012/03/08 10:53	2012/03/08 10:52	2012/12/31 23:59	All i/s.
FETT - Flow East To Toronto	5000	2012/03/08 10:54	2012/03/08 10:54	2012/12/31 23:59	All i/s.
CLAN - Claireville		2012/03/08	2012/03/08	2012/12/31	

North	2000	10:55	10:54	23:59	All i/s,
CLAS - Claireville South	1000	2012/03/08 10:55	2012/03/08 10:55	2012/12/31 23:59	All i/s.
WMFE - Wawa-Mackay Flow East	515	2012/03/09 09:06	2012/03/12 07:00	2012/03/15 17:00	WMFE-230 < 515 MW, Sault#3 o/s
WMFE - Wawa-Mackay Flow East	350	2012/03/09 09:09	2012/03/13 06:30	2012/03/14 16:30	WAWAFE < 350 MW, W23K o/s.
FIO - Flow Into Ottawa	2250	2012/03/07 14:22	2012/03/13 07:45	2012/03/14 16:00	Hawthorne T3, M29C and Merivale SC11 o/s,(Hawth HT1P1 and HT4 Bus o/s - C/A).

Intertie Transmission Interface Limitations					
Facility	**Operating Limit**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Ontario - Michigan Export Winter	1775	2012/03/07 10:44	2011/11/01 00:00	2012/05/01 00:00	LxD phase shifters on neutral tap.
Ontario - Michigan Import Winter	1400	2012/03/07 10:45	2011/11/01 00:00	2012/05/01 00:00	LxD phase shifters on neutral tap.
Ontario Niagara - New York Export Winter	1650	2012/03/07 10:55	2012/01/19 14:44	2012/12/31 14:44	BP76 o/s.
Ontario Niagara - New York Import Winter	1050	2012/03/07 10:55	2012/01/19 14:45	2012/12/31 14:45	BP76 o/s.
OMTW - Ontario-Manitoba Transfer West	50	2012/03/07 10:55	2012/01/30 08:00	2012/03/16 19:00	F25A o/s.
OMTE - Ontario-Manitoba Transfer East	230	2012/03/07 10:55	2012/01/30 08:00	2012/03/16 19:00	F25A o/s.
Ontario - Michigan Export Winter	1700	2012/03/07 15:06	2012/02/13 04:30	2012/03/31 18:00	L4D PAR byp + PS5 SS on single supply.
Ontario - Michigan Import Winter	1350	2012/03/07 15:06	2012/02/13 04:30	2012/03/31 18:00	L4D PAR byp + PS5 SS on single supply.
Ontario - Michigan Export Winter	1880	2012/03/07 10:46	2012/02/22 00:00	2012/03/31 00:00	L4D Par Byp.
Ontario - Michigan Import Winter	1500	2012/03/07 10:46	2012/02/22 00:00	2012/03/31 00:00	L4D Par Byp.
MPFN - Ontario-Minnesota Transfer North	50	2012/03/08 11:16	2012/03/06 08:00	2012/03/16 19:00	F25A o/s + other equipment o/s
MPFS - Ontario-Minnesota Transfer South	10	2012/03/08 11:16	2012/03/06 08:00	2012/03/16 19:00	F25A o/s + other equipment o/s
Ontario - Quebec Rapide 115 kV	75	2012/03/07	2012/03/07	2012/04/30	All i/s.

Import Winter or Summer		11:17	11:15	23:00	
Ontario - Quebec Kipawa 115 kV Export Winter or Summer	100	2012/03/07 11:18	2012/03/07 11:17	2012/04/30 23:00	All i/s.
OMTW - Ontario-Manitoba Transfer West	300	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
MPFS - Ontario-Minnesota Transfer South	150	2012/03/07 10:47	2012/03/07 14:00	2012/12/31 23:59	All i/s.
MPFN - Ontario-Minnesota Transfer North	100	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
OMTE - Ontario-Manitoba Transfer East	300	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Ontario - Quebec Beauharnois 230 kV Export Winter or Summer	460	2012/03/07 15:19	2012/03/07 14:58	2012/12/31 23:59	All i/s.
Ontario - Quebec Beauharnois 230 kV Import Winter or Summer	790	2012/03/07 15:19	2012/03/07 14:59	2012/12/31 23:59	All i/s.
Ontario - Quebec Maclaren 230 kV Export Winter or Summer	190	2012/03/07 15:21	2012/03/07 15:20	2012/12/31 23:59	All i/s.
Ontario - Quebec Maclaren 230 kV Import Winter or Summer	240	2012/03/07 15:22	2012/03/07 15:21	2012/12/31 23:59	All i/s.
Ontario - Quebec Masson 115 kV Export Winter or Summer	50	2012/03/07 15:23	2012/03/07 15:22	2012/12/31 23:59	All i/s.
Ontario - Quebec Masson 115 kV Import Winter or Summer	166	2012/03/07 15:25	2012/03/07 15:24	2012/12/31 23:59	All i/s.
Ontario - Quebec Paugan 230 kV Export Winter or Summer	0	2012/03/07 15:28	2012/03/07 15:26	2012/12/31 23:09	All i/s.
Ontario - Quebec Paugan 230 kV		2012/03/07	2012/03/07	2012/12/31	

Import Winter or Summer	335	15:30	15:28	23:59	All i/s.
Ontario - Quebec Quyon 230 kV Export Winter	140	2012/03/07 15:34	2012/03/07 15:30	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 230 kV Import Winter	0	2012/03/07 15:33	2012/03/07 15:32	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 203 kV Export Summer	120	2012/03/07 15:33	2012/03/07 15:33	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 203 kV Import Summer	0	2012/03/07 15:36	2012/03/07 15:35	2012/12/31 23:59	All i/s.
Ontario - Quebec Bryson 115 kV Export Winter or Summer	0	2012/03/07 15:38	2012/03/07 15:37	2012/12/31 23:59	All i/s.
Ontario - Quebec Bryson 115 kV Import Winter or Summer	65	2012/03/07 15:39	2012/03/07 15:38	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Export Winter or Summer	1230	2012/03/07 15:41	2012/03/07 15:40	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Import Winter or Summer	1230	2012/03/07 15:41	2012/03/07 15:41	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Export Winter or Summer	0	2012/03/12 08:58	2012/03/10 19:33	2012/03/17 18:00	GC1 and GC2 O/S. *** Updated ***
Ontario - Quebec Outaouais 230 kV Import Winter or Summer	0	2012/03/12 08:58	2012/03/10 19:33	2012/03/17 18:00	GC1 and GC2 O/S. *** Updated ***
Ontario Niagara - New York Export Winter	800	2012/03/09 15:32	2012/03/12 05:30	2012/03/16 17:00	PA30x o/s + BP76 i/s.
Ontario Niagara - New York Import Winter	1040	2012/03/09 10:23	2012/03/12 05:30	2012/03/16 17:00	PA30x o/s + BP76 i/s.
Ontario - Michigan Export Winter	1700	2012/03/09 15:31	2012/03/12 06:00	2012/03/23 18:00	L4D PAR byp + Keith T22/23 o/s.
Ontario - Michigan	1350	2012/03/07	2012/03/12	2012/03/23	L4D PAR byp + Keith T22/23

Import Winter		10:56	06:00	18:00	o/s.
MPFN - Ontario-Minnesota Transfer North	50	2012/03/08 11:16	2012/03/13 08:00	2012/03/15 19:00	F25A + FF T2/A-Bus o/s + other equipment o/s
MPFS - Ontario-Minnesota Transfer South	10	2012/03/08 11:16	2012/03/13 08:00	2012/03/15 19:00	F25A + FF T2/A-Bus o/s + other equipment o/s

Urgent SSR Report for 2012/04/01 generated on 2012/04/01 12:17

System Advisory/Summary

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply Energy(MWhr)	Forecast Demand Energy(MWhr)	Forecast Excess(Shortfall) Energy(MWhr)	Energy Shortfall Hours(Yes/No)
538332	348998	191926	No

System Advisory Notices-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
Major Change Advisory - load	2012/04/01 12:16	2012/04/01 14:00	2012/04/01 18:00	Primary demand forecast has been increased by greater than 1.5% in HE15- HE18.

Hourly Details H1-12

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
Energy(MWhr)	22343	21295	21280	21549	21629	21720	21411	21809	22522	22934	22916	22555
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	430	430	430	430	430	430	430	430	430	430	430	430
Self-Sched (MWhr/hr)	787	785	785	786	786	785	777	750	747	743	735	731
Energy Limit'd (MWhr)	4321	4201	4201	4201	4281	4641	4663	4963	5445	5556	5596	5636
Energy Limit'd Cap (MW)	6411	6411	6762	6494	6494	6762	6572	6522	6705	6705	6755	6762
Imports - Est'd (MW)	0	0	0	0	0	0	108	108	0	0	0	0
Intermittent Capacity (MW)	540	540	540	540	540	540	540	540	540	540	540	540
Self-Sched Capacity (MW)	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)	7481	8409	8073	8072	8072	8073	8702	8654	8132	7831	7839	8233
Outages West(MW)	623	623	623	623	623	623	623	623	623	623	623	623
Total Outages	8104	9032	8696	8695	8695	8696	9325	9277	8755	8454	8462	8856
Forecast Demand												
Primary Demand	12403	12150	11950	11820	11891	12267	12709	13694	14236	14466	14726	14979

East(MW)													
Primary Demand West(MW)		483	477	472	473	469	485	502	514	533	457	459	469
Primary Demand Total(MW)		12886	12627	12422	12293	12360	12752	13211	14208	14769	14923	15185	15448
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
	Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
	Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
	Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
	Add. Cont. Allowance	0	0	0	0	0	0	0	0	0	0	0	0
	Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)													
Energy(MWhr)		9565	8776	8966	9364	9377	9076	8308	7709	7861	8119	7839	7215
Capacity(MW)		10237	9568	10109	10239	10172	9779	8799	7850	7703	7850	7580	6923
Ancillary Services													
AGC Range Required (MW)		100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)		50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)		200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements													
East(MW)		0	0	0	0	0	0	0	0	0	0	0	0
West(MW)		0	0	0	0	0	0	0	0	0	0	0	0

Hourly Details H13-24

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply		H13	H14	H15	H16	H17	H18	H19	H20	H21	H22	H23	H24
Energy(MWhr)		22473	22777	22752	22855	23188	23233	23459	23425	23043	22884	22489	21791
Capacity(MW)		32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)		430	430	430	430	430	430	430	430	430	430	430	430
Self-Sched (MWhr/hr)		729	728	723	723	728	733	762	768	771	772	768	773
Energy Limit'd (MWhr)		5556	5456	5436	5539	5867	5907	5839	5699	5679	5519	5128	4425
Energy Limit'd Cap (MW)		6762	6762	6762	6762	6762	6762	6844	6844	6844	6844	6844	6844
Imports - Est'd (MW)		0	0	0	0	0	0	265	365	0	0	0	0
Intermittent Capacity (MW)		540	540	540	540	540	540	540	540	540	540	540	540
Self-Sched Capacity (MW)		1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)		8235	7831	7836	7836	7831	7826	7715	7709	7706	7705	7709	7704
Outages West(MW)		623	623	623	623	623	623	623	623	623	623	623	623
Total Outages		8858	8454	8459	8459	8454	8449	8338	8332	8329	8328	8332	8327
Forecast Demand													
Primary Demand East(MW)		15075	15054	15060	15343	15482	15461	15634	16117	15407	14500	13552	12835
Primary Demand West(MW)		473	470	484	514	520	557	571	583	579	567	546	530
Primary Demand Total(MW)		15548	15524	15544	15857	16002	16018	16205	16700	15986	15067	14098	13365
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
	Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
	Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
	Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
	Add. Cont.	0	0	0	0	0	0	0	0	0	0	0	0

Allowance												
Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)												
Energy(MWhr)	7033	7361	7316	7106	7294	7323	7362	6833	7165	7925	8499	8534
Capacity(MW)	6821	7249	7224	6911	6771	6760	6949	6560	6912	7832	8797	9535
Ancillary Services												
AGC Range Required (MW)	100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)	50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)	200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements												
East(MW)	0	0	0	0	0	0	0	0	0	0	0	0
West(MW)	0	0	0	0	0	0	0	0	0	0	0	0

SAA Notes

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Security and Adequacy Assessment Notes-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment

Transmission Interfaces

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Internal Transmission Interface Limitations					
Facility	**Operating Limit**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
FIO - Flow Into Ottawa	2400	2012/03/07 10:53	2012/02/14 15:00	2012/04/13 17:00	Hawthorne T3 o/s, HT1P1 + HT4 Bus open as C/A.
Madawaska Generation - Madawaska 115 kV generation	400	2012/03/07 14:33	2012/03/07 10:16	2012/12/31 23:59	All i/s. Assumed 25 MW G/R armed.
Flow North - flow north on circuits X503E, X504E and D5H	1900	2012/03/07 11:12	2012/03/07 11:10	2012/12/31 23:00	All i/s.
Flow South - flow south on circuits X503E, X504E and D5H	1550	2012/03/07 11:13	2012/03/07 11:12	2012/12/31 23:00	All i/s.
WMFE - Wawa-Mackay Flow East	590	2012/03/20 11:41	2012/03/07 11:13	2012/12/31 23:00	All i/s.
TEK - Transfer East of Kenora	350	2012/03/07 10:42	2012/03/07 14:00	2012/12/31 23:59	All i/s.
TEM - Transfer East of Mackenzie	475	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Lakehead(Ecct)E - Lakehead East Circuit Flow East	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
EWTE - East-West Transfer East	325	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
TWM - Transfer West of Mackenzie	350	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
EWTW - East-West Transfer West	350	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
SFW Global - Sudbury Flow West Global	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
FID - Flow Into Dobbin	390	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
FIO - Flow Into Ottawa	2900	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Miss(Ecct)W - Mississagi East	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.

Circuits Flow West					
Miss(Ecct)E - Mississagi East Circuits Flow East	550	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Chats Falls Area Generation - Chats Falls GS 230 kV Area Generation	650	2012/03/07 14:29	2012/03/07 14:26	2012/12/31 23:59	All i/s.
P33C Inflow - P33C Chats Falls Inflow	335	2012/03/07 15:16	2012/03/07 14:28	2012/12/31 23:59	All i/s.
Beauharnois Delivery	790	2012/03/07 15:16	2012/03/07 14:32	2012/12/31 23:59	All i/s. Assumed maximum G/R armed.
D5A Import - D5A Import From Maclaren	240	2012/03/07 14:55	2012/03/07 14:34	2012/12/31 23:59	All i/s.
D5A Export - D5A Export From Maclaren	190	2012/03/07 14:55	2012/03/07 14:35	2012/12/31 23:59	All i/s.
FABCW - Flow Away From Bruce Complex plus wind generation in the Bruce Area	5800	2012/03/08 10:51	2012/03/08 10:51	2012/12/31 23:59	All i/s.
Positive BLIP - Positive Buchanan Longwood Input	3000	2012/03/08 10:52	2012/03/08 10:51	2012/12/31 23:59	All i/s.
Negative BLIP - Negative Buchanan Longwood Input	1500	2012/03/08 10:53	2012/03/08 10:52	2012/12/31 23:59	All i/s.
FETT - Flow East To Toronto	5000	2012/03/08 10:54	2012/03/08 10:54	2012/12/31 23:59	All i/s.
CLAN - Claireville North	2000	2012/03/08 10:55	2012/03/08 10:54	2012/12/31 23:59	All i/s,
CLAS - Claireville South	1000	2012/03/08 10:55	2012/03/08 10:55	2012/12/31 23:59	All i/s.
TEK - Transfer East of Kenora	175	2012/03/15 12:11	2012/03/19 11:30	2012/05/10 16:30	K24F o/s.
TEM - Transfer East of Mackenzie	300	2012/03/07 10:54	2012/03/19 11:30	2012/05/10 16:30	K24F o/s.
EWTE - East-West Transfer East	250	2012/03/07 10:54	2012/03/19 11:30	2012/05/10 16:30	K24F o/s.
FABCW - Flow Away From Bruce Complex plus wind generation in the Bruce Area	4700	2012/03/30 05:55	2012/03/26 06:00	2012/04/05 19:00	B561M o/s. Note: This outage is Monday to Thursdays only. B561M will be in service Fridays, Saturdays and Sundays.
					B561M o/s. Note: This outage is

Negative BLIP - Negative Buchanan Longwood Input	350	2012/03/30 05:55	2012/03/26 06:00	2012/04/05 19:00	Monday to Thursdays only. B561M will be in service Fridays, Saturdays and Sundays.
FETT - Flow East To Toronto	4500	2012/03/30 05:55	2012/03/26 06:00	2012/04/05 19:00	B561M o/s. Note: This outage is Monday to Thursdays only. B561M will be in service Fridays, Saturdays and Sundays.
Other	295	2012/03/29 09:51	2012/03/29 09:48	2012/04/02 16:00	GLP Inflow Limit penalized by 70 MW due to Third Line 405 breaker O/S.
TEK - Transfer East of Kenora	100	2012/03/30 14:27	2012/03/30 08:37	2012/04/02 23:59	K6F forced o/s with K24F on planned outage.
Flow North - flow north on circuits X503E, X504E and D5H	1450	2012/03/30 14:30	2012/03/30 14:28	2012/04/05 18:00	Essa JL504 on outage.

Intertie Transmission Interface Limitations					
Facility	**Operating Limit**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Ontario - Michigan Export Winter	1775	2012/03/29 10:01	2011/11/01 00:00	2012/04/05 16:30	LxD phase shifters on neutral tap.
Ontario - Michigan Import Winter	1400	2012/03/29 10:01	2011/11/01 00:00	2012/04/05 16:30	LxD phase shifters on neutral tap.
Ontario Niagara - New York Export Winter	1650	2012/03/07 10:55	2012/01/19 14:44	2012/12/31 14:44	BP76 o/s.
Ontario Niagara - New York Import Winter	1050	2012/03/07 10:55	2012/01/19 14:45	2012/12/31 14:45	BP76 o/s.
Ontario - Michigan Export Winter	1700	2012/03/29 10:01	2012/02/13 04:30	2012/04/05 16:30	L4D PAR byp + PS5 SS on single supply.
Ontario - Michigan Import Winter	1350	2012/03/29 10:01	2012/02/13 04:30	2012/04/05 16:30	L4D PAR byp + PS5 SS on single supply.
Ontario - Michigan Export Winter	1880	2012/03/29 10:02	2012/02/22 00:00	2012/04/05 16:30	L4D Par Byp.
Ontario - Michigan Import Winter	1500	2012/03/29 10:02	2012/02/22 00:00	2012/04/05 16:30	L4D Par Byp.
Ontario - Quebec Kipawa 115 kV Export Winter or Summer	100	2012/03/07 11:18	2012/03/07 11:17	2012/04/30 23:00	All i/s.
OMTW - Ontario-Manitoba Transfer West	300	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
OMTE - Ontario-Manitoba Transfer	300	2012/03/07	2012/03/07	2012/12/31	All i/s.

East		10:46	14:00	23:59	
MPFN - Ontario-Minnesota Transfer North	100	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
MPFS - Ontario-Minnesota Transfer South	150	2012/03/07 10:47	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Ontario - Quebec Beauharnois 230 kV Export Winter or Summer	460	2012/03/07 15:19	2012/03/07 14:58	2012/12/31 23:59	All i/s.
Ontario - Quebec Beauharnois 230 kV Import Winter or Summer	790	2012/03/07 15:19	2012/03/07 14:59	2012/12/31 23:59	All i/s.
Ontario - Quebec Maclaren 230 kV Export Winter or Summer	190	2012/03/07 15:21	2012/03/07 15:20	2012/12/31 23:59	All i/s.
Ontario - Quebec Maclaren 230 kV Import Winter or Summer	240	2012/03/07 15:22	2012/03/07 15:21	2012/12/31 23:59	All i/s.
Ontario - Quebec Masson 115 kV Export Winter or Summer	50	2012/03/07 15:23	2012/03/07 15:22	2012/12/31 23:59	All i/s.
Ontario - Quebec Masson 115 kV Import Winter or Summer	166	2012/03/07 15:25	2012/03/07 15:24	2012/12/31 23:59	All i/s.
Ontario - Quebec Paugan 230 kV Export Winter or Summer	0	2012/03/07 15:28	2012/03/07 15:26	2012/12/31 23:09	All i/s.
Ontario - Quebec Paugan 230 kV Import Winter or Summer	335	2012/03/07 15:30	2012/03/07 15:28	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 230 kV Export Winter	140	2012/03/07 15:34	2012/03/07 15:30	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 230 kV Import Winter	0	2012/03/07 15:33	2012/03/07 15:32	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 203 kV Export Summer	120	2012/03/07 15:33	2012/03/07 15:33	2012/12/31 23:59	All i/s.

Ontario - Quebec Quyon 203 kV Import Summer	0	2012/03/07 15:36	2012/03/07 15:35	2012/12/31 23:59	All i/s.
Ontario - Quebec Bryson 115 kV Export Winter or Summer	0	2012/03/07 15:38	2012/03/07 15:37	2012/12/31 23:59	All i/s.
Ontario - Quebec Bryson 115 kV Import Winter or Summer	65	2012/03/07 15:39	2012/03/07 15:38	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Export Winter or Summer	1230	2012/03/07 15:41	2012/03/07 15:40	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Import Winter or Summer	1230	2012/03/07 15:41	2012/03/07 15:41	2012/12/31 23:59	All i/s.
OMTW - Ontario-Manitoba Transfer West	50	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
MPFS - Ontario-Minnesota Transfer South	30	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
MPFN - Ontario-Minnesota Transfer North	50	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
OMTE - Ontario-Manitoba Transfer East	250	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
Ontario - Quebec Rapide 115 kV Import Winter or Summer	0	2012/03/30 14:30	2012/03/29 10:15	2012/04/06 16:00	D4Z o/s.
OMTE - Ontario-Manitoba Transfer East	100	2012/03/30 14:30	2012/03/30 08:38	2012/04/02 23:59	K6F forced o/s with K24F on planned outage.
Ontario - Michigan Export Winter	1730	2012/03/30 18:04	2012/03/30 17:54	2012/04/05 17:00	B3N nt + L4D PAR b/p + PS5 SS.
Ontario - Michigan Import Winter	1600	2012/03/30 18:04	2012/03/30 17:54	2012/04/05 17:00	B3N nt + L4D PAR b/p + PS5 SS.
Ontario - Quebec Beauharnois 230 kV Export Winter or Summer	0	2012/03/27 13:33	2012/04/01 17:00	2012/04/09 04:00	HQ Chateauguay T14, GC1 & GC2 o/s.

Urgent SSR Report for 2012/04/09 generated on 2012/04/09 20:08

System Advisory/Summary

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply Energy(MWhr)	Forecast Demand Energy(MWhr)	Forecast Excess(Shortfall) Energy(MWhr)	Energy Shortfall Hours(Yes/No)
499740	354256	148076	No

System Advisory Notices-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
Major Change Advisory - transmission	2012/04/09 20:04	2012/04/09 20:02	2012/04/09 20:02	A transmission outage will result in the Flow North and Flow South operating security limit being decreased by >25%. (see transmission interface for details) E510V will be O/S from April 10/12 06:00 to 11:00 for emergency repairs.
Major Change Advisory	2012/04/09 09:44	2012/04/09 07:00	2012/04/09 10:00	The IESO is no longer curtailing NYISO exports pre-emptively.

Hourly Details H1-12

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10	H11	H12
Energy(MWhr)	20769	20111	19049	19741	19669	19953	20647	20588	21014	21145	21225	21306
Capacity(MW)	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)	428	428	428	428	428	428	428	428	428	428	428	428
Self-Sched (MWhr/hr)	505	505	506	488	490	694	725	735	735	735	735	735
Energy Limit'd (MWhr)	4246	3586	3526	3646	3686	3766	4429	4360	4786	4917	4997	5057
Energy Limit'd Cap (MW)	6367	6365	6783	6783	6897	6897	6897	6897	6897	6897	6897	6876
Imports - Est'd (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Intermittent Capacity (MW)	540	540	540	540	540	540	540	540	540	540	540	540

Self-Sched Capacity (MW)		1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)		9021	9021	9605	9033	9031	8827	8796	8786	8786	8786	8786	8786
Outages West(MW)		626	626	626	626	626	626	626	626	626	626	626	626
Total Outages		9647	9647	10231	9659	9657	9453	9422	9412	9412	9412	9412	9412
Forecast Demand													
Primary Demand East(MW)		11476	11270	11372	11441	11992	12938	13918	14960	15412	15768	15935	15688
Primary Demand West(MW)		419	470	470	467	469	463	421	431	452	451	454	453
Primary Demand Total(MW)		11895	11740	11842	11908	12461	13401	14339	15391	15864	16219	16389	16141
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
Min. 10-Minute OR		945	945	945	945	945	945	945	945	945	945	945	945
Min. 10-Minute Spin OR		236	236	236	236	236	236	236	236	236	236	236	236
Load Forecast Uncertainty		0	0	0	0	0	0	0	0	0	0	0	0
Add. Cont. Allowance		0	0	0	0	0	0	0	0	0	0	0	0
Intrahour Margin (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)													
Energy(MWhr)		8982	8479	7315	7941	7316	6660	6416	5305	5258	5034	4944	5273
Capacity(MW)		9685	9840	9154	9660	9109	8373	7466	6424	5951	5596	5426	5674
Ancillary Services													
AGC Range Required (MW)		100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)		50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)		200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements													
East(MW)		0	0	0	0	0	0	0	0	0	0	0	0
West(MW)		0	0	0	0	0	0	0	0	0	0	0	0

Hourly Details H13-24

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Forecast Supply		H13	H14	H15	H16	H17	H18	H19	H20	H21	H22	H23	H24
Energy(MWhr)		21415	21254	21454	21385	21385	21380	21300	21472	21423	20720	20891	20444
Capacity(MW)		32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537	32537
Intermittent (MWhr/hr)		428	428	428	428	428	428	428	428	428	428	428	428
Self-Sched (MWhr/hr)		735	735	735	723	724	735	735	735	745	743	719	712
Energy Limit'd (MWhr)		5097	4957	5157	5100	5168	5088	5008	5180	5140	4374	4569	4129
Energy Limit'd Cap (MW)		6807	6828	6828	6828	6897	6897	6897	6897	6897	6702	6702	6702
Imports - Est'd (MW)		0	0	0	0	0	0	0	0	0	0	0	0
Intermittent Capacity (MW)		540	540	540	540	540	540	540	540	540	540	540	540
Self-Sched Capacity (MW)		1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084	1084
Outages East(MW)		8786	8786	8786	8798	8797	8722	8722	8722	8731	8863	8887	8894
Outages West(MW)		626	626	626	626	626	626	626	626	626	626	626	626
Total Outages		9412	9412	9412	9424	9423	9348	9348	9348	9357	9489	9513	9520
Forecast Demand													
Primary Demand East(MW)		15606	15393	15266	15420	15538	15462	15539	16074	15702	14738	13553	12773
Primary Demand West(MW)		448	442	441	427	415	421	469	504	522	519	507	487
Primary Demand Total(MW)		16054	15835	15707	15847	15953	15883	16008	16578	16224	15257	14060	13260
Dispatchable Load (MW)		108	108	108	108	108	108	108	108	108	108	108	108
GRH (MW)	Total Operating Reserve (MW)	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418	1418
	Min. 10-Minute OR	945	945	945	945	945	945	945	945	945	945	945	945
	Min. 10-Minute Spin OR	236	236	236	236	236	236	236	236	236	236	236	236
	Load Forecast Uncertainty	0	0	0	0	0	0	0	0	0	0	0	0
	Add. Cont.	0	0	0	0	0	0	0	0	0	0	0	0

Allowance												
Intrahour Margin (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Excess(Shortfall)												
Energy(MWhr)	5469	5527	5855	5646	5540	5605	5400	5002	5307	5571	6939	7292
Capacity(MW)	5761	5980	6108	5956	5851	5996	5871	5301	5646	6481	7654	8447
Ancillary Services												
AGC Range Required (MW)	100	100	100	100	100	100	100	100	100	100	100	100
AGC Rate Required (MW/Min)	50	50	50	50	50	50	50	50	50	50	50	50
AGC Range Available (MW)	200	200	200	200	200	200	200	200	200	200	200	200
Reliability Must Run Required (MW)	0	0	0	0	0	0	0	0	0	0	0	0
Black Start Adequate (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Minimum Operating Reserve Requirements												
East(MW)	0	0	0	0	0	0	0	0	0	0	0	0
West(MW)	0	0	0	0	0	0	0	0	0	0	0	0

SAA Notes

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Security and Adequacy Assessment Notes-Title	Date/Time Issued	Start Date/Time	End Date/Time	Comment
System note	2012/04/06 12:39	2012/04/08 00:00	2012/04/09 07:00	Due to anticipated surplus baseload generation, Ontario market participants have withdrawn about 600 MW of capacity from the IESO-administered market for the period April 5, 23:00 to April 9, 07:00. The capacity reduction will be reflected in the Forecast Surplus Baseload Generation reports for this period.
Minimum Generation Alert	2012/04/08 13:47	2012/04/09 00:00	2012/04/09 07:00	Surplus Baseload Generation is expected to exceed forecasted exports of 1800 MW for HE01-HE07. IESO may take actions to minimize the effect of SBG. These actions may include the curtailment of imports and reduction of generation units.

Transmission Interfaces

System Advisory/Summary Hourly Details H1-12 Hourly Details H13-24 Transmission Interfaces SAA Notes

Internal Transmission Interface Limitations					
Facility	**Operating Limit**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
FIO - Flow Into Ottawa	2400	2012/03/07 10:53	2012/02/14 15:00	2012/04/13 17:00	Hawthorne T3 o/s, HT1P1 + HT4 Bus open as C/A.
Madawaska Generation - Madawaska 115 kV generation	400	2012/03/07 14:33	2012/03/07 10:16	2012/12/31 23:59	All i/s. Assumed 25 MW G/R armed.
Flow North - flow north on circuits X503E, X504E and D5H	1900	2012/03/07 11:12	2012/03/07 11:10	2012/12/31 23:00	All i/s.
Flow South - flow south on circuits X503E, X504E and D5H	1550	2012/03/07 11:13	2012/03/07 11:12	2012/12/31 23:00	All i/s.
WMFE - Wawa-Mackay Flow East	590	2012/03/20 11:41	2012/03/07 11:13	2012/12/31 23:00	All i/s.
TEK - Transfer East of Kenora	350	2012/03/07 10:42	2012/03/07 14:00	2012/12/31 23:59	All i/s.
TEM - Transfer East of Mackenzie	475	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
TWM - Transfer West of Mackenzie	350	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Lakehead(Ecct)E - Lakehead East Circuit Flow East	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
EWTE - East-West Transfer East	325	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Miss(Ecct)E - Mississagi East Circuits Flow East	550	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
SFW Global - Sudbury Flow West Global	9999	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
FID - Flow Into Dobbin	390	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
FIO - Flow Into Ottawa	2900	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Miss(Ecct)W -		2012/03/07	2012/03/07	2012/12/31	

Mississagi East Circuits Flow West	9999	10:43	14:00	23:59	All i/s.
EWTW - East-West Transfer West	350	2012/03/07 10:43	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Chats Falls Area Generation - Chats Falls GS 230 kV Area Generation	650	2012/03/07 14:29	2012/03/07 14:26	2012/12/31 23:59	All i/s.
P33C Inflow - P33C Chats Falls Inflow	335	2012/03/07 15:16	2012/03/07 14:28	2012/12/31 23:59	All i/s.
Beauharnois Delivery	790	2012/03/07 15:16	2012/03/07 14:32	2012/12/31 23:59	All i/s. Assumed maximum G/R armed.
D5A Import - D5A Import From Maclaren	240	2012/03/07 14:55	2012/03/07 14:34	2012/12/31 23:59	All i/s.
D5A Export - D5A Export From Maclaren	190	2012/03/07 14:55	2012/03/07 14:35	2012/12/31 23:59	All i/s.
FABCW - Flow Away From Bruce Complex plus wind generation in the Bruce Area	5800	2012/03/08 10:51	2012/03/08 10:51	2012/12/31 23:59	All i/s.
Positive BLIP - Positive Buchanan Longwood Input	3000	2012/03/08 10:52	2012/03/08 10:51	2012/12/31 23:59	All i/s.
Negative BLIP - Negative Buchanan Longwood Input	1500	2012/03/08 10:53	2012/03/08 10:52	2012/12/31 23:59	All i/s.
FETT - Flow East To Toronto	5000	2012/03/08 10:54	2012/03/08 10:54	2012/12/31 23:59	All i/s.
CLAN - Claireville North	2000	2012/04/04 11:07	2012/03/08 10:54	2012/12/31 23:59	All i/s.
CLAS - Claireville South	1000	2012/03/08 10:55	2012/03/08 10:55	2012/12/31 23:59	All i/s.
TEK - Transfer East of Kenora	175	2012/03/15 12:11	2012/03/19 11:30	2012/05/10 16:30	K24F o/s.
TEM - Transfer East of Mackenzie	300	2012/03/07 10:54	2012/03/19 11:30	2012/05/10 16:30	K24F o/s.
EWTE - East-West Transfer East	250	2012/03/07 10:54	2012/03/19 11:30	2012/05/10 16:30	K24F o/s.
Flow North - flow north on circuits X503E, X504E and D5H	1450	2012/04/04 14:52	2012/03/30 14:28	2012/04/11 06:00	Essa JL504 on outage.
Flow South - flow south on circuits		2012/04/04	2012/04/04	2012/04/11	Serie Compensation on X504E

X503E, X504E and D5H	1400	10:56	10:00	06:00	o/s.

Intertie Transmission Interface Limitations					
Facility	**Operating Limit**	**Date/Time Issued**	**Start Date/Time**	**End Date/Time**	**Comments**
Ontario - Quebec Kipawa 115 kV Export Winter or Summer	100	2012/03/07 11:18	2012/03/07 11:17	2012/04/30 23:00	All i/s.
OMTW - Ontario-Manitoba Transfer West	300	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
OMTE - Ontario-Manitoba Transfer East	300	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
MPFS - Ontario-Minnesota Transfer South	150	2012/03/07 10:47	2012/03/07 14:00	2012/12/31 23:59	All i/s.
MPFN - Ontario-Minnesota Transfer North	100	2012/03/07 10:46	2012/03/07 14:00	2012/12/31 23:59	All i/s.
Ontario - Quebec Beauharnois 230 kV Export Winter or Summer	460	2012/03/07 15:19	2012/03/07 14:58	2012/12/31 23:59	All i/s.
Ontario - Quebec Beauharnois 230 kV Import Winter or Summer	790	2012/03/07 15:19	2012/03/07 14:59	2012/12/31 23:59	All i/s.
Ontario - Quebec Maclaren 230 kV Export Winter or Summer	190	2012/03/07 15:21	2012/03/07 15:20	2012/12/31 23:59	All i/s.
Ontario - Quebec Maclaren 230 kV Import Winter or Summer	240	2012/03/07 15:22	2012/03/07 15:21	2012/12/31 23:59	All i/s.
Ontario - Quebec Masson 115 kV Export Winter or Summer	50	2012/03/07 15:23	2012/03/07 15:22	2012/12/31 23:59	All i/s.
Ontario - Quebec Masson 115 kV Import Winter or Summer	166	2012/03/07 15:25	2012/03/07 15:24	2012/12/31 23:59	All i/s.
Ontario - Quebec					

Paugan 230 kV Export Winter or Summer	0	2012/03/07 15:28	2012/03/07 15:26	2012/12/31 23:09	All i/s.
Ontario - Quebec Paugan 230 kV Import Winter or Summer	335	2012/03/07 15:30	2012/03/07 15:28	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 230 kV Export Winter	140	2012/03/07 15:34	2012/03/07 15:30	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 230 kV Import Winter	0	2012/03/07 15:33	2012/03/07 15:32	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 203 kV Export Summer	120	2012/03/07 15:33	2012/03/07 15:33	2012/12/31 23:59	All i/s.
Ontario - Quebec Quyon 203 kV Import Summer	0	2012/03/07 15:36	2012/03/07 15:35	2012/12/31 23:59	All i/s.
Ontario - Quebec Bryson 115 kV Export Winter or Summer	0	2012/03/07 15:38	2012/03/07 15:37	2012/12/31 23:59	All i/s.
Ontario - Quebec Bryson 115 kV Import Winter or Summer	65	2012/03/07 15:39	2012/03/07 15:38	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Export Winter or Summer	1230	2012/03/07 15:41	2012/03/07 15:40	2012/12/31 23:59	All i/s.
Ontario - Quebec Outaouais 230 kV Import Winter or Summer	1230	2012/03/07 15:41	2012/03/07 15:41	2012/12/31 23:59	All i/s.
OMTW - Ontario-Manitoba Transfer West	50	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
MPFS - Ontario-Minnesota Transfer South	30	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
MPFN - Ontario-Minnesota Transfer North	50	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.
OMTE - Ontario-Manitoba Transfer East	250	2012/03/07 10:57	2012/03/19 11:30	2012/05/10 17:30	K24F o/s.

Ontario - Quebec Rapide 115 kV Import Winter or Summer	0	2012/04/04 07:44	2012/03/29 10:15	2012/04/11 15:00	D4Z o/s.
Ontario - Quebec Beauharnois 230 kV Export Winter or Summer	0	2012/03/27 13:33	2012/04/01 17:00	2012/04/09 04:00	HQ Chateauguay T14, GC1 & GC2 o/s.
Ontario - Michigan Export Winter	1970	2012/04/04 15:25	2012/04/05 09:00	2012/05/01 01:00	Base limits. L4D b/p.
Ontario Niagara - New York Export Winter	1550	2012/04/04 15:25	2012/04/05 09:00	2012/05/01 00:00	BP76 o/s, Michigan PARs regulating
Ontario Niagara - New York Import Winter	950	2012/04/04 15:25	2012/04/05 09:00	2012/05/01 00:00	BP76 o/s, Michigan PARs regulating
Ontario - Michigan Import Winter	1540	2012/04/04 15:25	2012/04/05 09:00	2012/05/01 01:00	Base limits. L4D b/p.
Ontario - Michigan Export Winter	1720	2012/04/06 05:17	2012/04/06 05:16	2012/04/09 07:00	BP76 o/s, Michigan PARs regulating
Ontario - Michigan Import Winter	1740	2012/04/06 05:17	2012/04/06 05:17	2012/04/09 07:00	BP76 o/s, Michigan PARs regulating
Ontario - Michigan Export Winter	1400	2012/04/08 13:00	2012/04/08 14:00	2012/04/09 23:59	Limited due to current system conditions.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-24

Northeast Power Coordinating Council
Reliability Assessment
For
Winter 2006 - 2007

Conducted by the

NPCC CO-12 Working Group

November 2006

TABLE OF CONTENTS

Information in this report has been provided by the Operations Planning Working Group of the NPCC Task Force on Coordination of Operation (CO-12) with additional information from Reliability Councils adjacent to NPCC.

The CO-12 Working Group members are:

Jason Drenth	Independent Electricity System Operator (IESO)
Wendell Ingalls	Nova Scotia Power
Dean Landers	New Brunswick System Operator (NBSO)
Ken Layman	New York ISO (NYISO)
Paul Metsa (Chair)	TransÉnergie
Paul Roman	Northeast Power Coordinating Council (NPCC)
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Information from neighboring Reliability Councils provided by:

Bill Harm	PJM Interconnection, LLC (PJM)
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Additional support by:

Phil Fedora (Chair CP-8)	Northeast Power Coordinating Council
Ken Wei	New York ISO (NYISO)

1. Executive Summary

This report focuses on the assessment of reliability within NPCC for the Winter Operating Period of 2006-2007. Portions of this report are based on work previously done for the *NPCC Reliability Assessment for the 2006 Summer Operating Period*[1]. For example, many of the Operational Readiness items discussed in the *NPCC Reliability Assessment for Summer 2006* remain applicable for the Winter Operating Period except where noted in this report.

The NPCC CP-8 Working Group performed a probabilistic analysis to estimate the projected use of Area Operating Procedures designed to mitigate resource shortages for the 2006-2007 Winter Operating Period under various scenarios. Detailed study results for each of these scenarios can be obtained from the *NPCC CP-8 Working Group – Multi-Area Probabilistic Reliability Assessment for Winter 2006/07*.

Those aspects that the Operations Planning Working Group (CO-12) have examined to determine the reliability and adequacy for NPCC for this Winter Operating Period are discussed in detail in the specific report sections. The following Summary of Findings addresses the significant points of the report discussion.

These findings are based on forecasted projections of load requirements, resource configurations and transmission configurations. This report identifies NPCC and the associated Areas' ability to deal with the differing resources and transmission configurations plus the actions needed to reasonably ensure that NPCC and the associated Areas are prepared to deal with possible uncertainties identified in this report.

Summary of Findings

- The forecasted capacity outlook for NPCC during the peak week (week beginning January 14, 2007)[2] indicates a net capacity margin[3] of approximately 12,970 MW. This equates to a net capacity margin of 11.2 % in terms of the 115,591 MW forecasted peak load. The forecasted minimum net capacity margin for NPCC occurs during the week beginning January 21. The margin is then 12,920 MW. The week with the largest net capacity margin is forecasted to occur the week beginning December 24, 2006. (23,829 MW). The net margins for the 2006-2007 Winter Operating Period are generally lower than what had been forecasted for the previous winter. However, most are not very different when a year to year comparison is done. The overall difference is reflected in the purchases outside NPCC. The margin reflected in this assessment is lower than last year's as a result of fewer purchases from outside NPCC in this year's assessment.

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[1] A copy of this report can be found on the NPCC website

[2] Load and Capacity Forecast Summaries for NPCC, Maritimes, New England, New York, Ontario, and Québec are included in Appendix I.

[3] The Net Capacity Margin is defined as installed capacity + firm purchases – firm sales + interruptible loads –maintenance and forced outages – peak load - operating reserves.

- During each Area's forecasted peak week, the forecasted net capacity margin ranges from a margin of approximately 4.1 % margin in Québec to a 25.0 % margin in New York.
- There is approximately 1,350 MW of forecasted new installed capacity for this operating period compared to last year. Québec has 1,080 MW of new capacity. Most of this capacity is already in service, so that any delays to the rest of the capacity additions should not materially impact the overall spare capacity projections for NPCC.
- The Resource and Transmission Assessments used in this report are mere snapshots in time and base case studies. Changes to the base case assumptions can alter this report's findings.
- The summer assessment indicated that each NPCC Area was reasonably prepared or was reviewing the necessary strategies and procedures to deal with operational problems and emergencies as they develop. The CO-12 Working Group believes that these preparations remain valid for dealing with the various operating scenarios expected during the Winter Operating Period. Maritimes and Québec, which are winter peaking areas, have additional preparation as a function of these conditions.

2. Introduction

The NPCC Task Force on Coordination of Operation (TFCO) established the CO-12 Working Group to conduct overall assessments of the reliability of the generation and transmission system in the NPCC Region for the Summer Operating Period (defined as the months of May through September) and the Winter Operating Period (defined as the months of December through March).

The CO-12 incorporated the following elements into the assessment of this Winter Operating Period.[4]

- Utilization of data standards for the reporting of Load and Capacity values to provide a uniform assessment between NPCC Areas and allow for consistent comparison of the results associated with the other parallel pre-seasonal assessments.
- Examination of historical operational experiences and assessment of their applicability.
- Reporting of the potential sensitivities on an Area basis, which may impact resource adequacy, including temperature deviations, merchant plant delays, load forecast uncertainties, fuel availability, load response programs and transmission adequacy.

[4] For the purposes of this report, the Winter Operating Period includes the week beginning November 26, 2006 to the week beginning March 25, 2007 inclusive.

3. Demand Forecasts for Winter 2006-2007

The forecasted non-coincident peak demand for NPCC during the Winter Operating Period is 115,647 MW. This non-coincident peak demand translates to a coincident peak demand of 115,591 MW and is forecasted for the week beginning January 14, 2007. Load and Capacity forecast summaries for NPCC, Maritimes, New England, New York, Ontario, and Québec are included in Appendix I.

Ambient weather conditions are an important variable impacting the demand forecasts. However, unlike the summer demand forecasts, the non-coincident peak demand varies only slightly from the coincident peak forecast in the winter. This is mainly due to the fact that the drivers that impact the peak demand are concentrated into a specific period in time. In winter, the peak demands are determined mainly by low temperatures along with the reduced hours of daylight that occurs over the first few weeks of January.

While the peak demands appear to be confined to a few weeks in January, each Area is aware that reduced margins could occur during any week of the operating period as a result of weather variables and / or higher than normal outage rates.

The impact of extreme ambient weather conditions on load forecasts can be demonstrated by various means. The IESO and Maritimes represent the resulting load forecast uncertainty in their respective Areas as a mathematical function of the base load. The NYISO and TransÉnergie (transmission operations division of Hydro-Québec) use a weather index that relates air temperature and wind speed to the load response and increases the load by a MW factor for each degree below the base value. ISO-NE relates air temperature to the load response and increases the load by a MW factor for each degree below the base value.

Each area's forecast demand and the associated load forecast uncertainty relating to weather variables is described in greater detail in the Summary of Area Forecasts below.

Summary of Area Forecasts

Maritimes

Based on the Maritimes Area 2006-2007 demand forecast, a peak of 5,564 MW is predicted to occur for the Winter Operating Period. The actual peak for Winter 2005-2006 was 4,987 MW on December 21, 2005, which was approximately 593 MW (10.63%) lower than last year's forecast of 5,580 MW. The reduction in demand was due to a combination of higher than normal temperatures, resulting in a lower electric heating load, and a reduction of approximately 200 MW of industrial load due to a labor dispute.

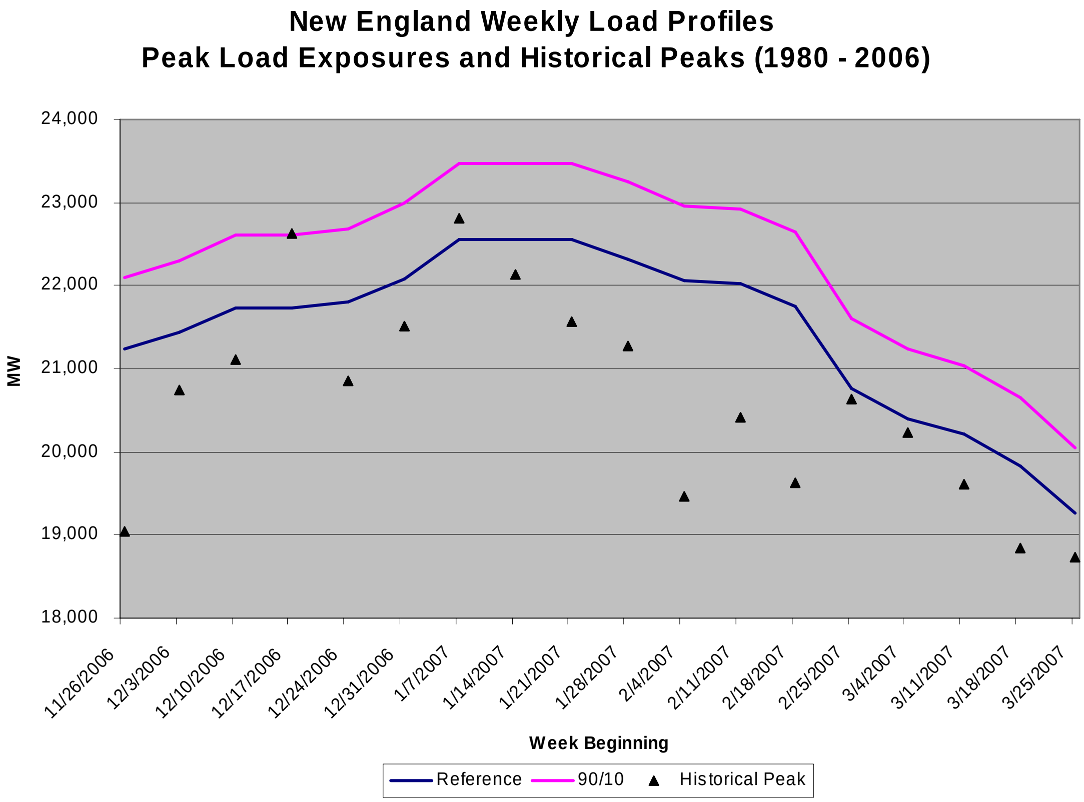
The load forecast for the Maritimes Area represents the expected load for the 2006-2007 Winter Operating Period. It should be noted that the Maritimes Area load is simply the mathematical sum of the forecasted weekly peak loads of the sub-areas (New Brunswick, Nova Scotia, Prince Edward Island, and the area served by the Northern Maine Independent System Operator). As such, it does not take the effect of load coincidence within the week into account. If the total Maritimes Area load included a coincidence factor, the forecast load would be approximately 1-3% lower.

New England

ISO New England's reference forecast (50% chance of being exceeded) for this Winter Operating Period projects a peak demand of 22,550 MW. This projected peak is 230 MW lower than last year's weather normalized peak demand of 22,780 MW. New England's all-time winter peak demand of 22,818 MW occurred on January 15, 2004. If extremely cold weather occurs for a prolonged period during the upcoming Winter Operating Period, the winter peak demand could reach 23,475 MW (10% chance of being exceeded).

The demand forecast for New England is based on weekly weather distributions. The weekly weather distributions were built using 30 years of temperature data at the time of daily electrical peaks (for non-holiday weekdays). The reference load forecast is based on a 50/50 probability of occurrence. While this temperature sampling is used to project temperature sensitive loads, a complete process of sampling and econometric models is used to project the overall aggregate electrical demand. A reasonable approximation for "normal weather" associated with this projection is 6.8 °F (-14 °C). At these forecasted load levels, a one degree Fahrenheit decrease in the temperature will result in approximately 150 MW of additional load.

The following graph illustrates the range of potential peak demands that ISO New England may experience this winter and compares them to historical peaks.

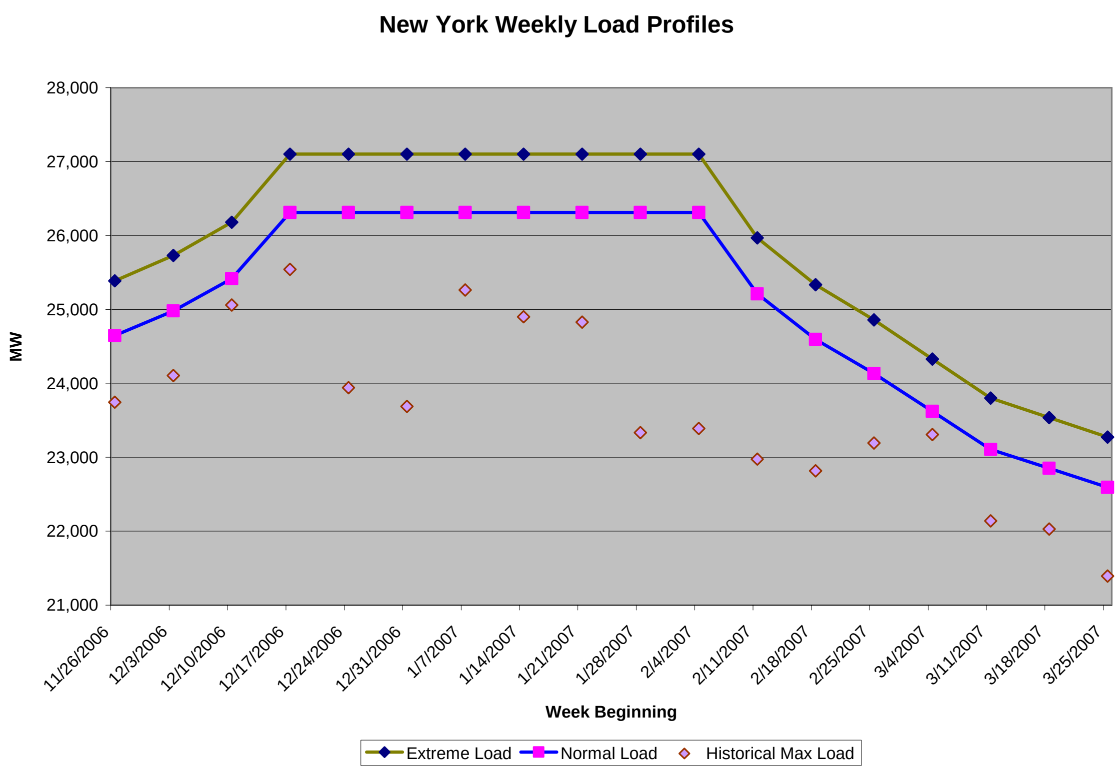

New England Weekly Load Profiles
Peak Load Exposures and Historical Peaks (1980 - 2006)
24,000
23,000
22,000
21,000
20,000
19,000
18,000
MW
11/26/2006
12/3/2006
12/10/2006
12/17/2006
12/24/2006
12/31/2006
1/7/2007
1/14/2007
1/21/2007
1/28/2007
2/4/2007
2/11/2007
2/18/2007
2/25/2007
3/4/2007
3/11/2007
3/18/2007
3/25/2007
Week Beginning
Reference
90/10
Historical Peak

New York

The New York Area peak load forecast for this Winter Operating Period is 26,311 MW, which is 961 MW higher than the forecast of 25,350 MW for the 2005-2006 Winter Operating Period. This forecast load is 3.0 % higher than the all-time winter peak load of 25,541 MW that occurred on December 20, 2004. The daily peak demand observed by New York during the Winter Operating Period occurs in the late afternoon or early evening hours.

The NYISO uses a weather index that relates dry bulb air temperature and wind speed to the load response in the determination of the forecast. At the forecast load levels, a one-degree decrease in this index will result in approximately 100 MW of additional load. A reasonable temperature at which the New York load could reach the forecast peak is 12.9 °F (-11 °C).

The following illustration provides the range of potential peak demands that the New York may experience this winter.



Ontario

The forecasted weather normal, hourly peak demand for this Winter Operating Period is 24,677 MW. This hourly average peak is forecasted to occur during the week beginning January 14, 2006. This weather normal projection is about 3.8 % higher than last year's winter peak of 23,766 MW, which was experienced during a cold snap in mid-December 2005.

Weather variations from normal can propel the demand significantly higher than the weather normal values. For example, when the temperature is below -5 °C (23 °F), a decrease in daily average temperature of one degree Celsius will result in about a 150 MW increase from the weather normal forecast. Likewise, a 10 km/h (6 mph) increase in wind speed will result in approximately a 110 MW increase to the weather normal forecast.

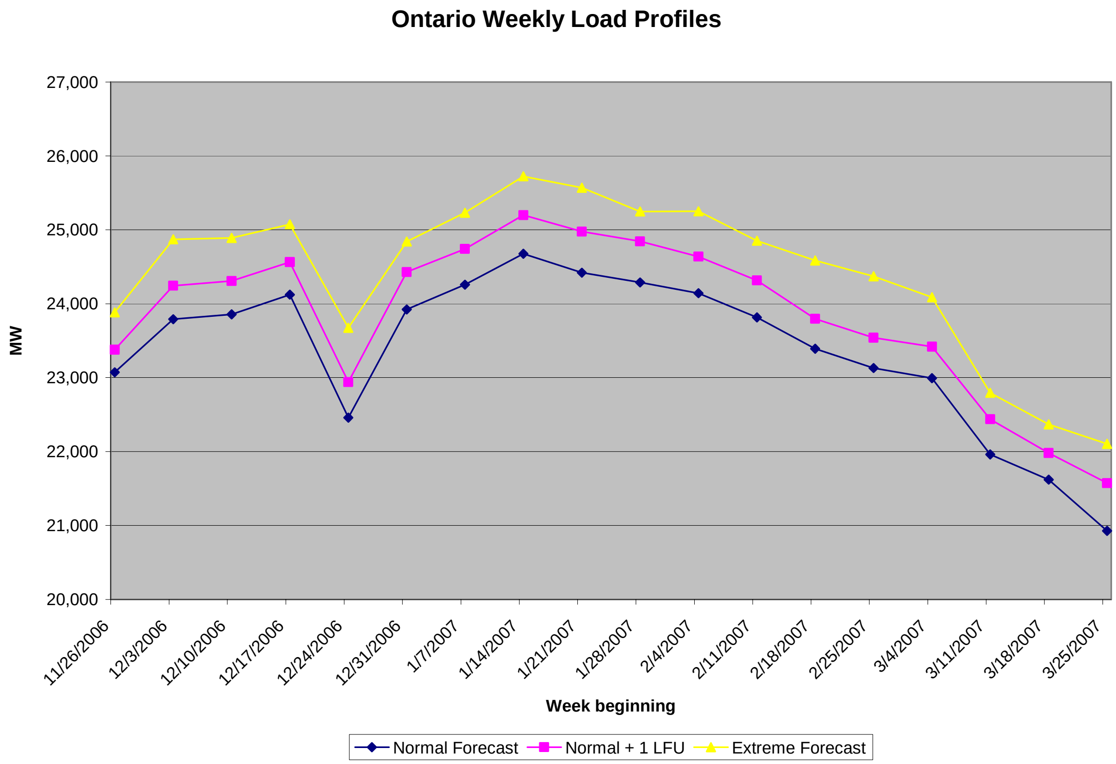
As seen last winter, warmer than normal temperatures can also have dramatic effects on demands. During the winter period, when temperatures are above -5 °C (23 °F), an increase in temperature of one degree Celsius results in a load reduction of approximately 100 MW.

The IESO reflects this weather sensitivity through Load Forecast Uncertainty (LFU) and extreme weather demand forecasts.

LFU is used to capture, in MW, the impact of the variations in weather. In this way, various demand levels can be derived and given an associated probability of occurring based on the likelihood of observing the underlying weather. For this forecast, there is a 50% chance that the monthly peak demand will be exceeded due to the variability of weather. LFU represents the impact on the peak demand of one standard deviation in the weather elements. The values of LFU associated with this analysis range around 2 – 3 % of the predicted normal weather demands. The highest values of LFU for Ontario appear during the end of January and during March. LFU equates to a potential increase in demand of about 600 MW over the projected weather normal demands for the peak week.

The winter operating period can also experience extreme weather driven demands where the system is likely to be under stress. For any given week, the forecasted extreme weather demand is determined by using the coldest day in the past thirty years as the reference point. Depending upon the week in this assessment period, the values that could be experienced under extreme weather conditions can be 3.5 to 5.5 % higher than the normal weather prediction. The extreme forecast demand for the Winter Operating period is approximately 1,050 MW over the normal weather prediction for the peak week and equates to an increase of about 8.3 % over last years actual peak.

The following graph indicates the range of possible demands that the IESO may experience over this Winter Operating Period.



Québec

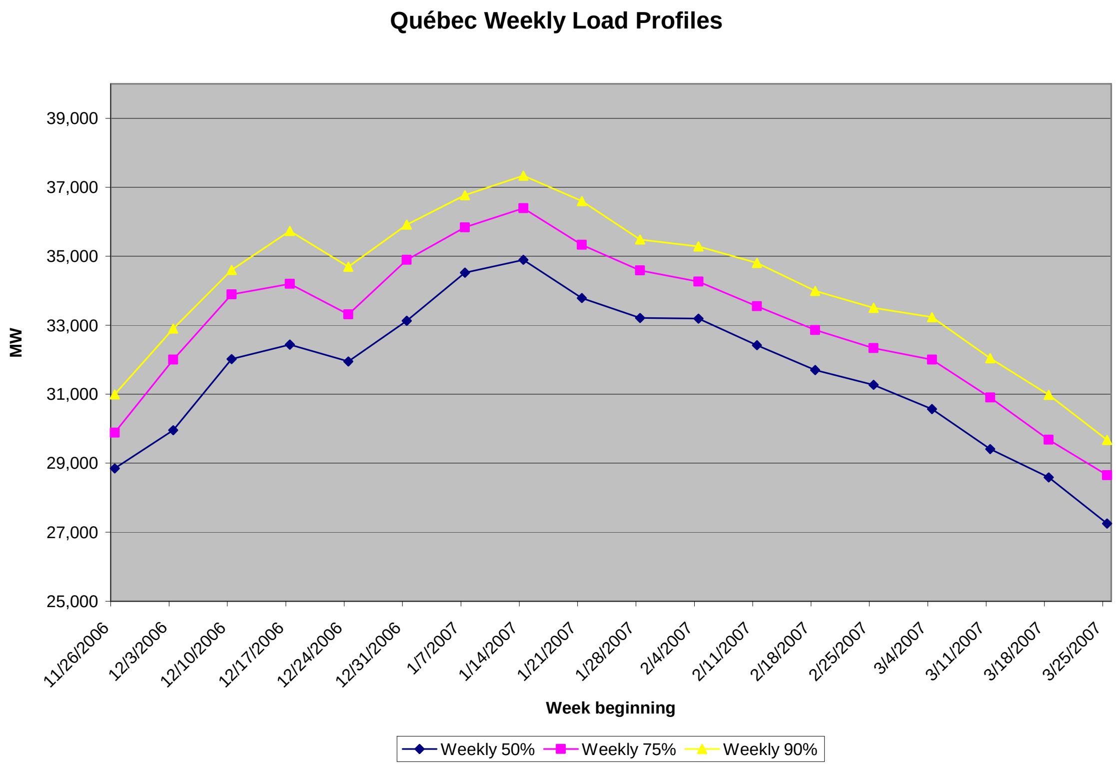
Hydro-Quebec's reference peak load forecast for the 2006-2007 Winter Operating Period with a 50 % probability of being exceeded is 36,391 MW. This is practically the same as the 2005-2006 forecast of 36,418 MW. This value does not include the supply of approximately 145 MW of load to Cornwall (154 MW with losses). This load is supplied by generation at Beauharnois and Les Cèdres Generating Stations. The Cornwall load is included in the Appendix I Load and Capacity table so that the load forecast in that table for the week beginning January 14 is 36,545 MW.

Throughout the Winter Operating Period, as seen in Table 6 of Appendix I, weekly peak load varies from 30,878 MW for the week beginning November 26 to 36,545 MW for the week beginning January 14 and back to 29,649 MW for the week beginning March 25.

Since there is a large proportion of electrical heating load on the Québec system, an episode of extreme weather could induce a large load increase. At normal winter temperatures, a 1 degree Celsius drop in temperature or a 5 km/h wind speed increase causes a load increase of 400 MW on the system. Furthermore, by analyzing extreme historical weather conditions that have occurred in the past 40 years, TransÉnergie has calculated that the load could reach 40,300 MW during the worst of these episodes. This is equivalent to approximately 110 % of the normal peak value.

When forecasting the weekly load curves, three basic forecasts are generated: a 50 %, a 25 % and a 10 % chance of being exceeded for any given week. This provides a range of potential peak demands that the system may experience during the peak period.

The following graph demonstrates the range of potential weekly peak demands on the system for the 2006-2007 Winter Operating Period for a normal range of temperature values.



4. Resource Adequacy

NPCC Summary for Winter 2006-2007

Table 1 of Appendix I is the NPCC load and capacity summary for the Winter Operating Period. Appendix I, Tables 2 to 6, contains the load and capacity summary for each Area of NPCC. Each entry in Table 1 is simply the aggregate of the corresponding entry for the five NPCC Areas. The following table (Table A) summarizes the load and capacity situation for the peak week beginning on January 14, 2007 compared to the winter 2005-2006 forecasted peak week (week beginning January 15, 2006).

TABLE A

All values in MW	Forecasted week of Jan. 14, 2007 Winter 2006-2007	Forecasted week of Jan. 15, 2006 Winter 2005-2006	Difference
Installed Capacity	154,059	152,713	1,346
Purchases into NPCC	80	1,300	-1,220
Sales out of NPCC	182	182	0
Total Capacity	**153,957**	**153,831**	**126**
Load	115,591	114,450	1,141
Interruptible load	2,793	2,249	544
Maintenance/Derating	6,885	6,017	868
Required. reserve	7,331	7,359	-28
Unplanned Outages	13,973	14,238	-265
Net margin	**12,970**	**14,015**	**-1,045**

The net margins for the 2006-2007 Winter Operating Period are generally lower than what had been forecasted for the previous winter. The overall difference is reflected in the purchases from outside NPCC. The margin reflected in this assessment is lower than last year's as a result of fewer purchases from outside NPCC in this year's assessment.

The resource adequacy assessment was performed on the basis of projected available capacity. Inadequate fuel supply, lower than normal water reservoirs, higher than anticipated forced outages or delays in anticipated new facilities can impact these capacity projections.

The following are each Area's assessments supporting this overall resource adequacy assessment.

Projected Load and Capacity Analysis by Area

Maritimes

The Maritimes Area is expecting a net increase of 53 MW of installed generation scheduled for addition to the Maritimes Area during the Winter Operating Period. There will be 72 MW of new wind generation and the retirement of 19 MW of bio-mass thermal. The total installed capacity for the assessment period ranges from a low of 6,852 MW to a high of 6,928 MW. The total capacity available during the forecasted peak load week is 6,703 MW when firm sales are taken into account.

When allowances for known maintenance and deratings, required operating reserve and unplanned outages are considered, the Maritimes Area is projecting adequate net margins for the Winter Operating Period. These net margins range from 363 to 1,442 MW (7 % to 31 %). The corresponding 2005-2006 winter Maritimes capacity margin range was also 7 % to 31 %.

The Maritimes Area assesses its seasonal resource adequacy in accordance with NPCC C-13 Operational Planning Coordination procedure. As such, the assessment considers the regional operating reserve criteria; 100 % of the largest single contingency and 50 % of the second largest contingency.

The Maritimes Area is forecasting normal hydro conditions for the 2006-2007 Winter Operating Period. The Maritimes Area hydro resources are run of the river facilities with limited reservoir storage facilities. These facilities are primarily utilized as peaking units and providing operating reserve.

The Maritimes Area is not relying on outside assistance or external resources during the Winter Operating Period.

New England

Under expected weather and normal resource outages, capacity within New England is forecasted to be sufficient to meet load plus operating reserve requirements during this Winter Operating Period. The lowest projected net margin of 1,740 MW is expected to occur during the week beginning January 28, 2007 while the highest projected net capacity margin of 9,403 MW is expected to occur during the week beginning March 25, 2007, if all assumed system conditions materialize under the reference load forecast (50 % chance of being exceeded). Low and high operable capacity margins of -1,176 MW and 8,612 MW, respectively, are projected under the high load forecast (10 % chance of being exceeded).

Net margin is based on known outages, an allowance for unplanned outages, anticipated generation additions and retirements, projected firm purchases and sales, and the impact of expected Demand Response Programs.

In addition to the allowance for unplanned outages, an allowance for higher unplanned outages due to possible natural gas shortages of New England generators is included in January and February.

During times of capacity deficiencies, ISO New England invokes ISO-NE Operating Procedure No. 4 – *Actions During a Capacity Deficiency* (OP-4) which includes public appeals for conservation, purchasing emergency energy from the neighboring Areas, interrupting real time demand response providers, and implementing voltage reductions.

While ISO New England expects to have adequate operable capacity margins for this winter under expected weather and normal resource outages, if operable capacity shortages occur due to higher than expected resource unavailability or higher than expected load conditions, ISO New England may have to implement ISO-NE OP-4 or ISO-NE Operating Procedure No. 21 – *Action During an Energy Emergency* (OP-21). OP-21 is a new emergency operating procedure designed to provide additional commitment and dispatch flexibility to manage and conserve fuel-limited supply-side resources.

New York

NYISO forecasts a minimum net margin of 5,375 MW during the week beginning on March 18, 2007. These margins range up to 8,892 MW and are generally over 6,500 MW. The net margin for the NPCC peak week (week beginning January 14, 2007) is forecasted to be 6,827 MW. The capacity values and resultant margins indicated in Appendix I, Table 4, are representative of the actual total installed capacity in New York. However, the NYISO conducts semi-annual and monthly Installed Capacity (ICAP) auctions to secure agreements with enough generation to meet its yearly ICAP requirement. The yearly ICAP requirement is based on the amount of generation needed to reliably serve the summer peak load and reserve requirements after accounting for generation outages. For the 2006-2007 Winter Operating Period, the ICAP requirement is 39,288 MW and is based on the summer peak load forecast. The generation that has been selected as ICAP in the New York market is contractually obligated to bid its capacity into the New York markets, and is not necessarily equivalent to the amount of generation physically located in the New York Area (NYISO). Generation physically located in the Area that has not been selected as ICAP, is not bound by any ICAP obligations.

Generation resources, which are external to the New York Area, that provide ICAP to the New York market are included in the total ICAP supply. Resources within the New York Area that provide firm capacity to an entity external to the Area are not included in the ICAP total (i.e. this generation cannot participate in the ICAP market).

Ontario

All resources that were projected to be in service for the summer 2006 and winter 2005-2006 assessments have been declared in service. This represents a net increase of capacity from the winter of 2005-2006 of 412 MW.

Ontario is also expecting a net increase of 5 MW of new generation resources during the actual Winter Operating period. This increase is due to improvements in efficiency to one nuclear generating unit.

With the addition of the new generation, Ontario is expected to have a net capacity margin of approximately 8.3 % over the peak week (2,063 MW). However if all generating unit planned outages were to proceed as requested, the margin would be reduced to about -1.7 % during the week beginning March 4, 2007.

This analysis is based on a review of known outages, a projection of unknown outages, and a forecast of price responsive loads.

For this report period, known outages include those resources that are scheduled to be on planned outages, transmission constrained resources as well as the difference between the installed capacity and the dependable capacity associated with certain resources.

Unknown outages represent an estimate of the forced outages that may be experienced in this study period.

A value of approximately 427 MW of price responsive load has been assumed to be available for this forecast period based on past operational experience.

The net capacity margins, in Table 5 of Appendix I, depict an estimate of the spare capacity margin that does not consider all the additional off-market control actions available to the IESO. For example, the IESO can institute a 3 % or 5 % voltage reduction. These control actions have the effect of reducing the demand by 1.7 % to 2.6 %, which, equates to approximately 400 MW to 600 MW on the peak week for weather normal demands.

The risks associated with this analysis are that demands may be heavier than expected due to extreme weather, units on outage may not return to service as scheduled or units forced unavailable may be higher than projected. The projected margins and control actions available to the IESO are continuously assessed. Should the IESO determine that the Ontario Area is deficient, the appropriate course of action will be taken. Actions can include the adjustment of outage programs and/or securing of assistance via market mechanisms or as a final step, the acquisition of emergency energy from other Areas.

Québec

For the next winter peak period, Québec will have 41,451 MW of total installed generation capacity, increasing to 41,617 MW in February 2007. This constitutes a 1,043 MW increase from last year. This includes 5,064 MW of firm capacity purchases from Churchill-Falls Labrador Co. and 2,257 MW from Québec private producers (consisting of small private producers, Trans Canada Energy, Alcan and a certain number of wind farms). Hydro-Québec Production is commissioning the Eastmain 1 Generating Station in James Bay (160 MW in October 2006 and 160 MW in February 2007). HQP is also commissioning the Mercier G.S. in the southern part of the system (18 MW this winter and 12 MW later in 2007).

Also, a small amount of generating capacity is being added to the system in the fall of 2006 from the refurbishments of two hydro units (Outardes 3 - 52 MW and Outardes 4 - 14 MW). These refurbishments will be in service in December, 2006.

At peak load, 1,880 MW of known maintenance, derating and hydraulic restrictions is expected. This brings the operable capacity to 39,571 MW in January. In addition to this, a total of 500 MW of firm capacity purchases is included. From this total, 300 MW will come from New York and 200 MW from New-Brunswick (Milbank).

The winter peak is expected to materialize during the week of January 14, 2007. The forecast is 36,391 MW. In Table 6 of Appendix I, 154 MW is added to this amount for the Cornwall load, which is fed by radial generation from Québec. The total peak load in Table 6 is therefore 36,545 MW. Firm sales to neighboring systems, excluding the firm sale to Cornwall, amount to 330 MW. This is entirely sold to New England. When the required operating reserve, the interruptible load and the allowance for unplanned outages and load uncertainty are taken into account, the net margin at peak load is 1,486 MW. This is a 918 MW increase over last year's net margin at peak. During the 2006-2007 Winter Operating Period, net margins varying from 1,486 MW to 6,248 MW, can be observed for Québec.

Delays to In-service of New Generation Resources

Maritimes

In the Maritimes Area 72 MW of wind power generation is scheduled for addition during the Winter Operating Period. There is 19 MW of thermal bio-mass generation scheduled to be retired. There is no significant impact on the capacity outlook of the Area if commissioning of this generation is delayed.

New England

It is assumed that approximately 23 MW of new generation will become commercial before the Winter Operating Period. If this capacity is not available due to delays, there will be no significant adverse impacts on the forecasted capacity margins.

New York

Net resource additions, totaling 41 MW are expected to be available for service during the winter period. The Maple Ridge phase 2 wind project with a capacity of 100 MW is expected to be available during the Winter Operating Period, and the uprate of the existing Ginna station is expected to be completed for an additional 95 MW. The overall capacity in the New York Area will be reduced by 154 MW due to the retirement of Huntley 65 and 66.

Ontario

Given the minimal increase to the resource scenario for this Winter Operating Period, delays to the in service of new generation will not dramatically affect the resource adequacy scenario.

Québec

Net resource additions, totalling 1,080 MW will be available for service during the winter period. Trans Canada Energy has commissioned its 547 MW natural gas Generating Station and 109 MW of wind generation is to be placed in service before the peak period. Meanwhile, Hydro-Québec production has put in service two of the three 160 MW units at Eastmain 1 Generating Station and three out of five 6 MW units at Mercier Generating Station. Also, refurbishments at Outardes 3 and Outardes 4 will add 66 MW to the capacity of the Québec Area. Finally, a new 20 MW private producer will be commissioned for the winter period. No delays are expected for the additions and refurbishments on the system.

Fuel Infrastructure by Area

The following is a self-assessment by each Area of the expected fuel supply infrastructure.

Maritimes

The Maritimes Area does not consider potential fuel-supply interruptions in the regional assessment. The fuel supply in the Maritimes area is very diverse and includes nuclear, natural gas, coal, oil (both light and residual), Orimulsion, hydro, tidal, municipal waste, and wood. Fuel supplies are expected to be adequate during the projected peak winter demand. Extreme weather conditions should have no impact on the fuel supply to the Area. Responsibility for fuel switching plans lies with the generation owner. All applicable units have the required procedures. The only units with fuel-switching capability are at Tuft's Cove, NS (natural gas or oil) and Dalhousie, New Brunswick (Orimulsion or oil). Each Facility maintains an adequate supply of its primary fuel.

New England

Generators in New England are primarily fueled by natural gas, followed by oil, nuclear, coal, hydro and renewable resources. The region's heavy reliance on natural gas to generate electricity has led to winter reliability concerns, especially following the January 14-16, 2004 cold snap and the unforeseen results of Hurricanes Katrina and Rita during the fall of 2005. Some of the issues that contributed to the problems encountered during the cold snap are constrained regional pipeline capacity into New England, the "non-firm" contracting practices of gas-fired generators, fuel arbitrage, and the disconnect in bidding timelines between the electricity and natural gas markets.

New England's gas-fired electricity generators continue to compete with the ever-growing core natural gas market (i.e. for space heating) for finite supply and transportation infrastructure. Many of New England's gas-fired generators are opting to purchase fuel from the spot market or from non-affiliated fuel managers rather than enter into firm supply/transportation contracts. ISO New England has been performing a pre-winter review of natural gas pipeline transportation contracts held by regional gas-fired generators to identify: 1) which units have the contracts in place to generate electricity on cold winter days; and conversely, 2) the amount of gas-fired capacity that is projected to be unavailable based on their fuel supply arrangements.

During the 2006-2007 Winter Operating Period, it is estimated that under the reference load forecast, 4,200 MW of gas-only generation in New England may be unavailable due to gas supply issues. About 1,550 MW of gas-only capacity has already been converted to dual-fuel capability prior to last winter. It is projected that an additional 800 MW will be converted by around January 2007. These new dual-fuel conversions will significantly contribute to reliably operating the system through winter peak-demand conditions.

In addition, new market rules and revised operating procedures have been developed to address some of the issues brought to light following the cold snap investigation. Included among the measures to be taken during cold weather conditions are temporarily shifting the electric market bidding and commitment process to be more synchronized with the gas nomination cycles, and allowing generation offers to exceed the current $1,000/MWh Effective Offer Cap. Furthermore, the new rules provide enhanced market and operational information during times of extremely cold weather. ISO Operations personnel are now routinely in contact with their operations counterparts in the gas industry (gas control) to identify maintenance and share critical system information for supporting reliable operations in times of system stress.

New York

Traditionally, the New York Area has been dependent on fossil fuels for the largest portion of the installed capacity. Recent capacity additions or enhancements use natural gas as the primary fuel. Extreme weather or other conditions that might limit the availability of natural gas are not anticipated to impact system reliability in New York. A number of the steam units in southeastern New York have "dual-fuel" capability, employing the use of residual or distillate oil as an alternative to natural gas. Adequate supplies of all fuel types are expected to be available.

Ontario

The majority of generation facilities operating on the IESO-controlled grid are represented by three basic types of fuel (Hydroelectric, Nuclear and Fossil). The fossil-fueled facilities are predominately fired by coal. A portion of these fossil-fired resources is fueled by natural gas or oil, with a majority of the oil-fired capability being dual fuel capable (natural gas and oil).

Fuel for a portion of the coal-fired resources is delivered by boat. During the winter months, shipping capability is limited by ice and weather conditions on the Great Lakes. While these conditions may prevent delivery for extended periods, all sites relying on this delivery mechanism stockpile the fuel.

Similar to other Areas, natural gas supplies for electricity generation in Ontario also compete with space heating requirements. However, due to last winter's mild temperatures and a relatively quiet Gulf Hurricane season, natural gas supplies and delivery infrastructures are expected to be adequate for the Winter Operating Period.

At the time of this report, the IESO has not been made aware of any fuel supply concerns. It is therefore expected that adequate supplies of these fuels will be available for the Winter Operating Period.

Québec

Québec's electrical energy is largely produced by hydro generating stations located on different river systems, which are geographically dispersed. The major systems have multi-year storage capability. For planning purposes and day-to-day operation of the Québec system, these multi-year water reserves and other non-hydroelectric resources can be relied upon allowing Québec to cope with periods of low inflows (lower than annual average). Hydro-Québec Production has 876 MW of gas turbines (Jet turbines fuelled by oil or kerosene), 675 MW of nuclear production and 600 MW of classic thermal production (Oil). This accounts for about 5.2 % of the total capacity. The gas turbines and oil generation are used for peaking purposes; fuel supply is not an issue in this case. The new private producer, Trans Canada Energy (TCE), is a natural gas generating station. This generation is delivered under a firm purchase contract to Hydro-Québec Distribution and a firm purchase contract for the natural gas has been secured by TCE.

In its 2005 Triennial Review of Resource Adequacy, Québec required 3,431 MW of reserves to meet the NPCC reliability planning criterion. This represents 9.3 % of the peak load. For the 2006-2007 winter peak, a capacity margin of 4,486 MW is expected, which represent 12.7 % based on the internal peak demand. This is higher than the required reserves as stated in the Québec 2005 Triennial review of Resource Adequacy. Each year, Québec submits to the NPCC an Interim or Triennial Review and Hydro-Québec must demonstrate its reliability to the Québec Energy Board. This exercise is done with the same tools and assumptions as those used in the assessment of resource adequacy for the NPCC.

5. Transmission Adequacy

Transmission studies are usually performed on the basis of meeting summer loads as these represent the highest stress on the system from a reactive support and thermal transfer capability perspective. No specific NPCC Regional Transmission study has been performed for this Winter Operating Period. Recognizing this limitation, the CO-12 working group reviewed the Normal Transfer Capability (NTC) and the Feasible Transfer Capabilities (FTC) under peak loads between the Areas of NPCC.

The following is a transmission adequacy assessment from the perspective of the ability to support differing levels of energy transfers, from Inter-Region, Inter-Area and Intra-Area perspectives.

Inter-Regional Transmission Adequacy

The phase angle regulators (PARs) on the Michigan - Ontario Interface (PS4 on 230 kV circuit L4D and PS51 on circuit L51D) are available but are presently by-passed, pending completion of an agreement being negotiated with the International Transmission Company for the operation of the PARs. Until this agreement is in place, PS4 and PS51 will only be operated off neutral tap under emergency conditions, prior to voltage reductions or load shedding operating actions. Due to a forced outage, 230 kV circuit B3N (230 kV Scott – Bunce Creek circuit) has been out of service since 2003. The circuit was returned to service in November 2006 without a phase shifter at Bunce Creek. Until a new phase shifter is installed replacing one that failed at Bunce Creek (estimated to be 2008) and/or the agreement can be reached, it was assumed that the Michigan - Ontario Ties will remain free flowing for the study period.

Inter Area Transmission Adequacy

The tables in Appendix II provide a summary of the normal transfer capabilities (NTC) on the interfaces between NPCC Areas and for some specific load zone areas. They also indicate the corresponding feasible transfer capabilities (FTC) under peak conditions based on internal limitations or other factors and indicate the rationale behind reductions from the normal transfer capability.

Maritimes to Québec NTC and FTC remain as they were last year. The Québec to Maritimes FTC is down to 900 MW from 1,200 MW, due to the outage of a 315/230 kV transformer at Matapédia Transformer Station. New York (Frontier) to Ontario NTC and FTC are down from 1,410 MW to 1,250 MW, due to limitations on the New York system. The simultaneous FTC from New York to PJM is down from 3,125 MW to 2,300 MW. Ontario to New York (Frontier) NTC and FTC are down from 2,000 MW to 1,600 MW. Ontario to Beauharnois FTC is up from 245 MW to 470 MW. The former value is the TTC intended to cover all operating conditions but the latter value corresponds to the transfer capability likely to be available at peak load under emergency conditions.

The 100 MW Variable Frequency Transformer (VFT) at the Langlois Transformer Station near Les Cèdres Generating Station was commissioned in January 2005. Currently, imports via this interconnection are prohibited except during emergencies. The status of the interconnection should change by March 2007, when full import-export operation will be possible.

Transmission Adequacy Assessment by Area

Maritimes

The Maritimes bulk transmission system is projected to be adequate to supply the demand requirements for the Winter Operating Period. There are no major maintenance outages scheduled on the Maritimes bulk transmission system during the Winter Operating Period.

There have been no major additions to the Maritimes bulk transmission system. Interconnection capability remains unchanged and is capable of delivering up to 700 MW to New England and up to 785 MW to Québec.

New England

During the upcoming Winter Operating Period, New England expects various new transmission facilities to be placed in-service. The first stage of the NSTAR 345 kV Reliability Project involves the addition of two new 345 kV underground cables from Stoughton, Mass. into the Boston area, providing a much needed increase in import capability for this area. The first of those cables went into service in November. The Killingly, Connecticut 345/115 kV transformer will provide a new, independent supply to the eastern Connecticut 115 kV system from the north. The Plumtree to Norwalk combined overhead/underground 345 kV project, which was placed into service in October, provides the first leg of a new 345 kV loop through Southwest Connecticut designed to increase import into the area.

The new 345 kV New Haven to North Rutland project creates a new 345 kV path from southern Vermont into central Vermont, relieving overloads on the 115 kV system and providing voltage support in the area.

Upgrades to the structures and the addition of the Killingly transformer will require outages of the 347 line (Lake Road, Connecticut to Sherman Road, Rhode Island) which will reduce Connecticut import capability.

Another significant outage is the 301 line from Carpenter Hill to Ludlow, which will be out of service from January through March and will reduce east-west transfers.

ISO-NE continually monitors transmission facility additions and coordinates outages in order to mitigate any possible reliability risks that may be associated with changes in the transmission system.

New York

Major transmission facility additions to the New York bulk power system are not planned for the winter 2006-2007 period.

For the Flat Rock Wind Generation project to connect to the NYISO power system, the Chase's Lake Road 230 kV station will tap into the existing Adirondack – Porter #11 230kV circuit. A 230 kV circuit from Chase's Lake Road to Rector Road will terminate at the Rector Road 230/34.5 kV station, and will be available during the winter capability period. The New York Area transmission system is expected to be adequate during the Winter Operating Period.

Ontario

The major transmission projects in Ontario during the 2006-2007 Winter Operating Period are taking place at two stations on the Michigan interface; Scott and Lambton TS. The outages have already begun and will extend past the winter operating period. A major breaker replacement project will be undertaken at Scott TS; this work is expected to be competed by the beginning of the 2007 Summer Operating Period. In parallel, major work is underway at the Lambton switch yard. Major work here includes replacing the strain bus work with rigid bus, re-terminating three circuits, the addition of two new circuits and upgrading three breakers. The overall goal is to reduce the short circuit limitations in the area and allow for the addition of approximately 1700 MW of new gas fired generation in the area over the next 2 years.

There are no long-term internal transfer limitations identified that will significantly impact this load and capacity analysis. However there may be periodic short-term limitations on transfers. For example, on very cold winter nights the transfer north of Essa may limit the amount of hydroelectric generation that can be shut down overnight, limiting ponding operations.

Québec

TransÉnergie has three major projects for the 2006-2007 Winter Operating Period. Hydro-Québec Production is in the process of commissioning the 480 MW Eastmain 1 Generating Station. As mentioned in the summer 2006 assessment, TransÉnergie has therefore commissioned a 60 km (37 mile) double circuit 315 kV line from Eastmain 1 to the Némiscau substation. For this Operating Period, TransÉnergie is placing in service the Eastmain 1 13.8/315 kV transformers to connect the generators to the system.

A 345 Mvar 315 kV capacitor bank is also being added to the high voltage system at the Hertel substation near Montréal to improve voltage support in the load area of the system. Under certain circumstances, internal transfer capability in the southern part of the province is limited by voltage support.

Finally, a new 735/315 kV 1110 MVA transformer is being placed in service at the Arnaud substation on the Churchill Falls system. A large local load increase requires TransÉnergie to add transformer capacity at this station.

During the Winter Operating Period no major maintenance outages are scheduled on the TransÉnergie system. Transmission margins for the peak period are adequate to carry the net internal demand plus the firm capacity sales. Moreover, enough transmission capability remains on the system to carry additional resources that would be called upon if load was greater than the forecast.

Voltage support in the southern part of the system (load area) is a concern during the winter operating period especially during episodes of heavy load. TransÉnergie has an agreement with HQ Production (the largest producer on the system) that maintenance on generators will be finished by December 1, 2006, and that all possible generation will be available. This, along with yearly testing of reactive capability of the generators, ensures maximum availability of reactive power. The end of TransÉnergie maintenance on the high voltage transmission system is also targeted for December 1, 2006. Moreover, TransÉnergie has a target for the availability of both high voltage and low voltage capacitor banks, that no more than 200 Mvar should be unavailable during the Winter Operating Period. The target for the low voltage banks is 90% availability.

On May 27 2006, smoothing reactor XL50 (At Radisson) on pole 1 of the Radisson-Nicolet-Sandy Pond Multi terminal DC (MTDC) link was damaged. The spare was installed and failed on July 17. During the rest of the summer, the MTDC link was operated in hybrid monopolar mode, after a series of tests were made to make sure that this mode was operable. During September, a smoothing reactor from Nicolet was relocated to Radisson and installed. This now permits normal bipolar operation. The actual situation is to rely on a single spare smoothing reactor located at Nicolet.

6. Operational Readiness for 2006-2007

Load Response Programs

Each Area utilizes various methods of demand management associated with interruptible loads. In those Areas where market based structures have been implemented or are evolving there has been a shift in contractual obligations of the interruptible loads. The move is an attempt to manage load interruption, as a result of demand exceeding resources, by giving industrial and commercial customers the ability to respond to price signals in the wholesale electricity marketplace. The following is a summary of current interruptible load programs available or in development to be available for this Winter Operating Period in each Area.

Maritimes

The Maritimes Area does not have any Load Response Programs. Interruptible and Dispatchable loads are forecast on a weekly basis as indicated in Appendix I, Table 2, and are available for use when corrective action is required within the Area.

New England

During times of capacity deficiencies, ISO New England declares ISO-NE Operating Procedure No. 4 – *Actions during a Capacity Deficiency* (OP 4), which includes public appeals for conservation, purchasing emergency energy from the neighboring Areas, activating demand response resources, and implementing voltage reductions.

Demand response resources are activated through ISO-NE's Demand Response Programs. Demand Response Providers enroll resources directly with ISO-NE and enter into agreements with retail customers requiring them to reduce their electricity consumption during OP-4 actions.

During the 2006-2007 Winter Operating Period, ISO-NE will administer the following programs, designed to provide emergency resources:

- 30-Minute Real-Time Demand Response Program
- 2-Hour Real-Time Demand Response Program
- Real-Time Profiled Response Program

Participants within the Real-Time Demand Response Program will be involved in one of two sub-programs based on their response time (30 Minutes or 2 Hours). Each subprogram will require the participant to interrupt during pre-specified actions of OP-4.

Participants in the Real-Time Profiled Response Program will also be required to respond during certain actions of OP-4.

Demand response resources totaling 566 MW are assumed available during OP-4 conditions for the 2006-2007 Winter Operating Period in the Load and Capacity table for New England (Table 3, Appendix I).

In addition to the reliability-based programs, ISO-NE also administers a Real-Time Price Response program and offers the Day-Ahead Load Response Program. Resources in any of the Demand Response programs have the option to participate in the Day-Ahead Load Response Program. Participants in the Day-Ahead Load Response Program will offer an amount of energy into the Day-Ahead market and, if cleared, will be required to interrupt as offered. Within the Price Response program, participants will have the option to voluntarily reduce energy consumption in real time when the zonal price is or is forecasted to be greater than or equal to $100/MWh. Due to their voluntary nature, these programs are not included as capacity in the 2006-2007 Winter Operating Period in the New England Load and Capacity table.

New York

The NYISO Emergency Demand Response Program (EDRP) and Special Case Resources (SCR) load relief programs are only active during the Summer Operating Period.

Ontario

As mentioned in the resource adequacy assessment, under the IESO-Administered Market, there are expected to be approximately 427 MW of price responsive loads available during the peak week. A majority of these loads are treated as a resource that will be dispatched by the IESO once the price of energy in the real time market has exceeded the bid (to buy) price submitted by the load. The subject load must then reduce their demand according to the dispatch instructions.

The Emergency Load Reduction Program (ELRP) is a program that was implemented for the summer of 2006. The ELRP helps address reliability needs by creating incentives for load reduction. The IESO will implement ELRP before applying more severe emergency control actions such as voltage reductions, requesting Ontario generators to apply for environmental variances, and emergency energy purchases from neighboring jurisdictions. When a requirement for ELRP is forecasted either in the day-ahead or early on the day-at-hand, ELRP participants will indicate the load reduction they are willing to provide. For a commitment to reduce load, ELRP participants are paid a standby payment until activation. Following an ELRP activation, participants are paid for their actual measured and verified load reduction.

In June 2006, the IESO implemented a new reliability program, the Day Ahead Commitment Process with an expiry date of November 30, 2006. On November 17, 2006, the IESO Board of Directors approved that the Day Ahead Commitment Process shall continue until such time as another program is implemented that provides at least equivalent reliability benefits. The process will be reviewed annually. The process is aimed at reducing the number of import failures and providing more assurance to internal generation. The design provides a commitment to imports and internal generators, with financial guarantees, in order to provide greater reliability. It uses a simple commitment process that limits the impacts on market prices and uplifts. It required only minor changes to both IESO and participant systems and processes.

Québec

Hydro-Québec Distribution, with TransÉnergie, has developed a voltage reduction program at a large number of distribution substations. Successive upgrades to an already existing system and regular testing by TransÉnergie has prompted Hydro-Québec Distribution to consider the voltage reduction system as a 250 MW resource available in its NERC resource assessment. This program is included in the "Interruptible Load" column in the Appendix I, Table 6.

There are also two interruptible load programs. One program involves large industrial customers and the other involves medium size industrial consumers, dispersed in all parts of the system. However, most interruptible load is concentrated in the southern part of the system, where most of the load occurs. These programs sum to 1,040 MW as shown in Table 6. Clients must be notified 3 to 18 hours in advance, depending on the nature of their individual contracts. (The programs total more than 1,040 MW but a factor is applied to estimate the actual availability of the interruptible load). Table 6 therefore presents 1,290 MW of interruptible load. (Interruptible load plus the voltage reduction program)

A public appeal program is in place to reduce load if the reserve criterion cannot be met or if a particular event occurs on the system. For example, an appeal was made during the 2003-2004 peak load period (this was the historical peak) to sustain reserves during that very high load period and because a 735 kV line (Line 7004 Micoua – Laurentides) had been previously damaged by an ice storm in the Manicouagan region. At that time, the appeal was judged to provide about 800 MW of load relief.

7. Post-Seasonal Assessment and Historical Review

Winter 2005-2006 Post-Seasonal Assessment

NPCC

The sections below describe each Area's winter 2005-2006 operational experiences and compare it to the forecast from the last seasonal assessment. The summer 2006 operational experience is described in the "NPCC Summer 2006 Post-Seasonal Assessment (CO-12)" and in the "Review of Actual 2006 Summer Use of Operating Procedures (CP-8)", previously published.

Maritimes

The Maritimes Area experienced above normal temperatures from mid-December through March. The actual weekly peak loads experienced during this period were typically 14 to 20 % lower than forecast. The coincident peak load experienced by the Maritimes Area during the Winter Operating Period was 4,987 MW on December 21, 2005 at 19:00 EDT. This is 593 MW lower (10.63 %) than the forecast of 5,580 MW. This is due to a combination of higher than normal temperatures, resulting in a lower electric heating load, and a reduction of approximately 200 MW of industrial load due to a labor dispute.

New England

During the 2005-2006 Winter Operating Period, temperatures were very mild and no significant operating events occurred. A peak load of 21,733 MW was experienced on December 14, 2005 at hour ending 19:00.

At the time of New England's 2005-2006 winter peak, the temperature was 17 °F (-8 °C), which is well above the 6.8 °F (-14 °C) that is associated with "normal weather". December was the coldest month of the winter, with the lowest temperatures of the season occurring around the time of the peak load on December 13 and 14. The average January weekday temperature at the time of the peak hour was 33 °F (1 °C).

Before the winter began, ISO-NE put a winter Action Plan in place to mitigate any risks associated with fuel availability and/or energy emergencies that could have resulted due to the Hurricanes Katrina and Rita. The objectives of this plan were to develop Emergency Energy procedures, improve communications with the New England stakeholders and consumers, encourage the utilization of dual-fuel generating capability, expand demand-side management programs and develop Market Rule additions and changes, including the creation of Operating Procedure No. 21 – *Actions during and Energy Emergency*.

New York

The New York Area recorded a winter peak of 25,060 MW on December 14, 2005. The all-time winter peak for the New York Area is 25,541 MW which occurred on December 20, 2004. The peak load was 290 MW lower than the forecasted peak load of 25,350 MW. There was sufficient resources available as the net available resources was 32, 492 MW.

Ontario

The Winter Operating Period began with below normal temperatures in early December climbing to above normal temperatures in January and February. January was the mildest on record with afternoon temperatures averaging +2.5 °C (36.5 °F). For the Toronto area, which is Ontario's load centre, there were only 18 days in the Winter Operating Period where the minimum daily temperature was below -10 °C (14 °F). This is in contrast to the historical average of 39 days for this period. Additionally, there were no days in the Winter Operating Period where the minimum daily temperature was below -20 °C (-4 °F) in the Toronto area. This is in contrast to the historical average of five days for this period.

With the milder than expected temperatures came lower than expected demands. The peak winter demand occurred during the week beginning December 18, 2005. The demand that week reached a peak of 23,766 MW. This is 5 % below the all time winter peak of 24,979 MW which was set on Dec.20, 2004 and was 2% below the forecasted 2005-2006 winter peak of 24,272 MW.

The net result of the milder than normal temperatures and subsequently lower primary demands was more than sufficient capacity to meet load and reserve requirements during the 2005-2006 Winter Operating Period.

Québec

The forecasted peak internal demand for the 2005-2006 Winter Operating Period was 36,418 MW. The actual peak internal demand was 33,636 MW, occurring on February 27, 2006 at 18h00. This is 2,782 MW lower than the projection. The normal weather conditions did not occur during the 2005-2006 winter. It is exceptional to even have a peak in late February, but no cold spell worth mentioning occurred in January.

The installed capacity in Québec was 40,408 MW for this operating period. The maintenance outages, deratings and unplanned outages were 2,145 MW. At peak, purchases were 85 MW (50 MW from New York and 35 MW from Ontario). Sales were 1,580 MW (146 MW to Cornwall and 1,339 MW to New England through Phase II, Highgate and Stanstead-derby). Only 330 MW of sales to New England and 146 MW to Cornwall had been forecasted for the peak load period. Interruptible load (351 MW) was used for commercial reasons by Hydro-Québec-Production. The required operating reserve at all times is 1,500 MW. The actual operating reserve was 2,839 MW. No unusual events occurred during this period and no Operating Procedures were enacted.

All the new equipment that was scheduled to be in service on the system for the 2005-2006 Winter Operating Period was effectively commissioned.

The voltage support in the load area of the system was adequate, in part because the load was lower than usual and in part because much attention is paid to the availability of shunt capacitors and of generator reactive power during the peak period.

Winter Historical Review (Pre-2005-2006)

As summarized in the table below, the forecasted non-coincident peak for this Winter Operating Period in NPCC Areas is 115,647 MW.

Table B

Historical Peak Demands by Area Occurring November to March (MW)

Year	Ontario	Maritimes	New England	New York	Québec	Total NPCC Non-Coincident Demand
2000-2001	23,126	4,822	20,088	23,764	30,277	102,077
2001-2002	22,623	4,783	19,872	22,798	30,080	100,156
2002-2003	24,158	5,376	21,535	24,454	34,989	110,512
2003-2004	24,937	5,716	22,818	25,262	36,268	115,001
2004-2005	23,905	5,419	22,635	25,541	34,956	112,456
2005-2006	23,766	4,987	21,733	25,060	33,636	109,182
2006-2007 Forecast	24,677	5,564	22,550	26,311	36,545[5]	115,647

[5] Forecasted peak load for Quebec includes 145 MW in Cornwall (154 MW with losses).

8. Winter 2006-2007 Reliability Assessments of Neighboring Regions

This assessment was produced by ReliabilityFirst Corporation for their NERC Assessment and sent to CO-12 to be included in this report.

Reliability*First* Corp. 2006-2007 Winter Assessment

The former ECAR, MAAC, and MAIN regional reliability councils have combined to form ReliabilityFirst Corporation (RFC), which began operation on January 1, 2006 as one of the now eight regional reliability councils under NERC. Many of the former members of MAAC, most of the former ECAR members, and some of the former MAIN members are now members of RFC. Two former ECAR members have joined the SERC region, and the remaining former MAIN members have joined either the MRO or SERC regions. Transmission owners that belong to RFC, except for some in Kentucky and a small portion in Ohio, are members of either the MISO or PJM regional transmission organizations (RTOs). Transition to a single set of processes and procedures is still in progress for all of the previous heritage regional activities. Heritage regional requirements still apply to the former members now in RFC.

All RFC members are affiliated with either MISO or PJM for operations and reliability coordination with the exception of Ohio Valley Electric Corporation (OVEC), a generation and transmission utility located in Kentucky and Ohio and E.ON US (a.k.a. LG&E Energy), a vertically integrated utility located primarily in Lexington and Louisville, Kentucky. OVEC is not affiliated with either RTO, but OVEC reliability coordinator services are performed by PJM. In addition, the Federal Energy Regulatory Commission (FERC) has approved the withdrawal of E.ON US from MISO effective September 1, 2006. At that time, Tennessee Valley Authority (TVA) became the reliability coordinator for E.ON US, which is now included in the TVA reliability plan. TVA is also included in the former ECAR regional reliability plan, which remains in effect.

Effective January 1, 2007, E.ON US will become a member of the SERC region and will no longer be a part of the RFC region. This assessment includes E.ON US information and data for the entire winter 2006/07 season.

Demand

RFC's total internal demand forecast for Winter 2006/07 is 154,800 MW. This is 4,984 MW (3.3%) higher than the actual peak demand experienced by the RFC member companies during the winter of 2005/06. The regional demand forecast is derived by aggregating the demand forecasts of the companies. The RFC member forecasts are based on expected average winter weather conditions and expected economic conditions during the winter of 2006/07 based on late 2005 economic forecasts. The Winter 2005/06 demand forecasts are not available for comparison to the Winter 2006/07 forecasts. Demand-side management programs and interruptible demand contracts that could be utilized, if necessary, are expected to total 2,200 MW at the time of the winter peak.

At this time in the transition of ECAR, MAAC, and MAIN to Reliability*First*, the regional assessment does not specifically address peak demand uncertainty and variability, or the variability in demand due to weather. Planning for such uncertainties is the responsibility of each individual Load Serving Entity. As a sensitivity analysis, a calculation based on a weather induced 5% load increase (7,700 MW) was performed. Even with such a load increase, the reserve margin would be adequate to meet the demand.

Resources

Generation projects are expected to add an additional 2,540 MW of capacity resources in the RFC region prior to the 2006/07 winter peak. An additional 403 MW of capacity resources are expected to go in service during the winter season, for a total increase of 2,943 MW. These are all considered to be committed capacity resources for the purpose of this assessment.

RFC expects net capacity resources in the region to be 228,563 MW (net seasonal capability), which is about 3,500 MW more capacity resources for the RFC regional area than there were in the winter of 2005/06. RFC forecasts its capacity margin to be 33.2%. The forecast capacity margin in the ECAR, MAAC, and MAIN regions last winter were 31.8%, 32.8%, and 39.6%, respectively. The reserve margin for this winter of 49.8% exceeds the MAAC reserve requirement of 15%, the MAIN recommended reserve of 14%, and the state of Wisconsin requirement of 18%. ECAR did not have a specified reserve requirement.

RFC has developed a reserve requirement criterion, to become effective in the spring of 2008, for the 2008 summer peak season. Reliability*First* does not require individual members to plan for resource unavailability due to extreme credible contingencies that might occur. Therefore, RFC has not surveyed its members to determine how the individual members plan for resource unavailability beyond the largest single contingency.

At this time, members have made arrangements to purchase 3,389 MW and sell 2,544 MW outside the RFC region. An additional 1,035 MW of member-owned capacity is located outside of the region, for a minimum net expected import of 1,880 MW. None of these transactions are necessary for the members of the region to meet their respective reserve criterion.

Since the formation of RFC occurred only recently, a comprehensive study of resource deliverability has not yet been conducted. However, the PJM RTO conducts analyses to determine that the aggregate PJM capacity can be delivered to the aggregate PJM load. PJM has approximately 5,300 MW of uncommitted resources, which includes approximately 800 MW of uncommitted capacity and approximately 4,500 MW of energy only capacity that is not considered committed capacity for this assessment.

A previous analysis conducted in ECAR had determined that about 2,000 MW of capacity might not be deliverable. That analysis determined the levels of export restriction from one area of the ECAR region to other areas in the region under first contingency conditions.

MISO has developed a deliverability test consistent with its tariff which may or may not result in additional committed capacity within RFC, and which has not been included in this assessment.

The capacity and reserve margin data listed above includes the projected generator additions as committed capacity and excludes the undeliverable and energy only generation from committed capacity. Based on the projected reserve levels, the committed capacity resources in the Reliability*First* region are expected to be adequate this winter.

Fuel

The Reliability*First* region has a diversified fuel supply. About 47% of the capacity uses coal for its fuel, with another 14% of the capacity being nuclear fueled. Oil and natural gas fuels 7% and 28% of the capacity respectively, and 3% of the capacity is hydroelectric. The remaining 1% of capacity uses a variety of renewable and other energy supplies.

RFC does not perform an explicit fuel supply interruption study, but reviews the potential for major supply problems based on past disruptions reoccurring. Adequate pipeline capacity is expected to be available during the winter, when needed to operate the gas units. Although some 67,000 MW of the regional capacity is fueled by gas, high reserve margins will allow the expected gas usage to be minimized, if needed. Additionally, the Energy Information Administration reports that natural gas in storage at the end of August is the highest it has been in the last five years at this time of the year and 12% above the 5 year average of gas in storage (see web site at http://tonto.eia.doe.gov/oog/info/ngs.html). RFC does not expect any problem with gas availability this winter.

At this time there are no known conditions affecting coal deliveries by rail that are expected to cause coal delivery problems for Reliability*First* members this winter. Since only 3% of the regional capacity is hydroelectric, and more than half of the hydro capacity in RFC is pumped storage, there is no expectation that hydro conditions will be a regional concern.

RFC expects each company to be ready to mitigate any fuel supply disruption that may occur. Although RFC has not compiled a list of mitigation actions that could be taken, some members may resort to fuel switching for those units with dual-fuel capability, if it becomes necessary to maintain reliable fuel supplies. Data available to RFC indicates that 13% (30,500 MW) of the regional capacity has dual-fuel capability. RFC has not verified with individual members the ease or difficulty involved with switching to alternate fuels.

The most likely impacts of extreme winter weather on fuel supplies are frozen coal and low gas pressure due to high residential gas use. Coal is routinely freeze treated during winter when weather conditions indicate the need. Anticipated reserve margins should be sufficient to minimize the need for gas-fired electric generation. Extreme weather conditions during peak load conditions should not materially affect the ability to adequately supply generation across the region.

Transmission

Historically, the heritage regions have experienced widely varying power flows due to transactions and prevailing weather conditions across the region. As a result, the transmission system could become constrained during peak periods because of unit unavailability and unplanned transmission outages concurrent with large power transactions. Generation redispatch has the potential to mitigate some of these potential constraints. Notwithstanding the benefits of this redispatch, should transmission constraint conditions occur, local operating procedures, as well as the NERC transmission loading relief (TLR) procedure may be required to maintain adequate transmission system reliability.

Certain critical flowgates that have experienced TLRs in previous winters continue to be identified as heavily loaded in various reliability assessments and may require operator intervention to ensure adequate reliability levels are maintained. No major system changes have been identified that would adversely impact reliability.

RFC actively participated in the existing interregional seasonal transmission assessment efforts. Transfer capability results are included in each of the interregional seasonal reports. Simultaneous import capabilities are projected to be adequate for the winter. A new interregional agreement, the Eastern Interconnection Reliability Assessment Group (ERAG), has been executed between RFC and the five other regions in the Eastern Interconnection. This new agreement will become effective for the 2007 summer assessments.

Operational Issues

The PJM portion of RFC has no significant reliance on any one fuel source, and it doesn’t depend on outside resources to any great extent. Furthermore, its membership's compliance with applicable criteria prevents any undeliverable load pockets. PJM is large enough that geographic diversity of weather helps balance its load factor and the load diversity is further enhanced by markets that are mature and well tested. External units that are considered capacity in PJM must sign an agreement specifying that if a capacity emergency is called, that unit’s capacity must be provided to PJM. Transmission availability is secured before an external unit can be considered PJM capacity. The MISO portion of RFC also has no significant reliance on any one fuel source.

RFC does not anticipate any generating unit or transmission facility outages or any unusual operating conditions that could impact reliability this winter.

In addition to the NERC TLR procedure, other operating procedures are available to maintain reliable system operations, such as a multiregional agreement involving balancing authorities around Lake Erie, to use generation and phase angle regulator redispatch to mitigate emergency TLR procedures and curtailments in situations where the affected system(s) is about to curtail firm demand.

RFC does not expect local environmental restrictions on any generating units to significantly impact availability during peak load conditions.

Appendix I –2006-2007 Winter Expected Load and Capacity Forecasts

Table 1 – NPCC Summary

Week Beginning Sundays	Installed Capacity MW	Purchases[1] MW	Sales[1] MW	Total Capacity[2] MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin[3] MW
26-Nov-06	154,003	80	182	153,901	104,531	2,810	13,860	7,332	10,574	20,414
3-Dec-06	154,044	80	182	153,942	108,114	2,815	12,863	7,331	10,174	18,275
10-Dec-06	154,044	80	182	153,942	110,953	2,815	9,170	7,331	10,174	19,130
17-Dec-06	154,044	80	182	153,942	112,555	2,815	5,779	7,331	10,174	20,918
24-Dec-06	154,044	80	182	153,942	109,950	2,790	5,448	7,331	10,174	23,829
31-Dec-06	154,054	80	182	153,952	112,995	2,790	5,131	7,331	13,973	17,312
7-Jan-07	154,059	80	182	153,957	114,839	2,793	5,549	7,331	13,973	15,058
14-Jan-07	154,059	80	182	153,957	115,591	2,793	6,885	7,331	13,973	12,970
21-Jan-07	154,059	80	182	153,957	114,577	2,793	7,949	7,331	13,973	12,920
28-Jan-07	154,059	80	182	153,957	113,863	2,793	7,480	7,331	14,273	13,803
4-Feb-07	154,230	80	182	154,128	113,322	2,810	7,929	7,331	14,273	14,083
11-Feb-07	154,230	80	182	154,128	111,156	2,810	8,661	7,331	14,273	15,517
18-Feb-07	154,230	80	182	154,128	109,164	2,810	8,258	7,331	14,273	17,913
25-Feb-07	154,230	80	182	154,128	106,648	2,810	10,237	7,331	9,173	23,550
4-Mar-07	154,210	80	182	154,108	105,002	2,817	17,578	7,331	9,173	17,841
11-Mar-07	154,210	80	182	154,108	102,045	2,817	19,157	7,331	9,173	19,220
18-Mar-07	154,210	80	182	154,108	99,727	2,817	20,792	7,331	9,173	19,902
25-Mar-07	154,210	80	182	154,108	97,062	2,817	19,621	7,331	9,173	23,738

Notes and Definitions

1) Purchases and Sales represent those contracts with areas outside NPCC
2) Total Capacity = Installed capacity + Purchases - Sales
3) Net capacity margin = Total capacity - Load forecast + Interruptible load - Known maintenance - Operating reserve - Unplanned outages

Table 2 – Maritimes

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
26-Nov-06	6,852	0	205	6,647	4,703	527	49	830	266	1,326
3-Dec-06	6,893	0	205	6,688	4,912	532	78	829	266	1,135
10-Dec-06	6,893	0	205	6,688	5,065	532	78	829	266	982
17-Dec-06	6,893	0	205	6,688	5,190	532	78	829	266	857
24-Dec-06	6,893	0	205	6,688	5,071	507	78	829	266	951
31-Dec-06	6,903	0	205	6,698	5,216	507	64	829	265	831
7-Jan-07	6,908	0	205	6,703	5,312	510	64	829	265	743
14-Jan-07	6,908	0	205	6,703	5,508	510	64	829	265	547
21-Jan-07	6,908	0	205	6,703	5,390	510	64	829	265	665
28-Jan-07	6,908	0	205	6,703	5,356	510	100	829	265	663
4-Feb-07	6,908	0	205	6,703	5,554	527	219	829	265	363
11-Feb-07	6,908	0	205	6,703	5,556	527	183	829	265	397
18-Feb-07	6,908	0	205	6,703	5,564	527	205	829	265	367
25-Feb-07	6,908	0	205	6,703	5,298	527	89	829	265	749
4-Mar-07	6,928	0	205	6,723	4,994	534	483	829	265	686
11-Mar-07	6,928	0	205	6,723	4,871	534	105	829	265	1,187
18-Mar-07	6,928	0	205	6,723	4,752	534	89	829	265	1,322
25-Mar-07	6,928	0	205	6,723	4,632	534	89	829	265	1,442

Table 3 – New England

Week Beginning Sundays	Installed Capacity[1] MW	Firm Purchases[2] MW	Firm Sales[2] MW	Total Capacity MW	Load Forecast[3] MW	Interruptible Load[4] MW	Known Maint./Derat.[5] MW	Req. Operating Reserve[6] MW	Unplanned Outages[7] MW	Net Margin MW
26-Nov-06	33,215	407	343	33,279	21,231	566	1,900	1,800	4,080	4,834
3-Dec-06	33,215	407	343	33,279	21,434	566	1,900	1,800	3,680	5,031
10-Dec-06	33,215	407	343	33,279	21,727	566	1,800	1,800	3,680	4,838
17-Dec-06	33,215	407	343	33,279	21,738	566	500	1,800	3,680	6,127
24-Dec-06	33,215	407	343	33,279	21,801	566	100	1,800	3,680	6,464
31-Dec-06	33,215	407	343	33,279	22,079	566	0	1,800	7,480	2,486
7-Jan-07	33,215	407	343	33,279	22,550	566	0	1,800	7,480	2,015
14-Jan-07	33,215	407	343	33,279	22,550	566	0	1,800	7,480	2,015
21-Jan-07	33,215	407	343	33,279	22,550	566	0	1,800	7,480	2,015
28-Jan-07	33,215	407	343	33,279	22,325	566	200	1,800	7,780	1,740
4-Feb-07	33,215	407	343	33,279	22,054	566	100	1,800	7,780	2,111
11-Feb-07	33,215	407	343	33,279	22,025	566	100	1,800	7,780	2,140
18-Feb-07	33,215	407	343	33,279	21,759	566	0	1,800	7,780	2,506
25-Feb-07	33,215	407	343	33,279	20,757	566	0	1,800	2,680	8,608
4-Mar-07	33,215	407	343	33,279	20,403	566	300	1,800	2,680	8,662
11-Mar-07	33,215	407	343	33,279	20,205	566	500	1,800	2,680	8,660
18-Mar-07	33,215	407	343	33,279	19,835	566	2,000	1,800	2,680	7,530
25-Mar-07	33,215	407	343	33,279	19,262	566	700	1,800	2,680	9,403

Notes

1) Installed Capacity from October 1, 2006 Seasonal Claimed Capability (SCC) Report, including Settlement Only generators
2) Purchases and Sales based on 2006 CELT Report and information from ISO-NE Settlements department
3) Load Forecast assumes Peak Load Exposure as reported in the 2006 CELT Report
4) Interruptible Loads as reported in Demand Response Enrollment Statistics as of October 2, 2006
5) Includes known maintance as of October 5, 2006
6) 1,800 MW of operating reserve assumes 100% of the first largest contingency at 1,200 MW and 50% of the second largest contingency of 1,200 MW
7) Assumed unplanned outages based on historical observation of outages, with an additional 4,200 MW of outages for generation at risk due to gas supply during eight weeks in January and February, and additional capacity deratings to reflect the assumption that Mystic 8 and 9 and Seabrook will be limited to a total of 1,200 MW

Table 4 – New York

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
26-Nov-06	41,296	410	273	41,433	24,647	0	2,793	1,800	3,378	8,815
3-Dec-06	41,296	410	273	41,433	24,981	0	2,392	1,800	3,378	8,882
10-Dec-06	41,296	410	273	41,433	25,418	0	1,398	1,800	3,378	9,439
17-Dec-06	41,296	410	273	41,433	26,311	0	1,220	1,800	3,378	8,724
24-Dec-06	41,296	410	273	41,433	26,311	0	1,220	1,800	3,378	8,724
31-Dec-06	41,296	410	273	41,433	26,311	0	1,052	1,800	3,378	8,892
7-Jan-07	41,296	410	573	41,133	26,311	0	1,481	1,800	3,378	8,163
14-Jan-07	41,296	410	573	41,133	26,311	0	2,817	1,800	3,378	6,827
21-Jan-07	41,296	410	573	41,133	26,311	0	3,049	1,800	3,378	6,595
28-Jan-07	41,296	410	573	41,133	26,311	0	2,284	1,800	3,378	7,360
4-Feb-07	41,296	410	523	41,183	26,311	0	2,749	1,800	3,378	6,945
11-Feb-07	41,296	410	523	41,183	25,212	0	3,059	1,800	3,378	7,734
18-Feb-07	41,296	410	523	41,183	24,596	0	2,717	1,800	3,378	8,692
25-Feb-07	41,296	410	523	41,183	24,134	0	3,418	1,800	3,378	8,453
4-Mar-07	41,296	410	273	41,433	23,620	0	5,530	1,800	3,378	7,105
11-Mar-07	41,296	410	273	41,433	23,107	0	6,332	1,800	3,378	6,816
18-Mar-07	41,296	410	273	41,433	22,850	0	8,030	1,800	3,378	5,375
25-Mar-07	41,296	410	273	41,433	22,593	0	7,454	1,800	3,378	6,208

Table 5 – Ontario

Week Beginning Sundays	Installed Capacity MW	Firm Purchases MW	Firm Sales MW	Total Capacity MW	Load Forecast MW	Interruptible Load MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
26-Nov-06	31,189	0	0	31,189	23,072	427	5,260	1,402	1,350	532
3-Dec-06	31,189	0	0	31,189	23,790	427	5,135	1,402	1,350	-61
10-Dec-06	31,189	0	0	31,189	23,856	427	2,725	1,402	1,350	2,283
17-Dec-06	31,189	0	0	31,189	24,124	427	2,193	1,402	1,350	2,547
24-Dec-06	31,189	0	0	31,189	22,459	427	2,372	1,402	1,350	4,033
31-Dec-06	31,189	0	0	31,189	23,921	427	2,135	1,402	1,350	2,808
7-Jan-07	31,189	0	0	31,189	24,257	427	2,124	1,402	1,350	2,483
14-Jan-07	31,189	0	0	31,189	24,677	427	2,124	1,402	1,350	2,063
21-Jan-07	31,189	0	0	31,189	24,420	427	2,956	1,402	1,350	1,488
28-Jan-07	31,189	0	0	31,189	24,289	427	3,016	1,402	1,350	1,559
4-Feb-07	31,194	0	0	31,194	24,143	427	3,036	1,402	1,350	1,690
11-Feb-07	31,194	0	0	31,194	23,815	427	3,494	1,402	1,350	1,560
18-Feb-07	31,194	0	0	31,194	23,392	427	3,511	1,402	1,350	1,966
25-Feb-07	31,194	0	0	31,194	23,131	427	4,905	1,402	1,350	833
4-Mar-07	31,194	0	0	31,194	22,992	427	6,278	1,402	1,350	-401
11-Mar-07	31,194	0	0	31,194	21,961	427	7,033	1,402	1,350	-125
18-Mar-07	31,194	0	0	31,194	21,619	427	7,033	1,402	1,350	217
25-Mar-07	31,194	0	0	31,194	20,926	427	7,538	1,402	1,350	405

Table 6 – Québec

Week Beginning Sundays	Installed Capacity[1] MW	Firm Purchases[2] MW	Firm Sales[3] MW	Total Capacity MW	Load Forecast[4] MW	Interruptible Load[5] MW	Known Maint./Derat. MW	Req. Operating Reserve MW	Unplanned Outages MW	Net Margin MW
26-Nov-06	41,451	250	330	41,371	30,878	1,290	3,858	1,500	1,500	4,925
3-Dec-06	41,451	250	330	41,371	32,997	1,290	3,358	1,500	1,500	3,306
10-Dec-06	41,451	250	330	41,371	34,887	1,290	3,169	1,500	1,500	1,605
17-Dec-06	41,451	250	330	41,371	35,192	1,290	1,788	1,500	1,500	2,681
24-Dec-06	41,451	250	330	41,371	34,308	1,290	1,678	1,500	1,500	3,675
31-Dec-06	41,451	250	330	41,371	35,468	1,290	1,880	1,500	1,500	2,313
7-Jan-07	41,451	500	330	41,621	36,409	1,290	1,880	1,500	1,500	1,622
14-Jan-07	41,451	500	330	41,621	36,545	1,290	1,880	1,500	1,500	1,486
21-Jan-07	41,451	500	330	41,621	35,906	1,290	1,880	1,500	1,500	2,125
28-Jan-07	41,451	500	330	41,621	35,582	1,290	1,880	1,500	1,500	2,449
4-Feb-07	41,617	450	330	41,737	35,260	1,290	1,825	1,500	1,500	2,942
11-Feb-07	41,617	450	330	41,737	34,548	1,290	1,825	1,500	1,500	3,654
18-Feb-07	41,617	450	330	41,737	33,853	1,290	1,825	1,500	1,500	4,349
25-Feb-07	41,617	450	330	41,737	33,328	1,290	1,825	1,500	1,500	4,874
4-Mar-07	41,577	200	330	41,447	32,993	1,290	4,987	1,500	1,500	1,757
11-Mar-07	41,577	200	330	41,447	31,901	1,290	5,187	1,500	1,500	2,649
18-Mar-07	41,577	200	330	41,447	30,671	1,290	3,640	1,500	1,500	5,426
25-Mar-07	41,577	200	330	41,447	29,649	1,290	3,840	1,500	1,500	6,248

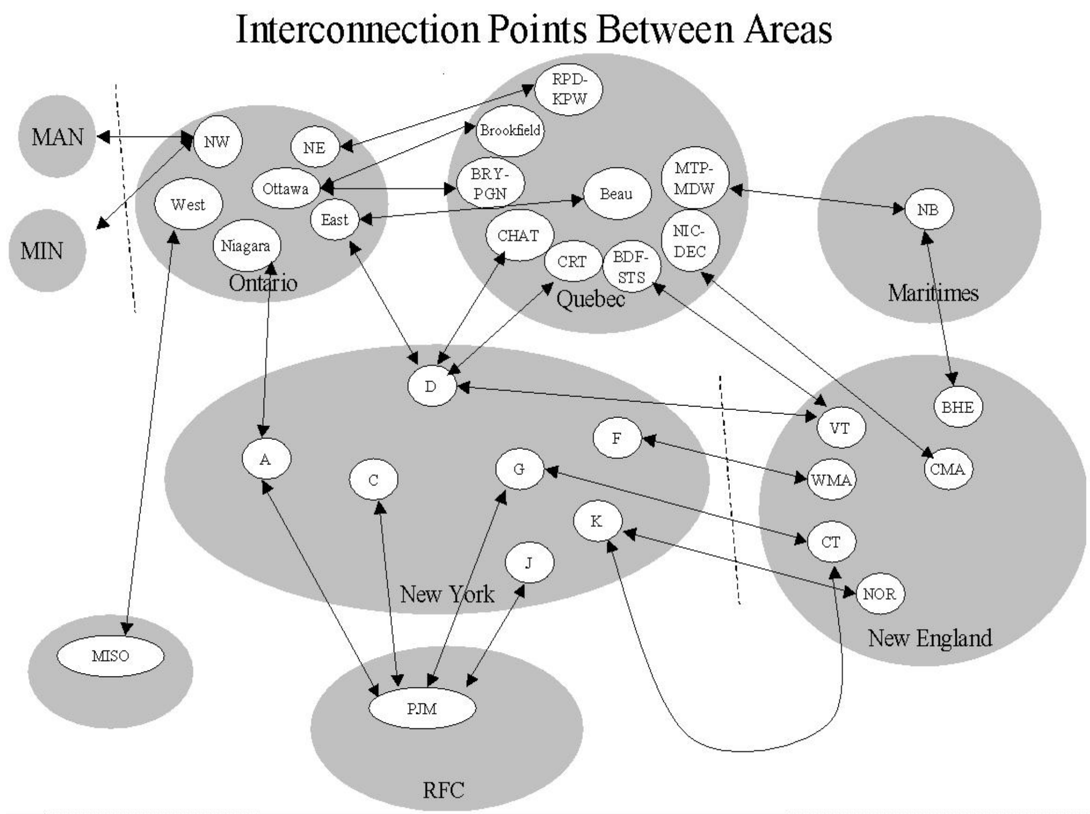
Notes

1) Includes HQ capacity, available capacity from Churchill Falls at the Newfoundland-Québec border and independant power producers (IPP).
2) Firm purchase from New Brunswick and short term firm purchases by HQD
3) Sales to NE. Does not include firm sale of 145 MW to Cornwall. (154 MW with losses).
4) Expected weekly internal peak load plus 154 MW for Cornwall load including losses.
5) Includes 250 MW of load management through voltage reduction.

Appendix II – Summary of Normal and Expected Feasible Transfer Capability Under Peak Conditions

The following figure and table is intended to show Normal Transfer Capability between Areas which represents transfers capability under ideal system conditions. It is recognized that the actual transfer conditions may differ depending on system conditions or configurations such as actual voltage profiles etc.. The Feasible Transfer Capability values represent an expected transfer capability under the peak load scenarios with the assumed Transmission configuration identified in Section 6 of this report. This Feasible Transfer Capability is based on historical operating experience and the total for each area represents the simultaneous transfer between areas that may be achievable. It should be noted that real-time transfer limits may change depending on the operation of the system at the time and readers are encouraged to review information on the Available Transfer Capability (ATC) and Total Transfer Capabilities (TTC) between Areas, via http://www.nerro.org/

Diagram 1



Transfers from Maritimes to

Interconnection Point	Normal Transfer Capability (NTC) at Interconnection Points (MW)	Feasible Transfer Capability (FTC) under Peak Conditions (MW)	Rationale for Constraint
Québec			
NB / MTP – MDW Lines 2101, 2102 (HQ), lines 3008, 3010 (NB) Lines 3012, 3113, 3114 (NB)	785	785	
Total	785	785	
New England			
NB / BHE	700	700	
Total	700	700	

Transfers from New England to

Interconnection Point	NTC at Interconnection Points (MW)	FTC under Peak Conditions (MW)	Rationale for Constraint
Maritimes			
BHE / NB	300	250	Transfer capability is dependent upon operating conditions in northern Maine.
Total	300	250	
New York			
VT / D	0		
WMA / F	800		
CT / G	800		
NOR / K	286		
Sub Total	1886	1,200	Feasible Simultaneous Transfer to New York excluding Cross Sound Cable. This is assumed to be the TTC as of Nov. 17 2006. ISO-NE planning assumptions are based on an interface limit of 900 MW, as reported in the 2006 Regional System Plan.
CT (CSC) / K	330	330	The Cross Sound Cable is a DC tie and is not included in the Feasible Simultaneous Transfer capability with NY.
Total	2,216	1,805	
Québec			
CMA / NIC-DEC HVDC link	1,700	0	Phase 2 is required for internal Québec transmission needs at the time of peak and Phase I cannot be used due to transmission limitations within New England during peak load conditions. Capability of the facility is 2,000 MW; conditions in HQ limit the capability to 1,700 MW; conditions in NE, NY & PJM may limit to 1,200 MW or less.
Highgate (VT) – Bedford (BDF) Line 1429	170	0	Capability of the facility is 220 MW; conditions in Vermont limit the capability to 100 MW or less. The DOE permit is 170 MW. When the delivery from Québec to NE at Highgate is zero, it is expected that the delivery to Québec from NE will be zero due to transmission limitations in New England
Derby (VT) – Stanstead (STS) Line 1400	0	0	There is no capability to export to Québec through this interconnection.
Total	1,870	0	The New England to Québec transfer limit at peak load is assumed to be 0 MW. It should be noted that this limit is dependant on New England generation and could be increased up to approximately 350 MW depending on New England dispatch. If energy was needed in Québec and the generation could be secured in the Real-Time market, this action could be taken to increase the transfer limit.

Transfers from New York to

Interconnection Point	NTC at Interconnection Points (MW)	FTC under Peak Conditions (MW)	Rationale for Constraint
New England			
D / VT	150		
F / WMA	800		
K / CT	800		
K / NOR	286		
Sub Total	2,036	1,400	Feasible Simultaneous Transfer to New England excluding Cross Sound Cable. This is assumed to be the same as the TTC as of Nov. 17 2006. ISO-NE planning assumptions are based on an interface limit of 1,600 MW, as reported in the 2006 Regional System Plan.
K / CT (CSC)	330	330	The Cross Sound Cable is a DC tie and is not included in the Feasible Simultaneous Transfer capability with NY.
Total	2,366	1,805	
Ontario			
D / East Lines L33P, L34P	400	400	
A / Niagara Lines PA301, PA302, BP76, PA27	1,250	1,250	New York limitation.
Total	1,650	1,650	Simultaneous Transfers between NY and Ontario may be impacted by loop flows and assume phase shifting capability of MECS interface is not available
PJM			
A / PJM	550		
C / PJM	1,100		
G / PJM	2,000		
J / PJM	0		
Total	3,650	2,300	Feasible Simultaneous Transfer to PJM on peak
Québec			
D / Chat L7040	1,000	1,000	
D / CRT Lines CD11, CD22	0	0	Emergency use of the Variable Frequency Transformer (VFT) has the potential of increasing transfer to Québec by 100 MW.
Total	1,000	1,000	

Transfers from Ontario to

Interconnection Point	NTC at Interconnection Points (MW)	FTC under Peak Conditions (MW)	Rationale for Constraint
New York			
East / D Lines L33P, L34P	400	400	
Niagara / A Lines PA301, PA302, BP76, PA27	2,000	1,600	Limits based on New York limitations.
Total	2,400	2,000	Simultaneous Transfers between NY and Ontario may be impacted by loop flows and assume phase shifting capability of MECS interface is not available.
MISO Michigan			
Lines L4D, L51D, J5D	2,350	2,350	Represents a worst case scenario for the implementation of Policy of operation.
Total	2,350	2,350	Simultaneous Transfers between Michigan and Ontario may be impacted by loop flows, assume phase shifting capability of MECS interface is not available, and the generation dispatch on the 120 kV system in the MISO – Bunce Creek area.
Québec			
NE / RPD – KPW Lines D4Z, H4Z	110	110	
Ottawa / BRY – PGN Lines X2Y, P33C	140	52	Circuit Q4C is capable of 140 MW less 1/2 of Chat-Falls units that are considered in Québec Installed Capacity (140-88=52)
Ottawa / Brascan Lines D5A, H9A	115	115	Only One of H9A or D5A can be in services at any time. The transfer capability reflects the usage of D5A.
East / Beau Lines B5D, B31L	470	470	
Total	835	747	
MISO			
NW / MAN Lines K21W, K22W	350		
NW / MIN Line F3M	140		
Total	490	375	Feasible Simultaneous Transfer to MISO NW.

Transfers from Québec to

Interconnection Point	NTC at Interconnection Points (MW)	FTC under Peak Conditions (MW)	Rationale for Constraint
Maritimes			
MTP-MDW / NB Lines 2101, 2102 (HQ), lines 3008, 3010 (NB) Lines 3012, 3113, 3114 (NB)	1,200	900	Capability is reduced because of the outage of one 315/230 transformer at Matapedia..
Total	1,200	900	
New England			
NIC-DEC / CMA HVDC link	2,000	1,100	Capability of the facility is 2,000 MW; actual conditions in NE, NY, PJM may lower this value. Limitations on the Quebec system under peak load conditions will limit this facility to 1,100 MW.
Bedford (BDF) – Highgate (VT) Line 1429	220	200	Limitations on the Quebec system under peak load conditions.
Stanstead (STS) – Derby (VT) Line 1400	80	80	
Total	2,300	1,380	
New York			
Chateauguay – D Line 7040	1,500	615	Limitations on the Quebec System under peak load conditions
CRT – D Lines CD11, CD22	325	180	Transfer limit is 325 MW less projected peak Cornwall load of 145 MW tapped off the circuit
Total	1,825	795	
Ontario			
RPD-KPW / NE Lines D4Z, H4Z	85	85	
BRY-PGN / Ottawa Lines X2Y, P33C	410	232	Limitations on the Quebec System under peak load conditions restrict deliveries as follows P33C - 167 MW and X2Y – 65 MW,

Brascan – Ottawa Lines D5A, H9A	200	200	Only One of H9A or D5A can be in services at any time. The transfer capability reflects usage of D5A
Beau / East Lines B31L, B5D	800	400	Limitations on the Quebec System under peak load conditions.
Total	1,495	917	

Note: Limitations on the Québec system under peak load conditions may be due to resource limitations as opposed to transmission limitations, so that the Feasible Transfer Capability does not necessarily correspond to the TTC's published elsewhere.

Transfers from Regions External to NPCC

Interconnection Point	NTC at Interconnection Points (MW)	FTC under Peak Conditions (MW)	Rationale for Constraint
MISO / ONT Lines L4D, L51D, J5D, B3N	1,720	1,720	Represents a worst case scenario for the implementation of Policy on operation.
Total	1,7200	1,720	Simultaneous Transfers between Michigan and Ontario may be impacted by loop flows and assumes phase shifting capability of MECS interface is not available.
MISO / ONT			
NW / MAN Lines K21W, K22W	300		
NW / MIN Line F3M	90		
Total	390	325	Feasible Simultaneous Transfer to Ontario.
PJM / New York			
A	150		
C	400		
G	1,100		
J	1,000		
Total	2,650	2,075	Feasible Simultaneous Transfer to New York.

Area Acronym Description

Maritimes Area

NB	-	New Brunswick

New England Area

BHE	-	Bangor-Hydro Electric
CMA	-	Central Massachusetts
VT	-	Vermont
WMA	-	Western Massachusetts
CT	-	Connecticut
NOR	-	Norwalk

New York Area

The New York Area is divided into 11 zones (A – K) that are defined based on the transmission system topology.

Ontario

NW	-	North West Sub-Area
West	-	Western Sub-Area
Niagara	-	Niagara
NE	-	North-East Sub-Area
Ottawa	-	Ottawa
East	-	East

Quebec

Brascan	-	Brascan
RPD-KPW	-	Rapide-des-Iles/ Kipawa
BRY-PGN	-	Bryson - Paugan
CHAT	-	Chateauguay
CRT	-	Cedar Rapids Transmission
BDF-STS	-	Bedford/ Stanstead
BEAU	-	Beauharnois
NIC-Dec	-	Nicolet /Des Cantons
MTP-MDW	-	Matapedia-Madawaska

Appendix III - NPCC Operational Criteria and Procedures

A-2 Basic Criteria for Design and Operation of Interconnected Power Systems

Description: This Criterion establishes the basic principles and requirements for the design and the operation of the NPCC **bulk power system**.

A-3 Emergency Operation Criteria

Description: Objectives, principles and requirements are presented to assist the NPCC **Areas** in formulating plans and procedures to be followed in an **emergency** or during conditions which could lead to an **emergency**.

A-6 Operating Reserve Criteria

Description: This Criterion establishes standard terminology and minimum requirements governing the amount, availability and distribution of operating reserve. Procedures are included for corrective action and mutual assistance in case of operating reserve shortages. The objective is to ensure a high level of reliability in the NPCC Region that is, as a minimum, consistent with the standards specified by the North American Electric Reliability Council (NERC).

B-3 Guidelines for Inter-Area Voltage Control

Description: This document establishes procedures and principles to be considered for occasions where a deficiency or an excess of reactive power can affect **bulk power system** voltage levels in a large portion of an **Area** or in two adjacent **Areas**.

B-12 Guidelines for On-Line Computer System Performance During Disturbances

Description: Establishes guidelines for the performance of NPCC **Area** on-line computer systems during a power system disturbance.

B-13 Guide for Reporting System Disturbances

Description: Establishes TFCO's requirement and guideline for reporting system disturbances. Reporting by operating entity is to NPCC and TFCO.

B-20 Guidelines for Identifying Key Facilities and Their Critical Components for System Restoration"

Description: Establishes requirements and guidelines for the identification of Key Facilities and their Critical Components that are required for restoration of the power system following a partial or total system blackout.

C-1 NPCC Emergency Preparedness Conference Call Procedures-NPCC Security Conference Call Procedures

C-4 Monitoring Procedures for Guidelines for Inter-Area Voltage Control

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Guidelines for Inter-AREA Voltage Control (Document B-3).

C-5 Monitoring Procedures for Emergency Operation Criteria

Description: This procedural document establishes TFCO's monitoring and reporting requirements for conformance with NPCC's Emergency Operation Criteria (Document A-3).

C-7 Monitoring Procedures for Guide for Rating Generating Capability

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC, Guide for Rating Generating Capability (Document B-9).

C-8 Monitoring Procedures for Control Performance Guide During Normal Conditions

Description: This procedural document establishes a performance measure for NPCC **Areas** and systems and outlines the reporting function for NPCC Control Performance Guide During Normal Conditions (Document B-2)

C-9 Monitoring Procedures for Operating Reserve Criteria

Description: This procedural document establishes the TFCO's monitoring and reporting requirements for conformance with the NPCC Operating Reserve Criteria (Document A-6)

C-11 Monitoring Procedures for Interconnected System Frequency Response (This Document has recently been revised and will have a new designation as Reference Document RD-10)

Description: This procedural document defines procedures for monitoring frequency responses to large generation losses.

C-12 Procedures for Shared Activation of Ten Minute Reserve

Description: This procedural document outlines procedures to share the activation of ten-minute reserve on an Area basis. The methods prescribed by the procedure are intended to ensure that lost generation or energy purchases are quickly replaced by several areas simultaneously loading generation in the few minutes immediately following a loss.

C-13 Operational Planning Coordination

Appendix D - NPCC Critical Facilities List

Description: This document coordinates the notification of planned facility outages among the **Areas**. It also establishes formal procedures for **Area** communications in advance of a period of likely capacity shortages as well as for weekly and emergency NPCC conference call among the **Areas**.

C-15 Procedures for Solar Magnetic Disturbances on Electrical Power Systems

Description: This procedural document clarifies the reporting channels and information available to the operator during solar alerts and suggests measures that may be taken to mitigate the impact of a solar magnetic disturbance.

C-20 Procedures During Abnormal Operating Conditions

Description: This procedure is intended to complement the Emergency Operation Criteria (Document A-3) by providing specific instructions to the System Operator during such conditions in an NPCC Area or Areas.

C-35 NPCC Inter-Area Power System Restoration Procedure

Description: This procedure provides guidance and training material to the system operator to manage system restoration events that affect the NPCC and adjoining Areas.

C-36 Procedures for Communications During Emergencies

Description: This procedure outlines how communications be conducted for various situations.

C-37 Operating Procedures for ACE diversity Interchange

Description: This procedure is intended to spell out how to utilize Area Control Error Diversity Interchange among NPCC entities and PJM.

C-38 Procedure for Operating Reserve Assistance

Description: This procedure is intended to provide the structure for NPCC Areas to assist each other in meeting 10-minute reserve.

Appendix IV - Web Sites

Independent Electricity System Operator

http://www.ieso.ca/

ISO- New England

http://www.iso-ne.com

LEER Members

http://www.npcc.org/leer_members.htm

MAPP

http://www.mapp.org/

Maritimes

Maritimes Electric Company Ltd.

http://www.maritimeelectric.com

New Brunswick System Operator

http://www.nbso.ca/

Nova Scotia Power

http://www.nspower.ca/

Northern Maine Independent System Administrator

http://www.nmisa.com

Midwest Reliability Organization (MRO)

http://www.midwestreliability.org/

New York ISO

http://www.nyiso.com/

North East Power Coordinating Council

http://www.npcc.org/

Reliability*First* Corporation

http://www.rfirst.org/

TransÉnergie

http://www.hydro.qc.ca/transenergie/en/index.html

Appendix V - References

NPCC 2006-2007 Winter Multi-Area Probabilistic Reliability Assessment – November 2006

NPCC Reliability Assessment for Winter 2005-2006 – November, 2005

NPCC Reliability Assessment for Summer 2006 - April 2006

2006-2007 Winter RFC-NPCC Interregional Transmission System Reliability Assessment

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-25

Question NYISO/IESO 2-2:

MISO, in response to NYISO data requests NYISO/MISO 1-18 through NYISO/MISO 1-21, and ITC, in response to NYISO data requests NYISO/ITC 1-30 through NYISO/ITC 1-33, each indicated that the MI/ON PARs will be operated to conform actual power flows to scheduled power flows at the Ontario/Michigan interface without regard to the number of MI/ON PARs that are in service. In light of MISO's and ITC's responses to the identified Data Requests, please respond to the following questions:

a. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 4/1/2003 to 8/31/2006 would have been an effective method of mitigating Lake Erie loop flow.
b. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 9/1/2006 to 2/15/2012 would have been an effective method of mitigating Lake Erie loop flow.
c. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 4/1/2003 to 8/31/2006 would have provided benefits to IESO's transmission system and customers.
d. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 9/1/2006 to 2/15/2012 would have provided benefits to IESO's transmission system and customers.
e. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 4/1/2003 to 8/31/2006 would have provided benefits to Hydro One's transmission system and customers.
f. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 9/1/2006 to 2/15/2012 would have provided benefits to Hydro One's transmission system and customers.
g. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 4/1/2003 to 8/31/2006 would have provided benefits to MISO's transmission system and customers.
h. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 9/1/2006 to 2/15/2012 would have provided benefits to MISO's transmission system and customers.

i. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 4/1/2003 to 8/31/2006 would have provided benefits to ITC's transmission system and customers.
j. Explain whether the operation of the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from 9/1/2006 to 2/15/2012 would have provided benefits to ITC's transmission system and customers.
k. Explain why Hydro One and IESO have not regularly operated the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from the date when the Original PAR failed (shortly prior to 4/1/2003) to the date when the Bunce Creek/Scott transmission line was restored to service (approximately 8/31/2006).
l. Explain why Hydro One and IESO have not regularly operated the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface from the date when the Bunce Creek/Scott transmission line was restored to service (approximately 8/31/2006) to the present (approximately 2/15/2012).
m. Explain why Hydro One and IESO are not regularly operating the Hydro One PARs to conform actual power flows to scheduled power flows at the Michigan-Ontario interface today.

IESO Response:

Due to the similar nature of the data requested we have grouped our responses as follows:

Parts (a) and (b)
We believe that operating the Hydro One PARs during this period would have had some effect in mitigating loop flows, however their effectiveness would be reduced from having all four PARs in service. It is important to note that, without an operating agreement in place between the IESO/MISO the IESO was unable to operate the PARs in regulate mode during this period.

Parts (c) and (d)
We suspect that there would likely have been occasions during these periods when greater control of circulation would have provided benefits to IESO's transmission system and customers though no formal assessment of that has been undertaken.

Parts (e), (f), (g), (h), (i) and (j)
This information is not within the IESO's knowledge or control.

Parts (k), (l) and (m)
The IESO did not have an operating agreement with MISO until August 8, 2011 which was predicated on ITC turning over operational control of the B3N PARs to MISO. This component was only formalized as part of the Presidential Permit received on February 24, 2012 and will now form the basis for operations across the interface.

Response Provided by: Nicholas Ingman, Manager, Operational Excellence

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-26

Pike, Robert

From:	Deborah Klueber [DKlueber@misoenergy.org]
Sent:	Monday, March 26, 2012 4:09 PM
To:	AC Advisory Committee Exploder (adv_committee@lists.midwestiso.org); RSC Reliability Subcommittee (rscommittee@lists.midwestiso.org); MSC Market Subcommittee (marketsc@lists.midwestiso.org); PAC Planning Advisory Committee (planningac@lists.midwestiso.org)
Subject:	[MISO] Michigan-Ontario Interface Phase Angle Regulators

Dear Stakeholders,

As discussed at the March 6th Market Subcommittee (MSC) and the March 20th Reliability Subcommittee (RSC), ITC took receipt of an amended Presidential Permit from the U.S. Department of Energy on February 24, 2012. The amended permit completes regulatory authorization allowing energizing, testing and operating the Phase Angle Regulator ("PAR") at Bunce Creek (B3N). ITC has started the process of energizing and testing the B3N PAR, which is currently scheduled to be completed by EOD April 4, 2012.

MISO, IESO, ITC and Hydro One have formally set ***1000 hours EDT Thursday, April 5, 2012*** as the target for starting coordinated operation of PARs on the Michigan-Ontario interface.

The Hydro One L4D PAR at Lambton is not expected to be available by April 5th, 2012. As a result, MISO ***does not*** intend to change the methodology for pricing transactions scheduled across the Michigan-Ontario interface as originally planned. The existing pricing methodology will remain in place until further notice.

Please direct questions to Kevin Frankeny (kfrankeny@misoenergy.org).

Thank you.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-27

NYISO/ITC 5-4. Please explain why ITC decided to select a different manufacturer for the Replacement PARs from the one that supplied the Original PAR (i.e., ABB), and provide all Documents and Communications Related To that decision.

Response to NYISO/ITC 5-4: ABB was chosen to manufacture the Original PAR by DTE who owned the system at the time when the Original PAR was installed. ITC does not use ABB as the preferred supplier for transformers. Therefore, when the New PARs were constructed under the ownership of ITC, a different manufacturer was used.
To the extent they exist, all Documents and Communications related to that decision have already been provided.

Response prepared by: Tim Greenen

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-28

REDACTED

PROTECTED MATERIAL

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-29

REDACTED

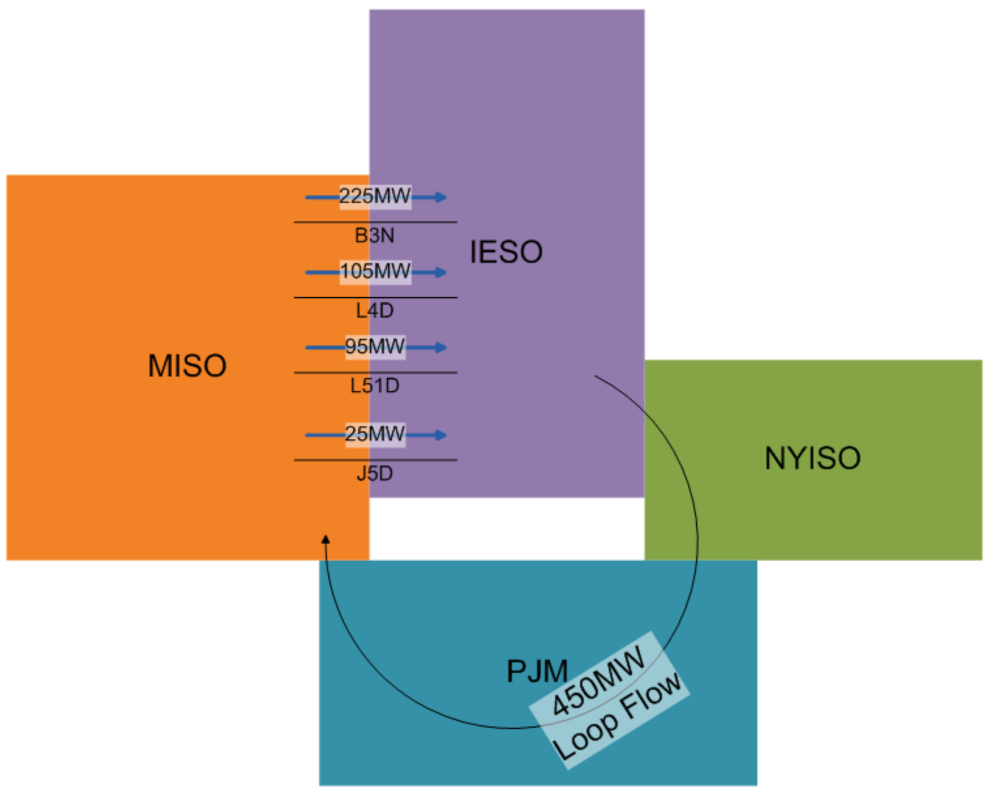
PROTECTED MATERIAL

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-30

Simplified Example
MI/ON PARs – Free Flowing

Assume:

1. 450 MW of LE loop flow across the MI/ON Interface
2. The MI/ON PARs are not being operated to match flow to schedule at the MI/ON Interface
3. Positive (+) LE loop flow is in the clockwise direction

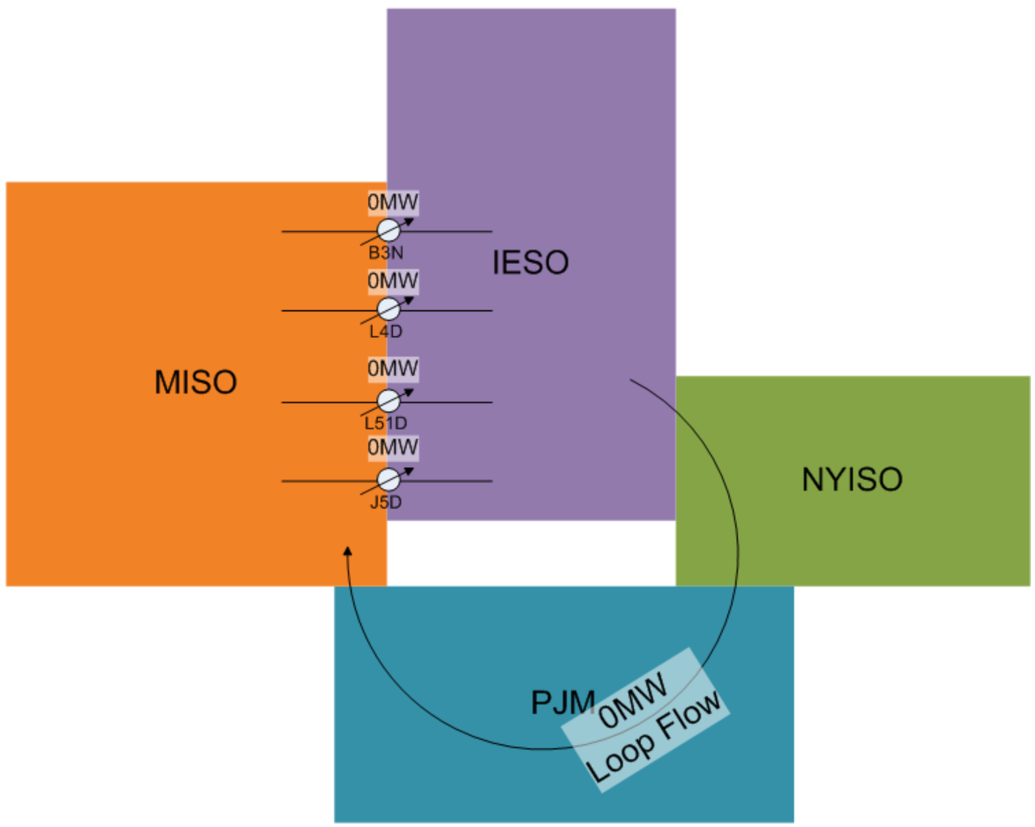


DOCKET NO. ER11-1844
EXHIBIT NO. NYI-31

Simplified Example
All MI/ON PARs Operating to Match Flow to Schedule

Assume:

1. 450 MW of potential LE loop flow across the MI/ON Interface
2. All four MI/ON PARs are operating to perfectly* match flow to schedule
3. Positive (+) LE loop flow is in the clockwise direction



*Each PAR tap move affects a significant quantity of MWs (50+MW). Spot-on control of a line or of the MI/ON Interface is unlikely in practice. MISO and IESO operate to a +/-200MW Control Band for the MI/ON Interface.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-32

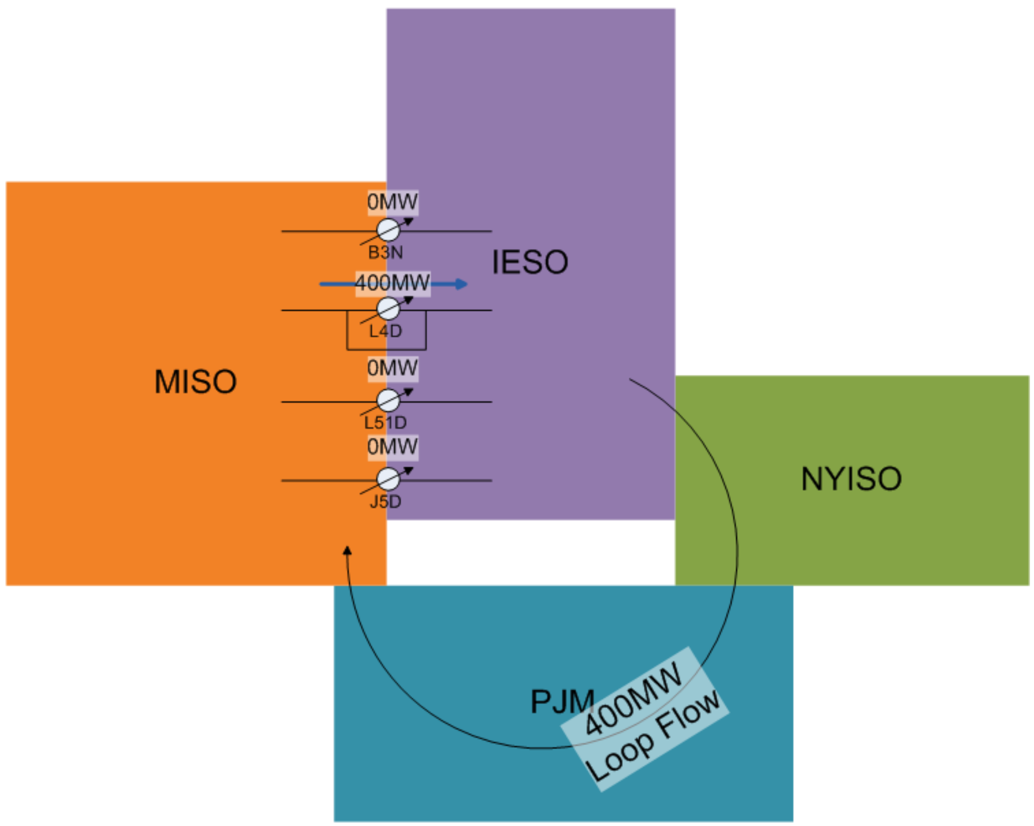
Simplified Example
Three MI/ON PARs Operating—Scenario 1

Assume:

1.450 MW of potential LE loop flow across the MI/ON Interface

2.Three MI/ON PARs perfectly matching individual line flows to schedule, L4D PAR out-of-service/bypassed

3.Positive (+) LE loop flow is in the clockwise direction



50MW of LE loop flow could be controlled with 3 out of 4 PARs controlling without actively generating counter flow to further reduce LE loop flow

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-33

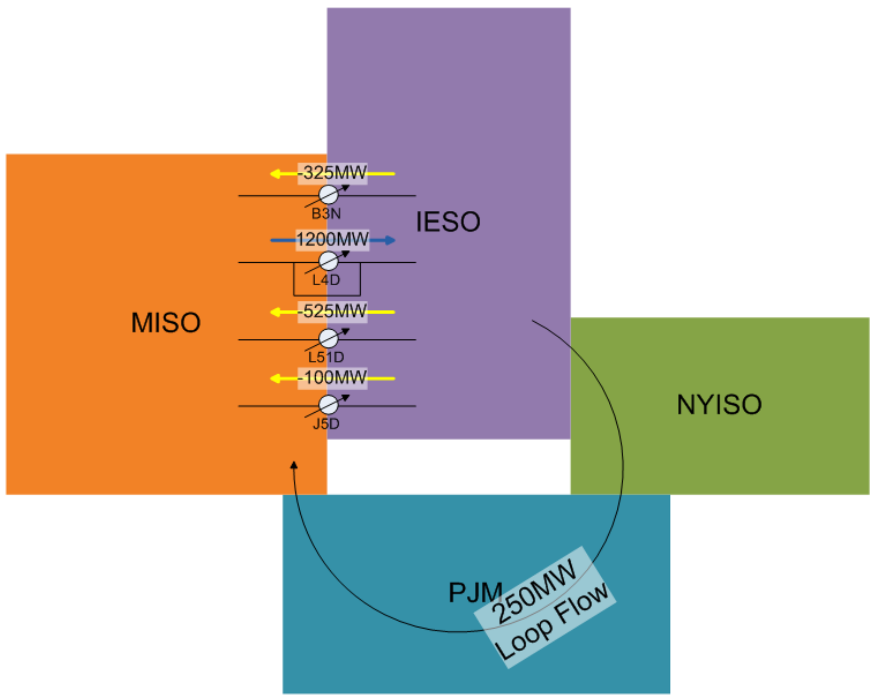
Simplified Example
Three MI/ON PARs Operating—Scenario 2

Assume:

1.450 MW of potential LE loop flow across the MI/ON Interface

2.Three MI/ON PARs operated to attempt to match MI/ON Interface flow to schedule, L4D PAR out-of-service/bypassed

3.Positive (+) LE loop flow is in the clockwise direction



Reduce LE loop flow by 200MW by introducing 950MW of counter flow on the operational MI/ON PARs

Throughout the process of increasing counter flow, the loading on L4D transmission line will increase to the point where it will be over its thermal rating (1200MW), limiting further PAR movement. It is reasonable to assume that limits on controlling loop flow with one PAR out of service will be a result of network contingency constraints rather than PAR equipment ratings or PAR tap range restrictions.

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-34

NYISO/MISO 1-18. If one of the Replacement PARs is unavailable, will MISO/ITC and IESO/Hydro One still operate the remaining four MI/ON PARs to better conform actual power flows to scheduled power flows at the MISO/IESO interface?

a. If the four remaining MI/ON PARs will not be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how will MISO/ITC and IESO/Hydro One operate the four remaining MI/ON PARs in this situation?

b. If the four remaining MI/ON PARs will be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how effective does MISO expect the four remaining PARs will be at conforming actual power flows to scheduled power flows?

Response: See response to NYISO/MISO 1-19.

Sponsor: KevinFrankeny

<u>NYISO/MISO 1-19.</u> If both of the Replacement PARs are unavailable, will MISO/ITC and IESO/Hydro One still operate the three remaining MI/ON PARs to better conform actual power flows to scheduled power flows at the MISO/IESO interface?

a. If the three remaining MI/ON PARs will not be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how will MISO/ITC and IESO/Hydro One operate the three remaining MI/ON PARs in this situation?
b. If the three remaining MI/ON PARs will be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how effective does MISO expect the three remaining MI/ON PARs will be at conforming actual power flows to scheduled power flows?

Response: Yes. Operating agreements related to the MI/ON PARs require conforming actual power flows to scheduled power flows to the maximum extent practical. Unavailability of one or more of the MI/ON PARs is one of many operational factors that may affect the overall ability of the MI/ON PARs to conform actual power flows to scheduled power flows.

a. There have been no equipment and/or system conditions identified that would make conforming actual power flows to scheduled power flows impractical (*e.g.*. overall control ability reduced to near zero), and operating agreements do not specifically address this condition.
b. While MISO expects the effectiveness of the MI/ON PARs will vary as equipment status and/or system conditions change, there have been no studies performed that quantify the effectiveness of the MI/ON PARs for any sub-optimal condition (*e.g.*, all PARs and Transmission elements in service).

Sponsored by: KevinFrankeny

<u>NYISO/MISO 1-20.</u> If one of the three Hydro One PARs is unavailable, will MISO/ITC and IESO/Hydro One still operate the four remaining MI/ON PARs to better conform actual power flows to scheduled power flows at the MISO/IESO interface?

a. If the four remaining MI/ON PARs will not be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how will MISO/ITC and IESO/Hydro One operate the four remaining MI/ON PARs in this situation?

b. If the four remaining MI/ON PARs will be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how effective does MISO expect the four remaining MI/ON PARs will be at conforming actual power flows to scheduled power flows?

Response:See response to NYISO/MISO 1-19.

Sponsored by: **Kevin Frankeny**

<u>NYISO/MISO 1-21.</u> If more than one of the three Hydro One PARs are unavailable, will MISO/ITC and IESO/Hydro One still operate the remaining MI/ON PARs to better conform actual power flows to scheduled power flows at the MISO/IESO interface?

a. If the remaining MI/ON PARs will not be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how will MISO/ITC and IESO/Hydro One operate the remaining MI/ON PARs in this situation?

b. If the remaining MI/ON PARs will be operated to better conform actual power flows to scheduled power flows at the MISO/IESO interface, how effective does MISO believe the remaining MI/ON PARs will be at conforming actual power flows to scheduled power flows?

Response: See Response to NYISO/MISO 1-19.

Sponsor: KevinFrankeny

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-35

NYISO/MISO 3-1. Please consider MISO's responses to NYISO/MISO 1-18 through NYISO/MISO 1-21, and respond to the questions below.

On pages 26 and 31 of Mr. Chatterjee's Direct Testimony he states that the MI/ON PARs will "fully mitigate Lake Erie loop flow approximately 74% of the time and will mitigate it by approximately 600 MW the remainder of the year." The NYISO would like to understand the impact of MI/ON PAR outages at the Ontario/Michigan interface on this assertion. For purposes of the questions below, please assume that all MI/ON PARs are in service and available, except for the PARs that are specifically identified as being out-of-service. Where there are multiple PARs to choose from (for example, where the question states that two of the three Hydro One PARs are out-of-service), Recipient should identify the PARs it is assuming to be out-of-service and respond to the question on that basis.

a. Does Recipient agree that the degree (in MW) to which the MI/ON PARs are capable of mitigating Lake Erie loop flow will depends on the number and location of the MI/ON PARs that are in service? If not, explain why not.

b. If one of the Replacement PARs is out-of-service, how frequently (in percentage terms) does Recipient expect the MI/ON PARs will fully mitigate Lake Erie loop flow?

c. If one of the Replacement PARs is out-of-service, to what degree (in MW) does Recipient expect the MI/ON PARs to reduce Lake Erie loop flow at times when they are not able to fully mitigate such loop flow?

d. If both of the Replacement PARs are out-of-service, how frequently (in percentage terms) does Recipient expect the MI/ON PARs will fully mitigate Lake Erie loop flow?

e. If both of the Replacement PARs are out-of-service, to what degree (in MW) does Recipient expect the MI/ON PARs to reduce Lake Erie loop flow at times when they are not able to fully mitigate such loop flow?

f. If one of the Hydro One PARs is out-of-service, how frequently (in percentage terms) does Recipient expect the MI/ON PARs will fully mitigate Lake Erie loop flow?

g. If one of the Hydro One PARs is out-of-service, to what degree (in MW) does Recipient expect the MI/ON PARs to reduce Lake Erie loop flow at times when they are not able to fully mitigate such loop flow?

h. If two of the Hydro One PARs are out-of-service, how frequently (in percentage terms) does Recipient expect the MI/ON PARs will fully mitigate Lake Erie loop flow?

i. If two of the Hydro One PARs are out-of-service, to what degree (in MW) does Recipient expect the MI/ON PARs to reduce Lake Erie loop flow at times when they are not able to fully mitigate such loop flow?

j. If Recipient is unable to respond to any of the questions included in NYISO/MISO 3-1, for each question that Recipient is unable to respond to, please explain why Recipient is unable to respond and explain what would be required in order for Recipient to be able to respond.

k. Provide all Documents that were used to develop or support Recipient's responses to NYISO/MISO 3-1 (including all sub-parts).

Response: MISO maintains its prior objections to NYISO/MISO 3-1 on the grounds previously stated and because MISO has already responded to the requests, which have already been asked, albeit more succinctly, in NYISO/MISO 1-19. Notwithstanding these objections and by way of further answer, MISO agrees that the effectiveness of the MI/ON PARs will vary as equipment status and/or system conditions change but MISO is unable to respond to the various hypothetical scenarios posed in NYISO/MISO 3-1as MISO has already stated in response to NYISO/MISO 1-19 (*i.e.*, there have been no studies performed that quantify the effectiveness of the MI/ON PARs for any sub-optimal condition). See response to NYISO/MISO 1-19 for responses to NYISO/MISO 3-1 (a) - (k).

Supplemental Response: For NYISO/MISO 3-1 (f)(g) MISO sustains its objections and refers to its prior responses to NYISO/MISO 3-1. However, Kevin Frankeny further explains that, based upon his professional judgment and experience, MISO believes that with the Hydro One L4D PAR out of service, overall capacity to reduce loop flows will decline so MISO would expect the MI/ON PARs to fully mitigate loop flows 40-50% of the time. However, the MI/ON PARs will still be able to mitigate Lake Erie loop flow by approximately 300-350 MW.

Sponsored by: Counsel and Kevin Frankeny

DOCKET NO. ER11-1844
EXHIBIT NO. NYI-36

Time	Difference Between Scheduled and Actual Power Flows, measured at the NYISO IESO Border		
4/5/12 0:00	519.7836914	Percent of Hours within Bandwidth	56.6%
4/5/12 1:00	90.42636108	Percent of Hours that MI/ON Interface flow is within ±10 MW of MI/ON Interface schedule	2.96%
4/5/12 2:00	285.6725464		
4/5/12 3:00	240.4515381		
4/5/12 4:00	151.8051758		
4/5/12 5:00	-16.52056885		
4/5/12 6:00	-235.7324829		
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DOCKET NO. ER11-1844
EXHIBIT NO. NYI-37

NYTO/ITC 1-86. Please describe the degree to which the Replacement PARs ability to control loop flow is dependent upon the operation of IESO's PARs or other facilities.

Response NYTO/ITC 1-86: In order to maximize the loop flow control effect of the PARs, the operation of all the PARs must be coordinated. This coordination is embedded in the ITC-Hydro One Interconnection Facilities Agreement filed at DOE. Some loop flow mitigation could occur by operating the ITC B3N PARs in isolation of the operation of the Ontario PARs on the interface but the results would be sub-optimal, and be contrary to NERC compliance requirements. The operational actions of the other parties around Lake Erie, such as operation of the Ramapo PAR and the generation dispatch configuration, greatly affects the magnitude of loop flow and therefore the ability of the ITC-Hydro One PARs to control the loop flow.

Response prepared by Mike Moltane