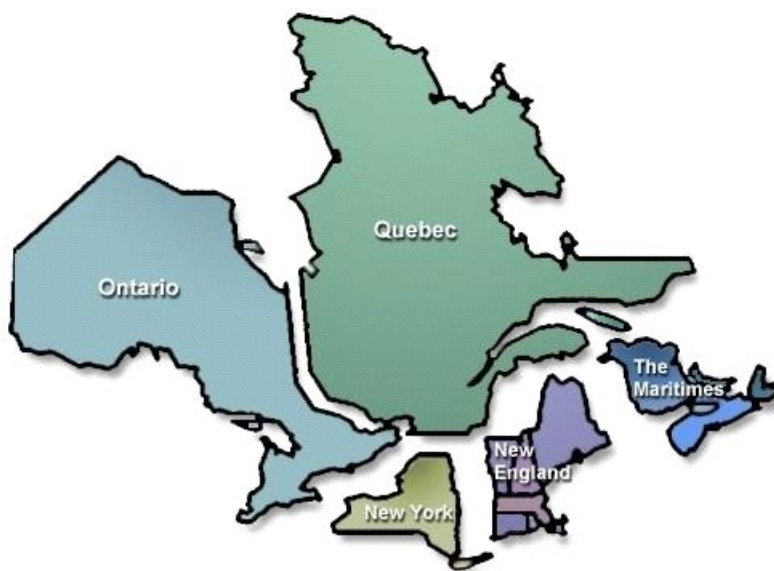




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Northeast Power Coordinating Council, Inc. Regional Reliability Plan



Redacted Version

Approved by the NPCC Reliability Coordinating Committee May 28, 2008

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I. EXECUTIVE SUMMARY

The Northeast Power Coordinating Council (NPCC) Reliability Plan describes the procedures, practices and requirements implemented to facilitate the reliable operation of the **Bulk Power System (BPS)** within the NPCC Region. This plan replaces the NPCC Regional Reliability Plan dated August 2005 which has been reviewed and updated to ensure that reliability continues to effectively be maintained under the expected operating conditions for 2008 and beyond.

The NPCC Reliability Plan outlines the coordination process to address the requirements of the NERC Reliability Standards and further achieves the following objectives:

- Identifies the regional entities that are registered with the NERC in accordance with the NERC Reliability Functional Model and “Reliability Standards” and summarizes the operating functions that will be performed by that Regional Entity.
- Establishes the essential industry practices to promote effective **Wide Area** reliability among the **Reliability Coordinators** within the NPCC **Region**: the Ontario Independent Electricity System Operator (IESO), New York ISO (NYISO), ISO New England (ISO-NE), New Brunswick System Operator (NBSO) and System Control Department (Direction Contrôle des mouvements d'énergie, Hydro-Québec TransÉnergie).
- Sets forth the requirements for the **Reliability Coordinator** to have the **Wide Area** view that provides for reliability monitoring and assessment beyond the scope of coverage of the NPCC **Reliability Coordinator Area**.
- Documents the procedures and tools necessary for NPCC's **Reliability Coordinators** to monitor and direct the real-time operation of their **Area** in coordination with their neighboring **Reliability Coordinators**.
- Documents the **Reliability Coordinators'** authority to direct other responsible entities to take corrective actions to maintain the reliability and integrity of their respective **Areas**.

The NPCC Reliability Plan outlines the requirements for coordination and monitoring in both current day and day ahead timeframes. The plan describes procedures for normal and **emergency** states of operation and presents the requirements for the sharing and dissemination of information utilizing NPCC procedures, conference calls and NERC communication tools.

The NPCC Reliability Plan provides the requirements to achieve reliable operations during **emergencies** caused by abnormal voltage conditions or transmission loading, unanticipated parallel flow, **operating reserve** deficiencies and **frequency deviations**. The plan states the requirements and the procedures to be followed should a **Reliability Coordinator** enter into an unknown operating state, such as that which preceded the sequence of events that led to the power system collapse of August 14, 2003.

In order to reduce risks to the reliability of the **Bulk Power Systems** from any compromise of **critical cyber assets**, the Responsible Entities' requirements for adherence to Critical Infrastructure Protection Standards are outlined.

The NPCC Reliability Plan also outlines the requirements for system restoration, vegetation management, staffing, training, certification, and provides specific operating considerations for the NPCC **Reliability Coordinator Areas**.

II. FUNCTIONAL ENTITIES REGISTRATION AND REGIONAL OPERATING REQUIREMENTS

1. NPCC REGISTRATIONS FOR FUNCTIONAL ENTITIES

Effective April 1, 2005, NERC introduced a new set of Reliability Standards. Each Regional Reliability Organization (RRO) was directed to initiate a process for the purpose of implementing the NERC Reliability Standards. This required the identification of functional entities within NPCC **Area** and the registration of those entities in order to comply with the requirements set forth in the Reliability Standards.

The NPCC Compliance Registry provides a matrix identifying the regional entities that have registered with the NERC in accordance with the NERC Reliability Functional Model and “Reliability Standards”, which summarizes what operating functions will be performed by the Regional Entity. The Compliance Registry can be found at:

http://www.npcc.org/viewDoc.aspx?name=NPCC_CBRE_Compliance_Registry_Listing.pdf&cat=compRegistration

Area Compliance Monitoring Responsibilities to Reliability Standards

An ongoing review is continually being performed at both the regional and organizational levels to ensure that:

- Gaps do not exist where an entity has not assumed responsibility for a requirement identified in Reliability Standards;
- Overlaps of responsibilities for the same requirements do not exist.

III. RELIABILITY PLAN ELEMENTS

1. TERMS

Bolded expressions used in the NPCC Reliability Plan have the meanings ascribed thereto in the NERC Document “NERC Glossary of Terms” and NPCC Document A-07 “NPCC Glossary of Terms”.

2. NPCC RELIABILITY COORDINATORS

The NPCC **Reliability Coordinators** for the Eastern and Québec Interconnections are:

- Independent Electricity System Operator (IESO), for the province of Ontario (known as the Ontario **Area**);
- New York Independent System Operator (NYISO), for the state of New York (known as the New York **Area**);
- Independent System Operator of New England (ISO-NE), for the New England states (known as the New England **Area**);
- New Brunswick System Operator (NBSO), for New Brunswick Power, Nova Scotia Power Incorporated, the province of Prince Edward Island, Maine Public Service Company and the Eastern Maine Electric Cooperative. The province of Prince Edward Island, Maine Public Service Company and the Eastern Maine Electric Cooperative are not part of the **Bulk Power System**.
- System Control Department (Direction Contrôle des mouvements d'énergie), Hydro-Québec TransÉnergie (HQT) for the Québec Interconnection and the transmission lines between Churchill Falls Generating Station (Labrador) and HQT system (known as the Québec **Area**).

To maintain the operational reliability of the NPCC Region, the NPCC **Reliability Coordinators** are required to:

- Plan for next-day operations, which includes reliability analyses such as pre- and post-**contingency** thermal monitoring, **operating reserves**, area reserves, **reactive reserves**, voltage limits, **stability**, etc., that may identify operating conditions for which special procedures may be needed;
- Analyze current day operating conditions;
- Implement procedures to mitigate **System Operating Limit (SOL)** and **Interconnection Reliability Operating Limit (IROL)** violations on the transmission system. Regardless of the process, the **Reliability Coordinator** is required to ensure that the transmission system is returned to within **Interconnection Reliability Operating Limits** as soon as possible, but no longer than 30 minutes.

- Monitor the **Wide Area** and observe the **Interconnection Reliability Operating Limits**. **Wide Area** monitoring is described as the ability to monitor the complete **Reliability Coordinator Area**, including critical flow and status information from adjacent **Reliability Coordinator Areas** as determined by detailed system studies.

2.1. RESPONSIBILITIES

2.1.1. Reliable Operation

The **Reliability Coordinator** is responsible for the reliable operation of its **Reliability Coordinator Area** in accordance with NPCC and NERC procedures. The **Reliability Coordinator** will assess transmission reliability and coordinate **emergency** operations among the operating entities within the region and across the regional boundaries. (IRO-001)

2.1.2. Wide Area View

The **Reliability Coordinator** is responsible for having the **Wide Area** view, the operating tools, processes and procedures, including the authority, to prevent or mitigate **emergency** operating situations in both next-day analysis and during real-time conditions. (IRO-003)

2.1.3. Authority

The **Reliability Coordinator** shall have clear decision-making authority to act and to direct actions to be taken by **Transmission Operators, Balancing Authorities, Generator Operators, Transmission Service Providers, Load-Serving Entities, and Purchasing-Selling Entities** within its **Reliability Coordinator Area** to preserve the integrity and reliability of the **Bulk Power System (BPS)**. These actions shall be taken without delay, but no longer than 30 minutes. (IRO-001)

2.1.4. Delegation

If a **Reliability Coordinator** delegates tasks to others, the **Reliability Coordinator** retains its responsibilities for complying with NERC and regional standards.

All responsibilities for complying with NERC and regional standards applicable to **Reliability Coordinators** shall remain with the **Reliability Coordinator**. (IRO-001)

2.2. STANDARDS OF CONDUCT AND CONFIDENTIALITY

2.2.1. Standards of Conduct

NPCC **Reliability Coordinator** shall sign and adhere to the NERC **Reliability Coordinator** Standards of Conduct and the NPCC Code of Conduct. Standards of conduct are necessary to ensure the Reliability Coordinator does not act in a manner that favors one market participant over another (NERC Reliability Coordinator Standards of Conduct).

2.2.2. Data Confidentiality Agreement

NPCC **Reliability Coordinators** must ensure that their staff adhere to the data confidentiality agreement and must not pass on information or data to any merchant function that is not made available simultaneously to all such merchant functions.

As a condition of receiving data from the Interregional Security Network (ISN), each ISN data recipient shall sign the NERC Confidentiality Agreement for “Electric System Reliability Data.”(TOP-005)

2.3. AUTHORIZATIONS

2.3.1. Serving the interests of the NPCC Reliability Coordinator Areas

The **Reliability Coordinator** shall act in the interests of reliability first for the overall **Reliability Coordinator Area** and the Interconnection before the interests of any other entity. (IRO-001)

2.3.2. Compliance with Reliability Coordinator Directives

Transmission Operators, Balancing Authorities, Generator Operators, Transmission Service Providers, Load-Serving Entities, and Purchasing-Selling Entities shall comply with **Reliability Coordinator** directives unless such actions would violate safety, equipment, or regulatory or statutory requirements. Under these circumstances, these entities shall immediately inform the **Reliability Coordinator** of the inability to perform the directive so that the **Reliability Coordinator** may implement alternate remedial actions. (IRO-001)

2.4. DELEGATION OF TASKS

2.4.1. Delegating Tasks

The **Reliability Coordinator** may delegate tasks to other entities, if this delegation is accompanied by formal operating agreements, with each entity to which tasks are delegated. The **Reliability Coordinator** shall verify that all delegated tasks are understood, communicated, and addressed within its **Reliability Coordinator Area**. The **Reliability Coordinator** shall list within its reliability plan all entities to which the **Reliability Coordinator** has delegated tasks. (IRO-001)

The **Reliability Coordinator** shall verify that all delegated tasks are carried out by NERC certified **Reliability Coordinator** operating personnel. (IRO-001)

Each **Transmission Operator**, **Balancing Authority**, and **Reliability Coordinator** shall staff all operating positions that meet both of the following criteria with personnel that are NERC certified for the applicable functions:

- (i) Positions that have the primary responsibility, either directly or through communications with others, for the real-time operation of the interconnected **BPS**. (PER-003)
- (ii) Positions directly responsible for complying with NERC standards. (PER-003)

2.4.2. Auditing Delegated Tasks

NPCC or NERC may audit all responsible entities delegated to perform the **Reliability Coordinator**'s tasks.

3. NORMAL OPERATIONS

3.1. NEXT DAY AND CURRENT DAY OPERATIONS

3.1.1. Common Tasks to Next Day and Current Day Operations

3.1.1.1. Assess Contingency Situations

The **Reliability Coordinator** shall conduct system assessment based on thermal, voltage and **stability** limits to coordinate current day and next day operations within applicable **SOL** and **IROL**. The **Reliability Coordinator** shall ensure that its **Wide Area** view is modeled to meet the requirements of coordinated operations.

3.1.1.2. Determine IROL

The **Reliability Coordinator** shall determine **IROL** based on local, Regional and inter-Regional studies. The **Reliability Coordinator** must recognize that an **IROL** violation can be created during multiple, normally non-critical outage conditions and, as such, the **Reliability Coordinator** must be knowledgeable of events that could lead to such an occurrence. The **Reliability Coordinator** is responsible for disseminating this information within its **Reliability Coordinator Area** and to neighboring **Reliability Coordinators**.

3.1.1.3. Ensure that each Reliability Coordinator Area Does Not Burden adjacent Reliability Coordinator Area

The **Reliability Coordinator** shall ensure that all entities under its authority operate to prevent the likelihood that a **disturbance**, action, or non-action in its **Reliability Coordinator Area** will result in a **SOL** or **IROL** violation in another **Area** of the **Interconnection**. In instances where the derived **operating limits** differ from one **Area** to another, the **Reliability Coordinators** shall always operate the **BPS** to the most limiting parameter. (IRO-005)

Each **Reliability Coordinator** shall pay particular attention to parallel flows to ensure one **Reliability Coordinator Area** does not place an unacceptable or undue **Burden** on an adjacent **Reliability Coordinator Area**. (IRO-004)

Reliability Coordinators shall approve, communicate, and coordinate the re-synchronizing of major system islands or synchronizing points so as not to cause a **Burden** on adjacent **Areas**. (EOP-006)

3.1.1.4. Transfer Capability Coordination

The **Reliability Coordinator** shall make known to **Transmission Service Providers** within its **Reliability Coordinator Area**, **SOLs** or **IROLs** within its **Wide Area** view. The TSP shall respect these **SOLs** or **IROLs** in the determination of **transfer capabilities**, in accordance with filed tariffs and/or regional **TTC/ATC** calculation processes. (IRO-005)

3.1.1.5. Communicate Effectively

The **Reliability Coordinator** shall issue directives in a clear, concise and definitive manner. The **Reliability Coordinator** shall ensure the recipient of the directive repeats the information back correctly; and shall

acknowledge the response as correct or repeat the original statement to resolve any misunderstandings. (COM-002)

Unless agreed to otherwise, each **Reliability Coordinator**, **Transmission Operator**, and **Balancing Authority** shall use English as the language for all communications between and among operating personnel responsible for the real-time generation control and operation of the interconnected **BPS**. **Transmission Operators** and **Balancing Authorities** may use an alternate language for internal operations. (COM-001)

3.1.1.6. **Maintain Flows Within Limits**

The **Reliability Coordinator** shall identify the cause of the potential or actual **SOL** or **IROL** violation and initiate the control action or **emergency** procedure to relieve the potential or actual **SOL** or **IROL** violation consistent with NERC Reliability Standards.

The **Reliability Coordinator** shall evaluate actions taken to address an **IROL** or **SOL** violation and, if the actions taken are not appropriate or sufficient, direct actions required to return the system to within limits. (TOP-007)

3.1.1.7. **Maintain a Wide Area View**

Each **Reliability Coordinator** shall monitor all **BPS** facilities, which may include sub-transmission information, within its **Reliability Coordinator Area** and adjacent **Reliability Coordinator Areas**, as necessary to ensure that, at any time, regardless of prior planned or unplanned events, the **Reliability Coordinator** is able to determine any potential **SOL** and **IROL** violations within its **Reliability Coordinator Area**. (IRO-003)

Each **Reliability Coordinator** shall know the current status of all critical facilities whose failure, degradation or disconnection could result in an **SOL** or **IROL** violation. **Reliability Coordinators** shall also know the status of any facilities that may be required to assist area restoration objectives. (IRO-003)

This responsibility may require **Reliability Coordinators** to receive additional information not normally monitored by their Energy Management System to assist in **IROL** violation determination.

3.1.1.8. Inter-Area/Inter-Regional Coordination

Reliability Coordinators are responsible for addressing inter-Area or inter-Regional operational concerns by coordinating their actions with other **Reliability Coordinators** from the NPCC **Region** and other **Regions**. This includes both foreseen and unforeseen events. **Reliability Coordinators** are responsible for taking immediate actions to contain an operating problem and to request or provide assistance from or to other **Reliability Coordinators**.

The **Reliability Coordinator** shall coordinate with other **Reliability Coordinators** and other responsible entities as needed to develop and implement action plans to mitigate potential or actual **SOL**, **IROL**, **CPS** or **DCS** violations. This includes coordination of pending generation and transmission maintenance outages in both the current-day and next-day timeframes. It also includes coordination of any actions, including **emergency** assistance, required to mitigate any operational concerns. (IRO-005)

When a **Reliability Coordinator** is aware of an operational concern, such as declining voltages, excessive reactive flows, or an **IROL** violation, in a neighboring **Reliability Coordinator Area**, it shall contact the **Reliability Coordinator** in whose **Area** the operational concern was observed. The two **Reliability Coordinators** shall coordinate any actions, including **emergency** assistance, required to mitigate the operational concern. (IRO-003)

3.1.2. Next-Day Operations

3.1.2.1. Reliability Analysis and System Studies

The **Reliability Coordinator** shall conduct next-day reliability analyses for its **Reliability Coordinator Area** to ensure that the **BPS** can be operated reliably in anticipated pre and post **contingency** conditions. (IRO-004)

3.1.2.1.1. Contingency Analysis

The **Reliability Coordinator** shall conduct **contingency** analysis studies to identify potential **interface** and other **SOL** and **IROL** violations.

3.1.2.1.2. Parallel Flows

The **Reliability Coordinator** shall monitor parallel flows to ensure that its **Reliability Coordinator Area** does not **burden** another **Reliability Coordinator Area**. (IRO-004)

3.1.2.2. Information Sharing

Each responsible entity in the **Reliability Coordinator Area** shall provide to their **Reliability Coordinator** all information required for system studies, such as critical facility status, load, generation, **Operating Reserve** projections and known **interchange** transactions. This information shall be available by 1200 Central Standard Time for the Eastern **Interconnection**. (IRO-004)

3.1.2.3. Action Plan Development

The **Reliability Coordinator** shall, in conjunction with its responsible entities, develop action plans that address operational concerns by reconfiguring the transmission system, re-dispatching generation, reducing or curtailing **interchange** transactions, or reducing firm load to return the transmission loading to within acceptable **SOL** and **IROL**. (IRO-004)

3.1.2.4. Sharing of Study Results

When conditions warrant or upon request, the **Reliability Coordinator** shall share the results of its system studies with responsible entities within its **Reliability Coordinator Area** or with other **Reliability Coordinators**. Study results for the next day shall be available no later than 1600 Eastern Standard Time (1500 CST), unless circumstances warrant otherwise. (IRO-004)

When required, the **Reliability Coordinator** shall initiate a conference call or other appropriate communications to address the results of its reliability analyses.

3.1.2.5. Issuing Alerts

If after applying all possible mitigation action plans, the study results indicate potential **SOL** or **IROL** violations, the **Reliability Coordinator** shall issue the appropriate alerts via the **Reliability Coordinator Information System (RCIS)** and direct its responsible entities to take the necessary actions to address the potential **SOL** or **IROL** violation. (IRO-004)

3.1.2.6. Compliance with Reliability Coordinator Directives

All responsible entities shall comply with the directives of their **Reliability Coordinator** based on the next day assessments in the same manner in which they would comply during real time operating events. (IRO-004)

3.1.3. Current Day Operations

3.1.3.1. Status of Facilities

The **Reliability Coordinator** must be aware of the status of all facilities whose failure, degradation or disconnection could result in an **SOL** or **IROL** violation. **Reliability Coordinators** must also be aware of the status of any facilities that may be required to assist **Area** restoration objectives. (IRO-003)

3.1.3.2. Situational Awareness

The **Reliability Coordinator** shall be continuously aware of operating conditions within its **Reliability Coordinator Area** and include this information in its reliability assessments. To accomplish this objective the **Reliability Coordinator** shall monitor its parameters that may have significant impacts on its **Reliability Coordinator Area** parameters, including but not limited to the following, where applicable: (IRO-005)

- Current status of **BPS** including AVRs and SPS schemes.
- Current pre-**contingency** and post-**contingency** element conditions (voltage, thermal, or **stability**).
- **Operating Reserve**: The **Reliability Coordinator** is required to monitor **Balancing Authorities'** parameters to ensure that the required amount of **Operating Reserve** is provided and available as required to meet NERC **CPS** and **DCS** requirements. If necessary, the **Reliability Coordinator** shall direct the **Balancing Authorities** in its **Reliability Coordinator Area** to arrange for assistance from neighboring **Areas**. The **Reliability Coordinator** shall issue **Energy Emergency Alerts**, as needed, and at the request of **Load Serving Entities**.
- Reactive Reserves: The **Reliability Coordinator** is required to monitor **its Area's** parameters to ensure that sufficient reactive resources are available to maintain voltage within normal limits for pre-**disturbance** conditions, and within applicable **emergency** limits for

the system conditions that exist following the **contingencies**.

- Capacity (NPCC Document A-13) and energy adequacy conditions.
- Current **ACE** for all its **Balancing Authorities**, per NPCC Document C-37.
- **Area** congestion management or TLR procedures in effect.
- Planned generation dispatches.
- Planned transmission or generation outages, per NPCC Documents A-03 and C-13.
- **Contingency** events.

3.1.3.3. Interchange Transaction Monitoring

The **Reliability Coordinator** shall monitor **interchange** transactions to ensure they do not significantly impact the **Reliability Coordinator Area** or the neighboring **Reliability Coordinator Areas**:

3.1.3.3.1. Interchange Transaction Information

The **Reliability Coordinator** shall be aware of all **interchange** transactions that wheel-through, source, or sink in its **Reliability Coordinator Area** and shall make that **interchange** transaction information available to all **Reliability Coordinators** in the **Interconnection**. (IRO-005)

3.1.3.3.2. Pending Interchange Schedules to Identify Potential Flow Impacts

As portions of the transmission system approach or exceed **SOLs** or **IROLs**, the **Reliability Coordinator** shall work with its responsible entities to evaluate and assess any additional **Interchange Schedules** that would violate those limits. If the potential or actual **SOL** or **IROL** violation cannot be avoided through proactive intervention, the **Reliability Coordinator** shall initiate control actions or **emergency** procedures to relieve the violation consistent with Reliability Standard. All resources, including shedding of firm load shall be available to the **Reliability Coordinator** to address a potential or actual **SOL** or **IROL** violation. (IRO-005)

3.1.3.4. Time Error Correction and Geo-Magnetic Disturbance Notification

The **Reliability Coordinator** will communicate start and end times for **time error corrections** to the relevant responsible entities within its **Reliability Area**. The **Reliability Coordinator** will ensure that its relevant entities are aware of Geo-Magnetic **Disturbance (GMD)** forecast information and assist as needed in the development of any required response plans. (IRO-005)

3.1.3.5. System frequency and resolution of significant frequency errors, deviations and real-time trends.

The **Reliability Coordinator** shall monitor system frequency and its **Balancing Authorities'** performance and direct any necessary re-balancing to return to **CPS** and **DCS** compliance. The **Transmission Operators** and **Balancing Authorities** shall utilize all resources, including shedding of firm load, as directed by its **Reliability Coordinator** to relieve the emergent condition. (IRO-005)

The **Reliability Coordinator** shall identify sources of large **Area Control Errors** that may be contributing to **Frequency Error, Time Error, or Inadvertent Interchange** and shall discuss corrective actions with the appropriate **Balancing Authority**. If a **Frequency Error, Time Error, or inadvertent** problem occurs outside of the **Reliability Coordinator Area**, the **Reliability Coordinator** shall initiate a NERC hotline call to discuss the **Frequency Error, Time Error, or Inadvertent Interchange** with other **Reliability Coordinators**. The **Reliability Coordinator** shall direct its **Balancing Authorities** to comply with **CPS** and **DCS**. (IRO-005)

3.1.3.6. Monitoring of Special Protection Systems (SPS)

Whenever a **Special Protection System** that may have an inter-**Balancing Authority, inter-Transmission Operator, or inter-Reliability Coordinator Area** impact (e.g., could potentially affect transmission flows resulting in a **SOL** or **IROL** violation) is armed, the **Reliability Coordinators** shall be aware of the impact of the operation of that **Special Protection System** on inter-area flows. The **Transmission Operator** shall immediately inform the **Reliability Coordinator** of the status of the **Special Protection System** including any degradation or potential failure to operate as expected. (IRO-005)

3.1.3.7. Issuing Alerts

The **Reliability Coordinator** who foresees a transmission problem (such as an **SOL** or **IROL** violation, loss of reactive reserves or any **emergency** operating conditions) within its **Reliability Coordinator Area** shall issue an alert to all impacted entities within its **Area**, and all **Reliability Coordinators** within the **Interconnections** via the **Reliability Coordinator Information System (RCIS)** without delay. The receiving **Reliability Coordinator** shall disseminate this information to its impacted entities and shall notify all when the transmission problem has been mitigated. (IRO-005)

4. EMERGENCY OPERATIONS

4.1. PRECEDENCE OVER COMMERCIAL OPERATIONS

The integrity and reliability of the **BPS** is of paramount importance and takes precedence over the interest of any other entity. (IRO-001)

4.2. ACTION THAT WOULD LEAD TO AN EMERGENCY CONDITION

Reliability Coordinators and **Transmission Operators, Generator Operators** and **Balancing Authorities** shall not take any action or refrain from taking any action that would, knowingly, lead to an **emergency** condition within their **Area** or a neighboring **Area**. (TOP-001)

4.3. EXERCISING SPECIFIC AUTHORITY TO PREVENT AND MITIGATE EMERGENCIES

Reliability Coordinators and **Balancing Authorities** and **Transmission Operators** have the responsibility and decision-making authority for maintaining the reliability of the **BPS** and shall exercise their specific authority to prevent and mitigate capacity and **energy emergencies**. (IRO-001 and EOP-002)

4.4. EXERCISING SPECIFIC AUTHORITY FOR LOAD SHEDDING

The **Reliability Coordinator** shall have clear decision-making authority to act and to direct actions to be taken by **Transmission Operators, Balancing Authorities, Generator Operators, Transmission Service Providers, Load-Serving Entities, and Purchasing-Selling Entities** within its **Reliability Coordinator Area** to preserve the integrity and reliability of the **BPS**. These actions shall be taken without delay, but no longer than 30 minutes. (IRO-001)

A **Balancing Authority** and **Transmission Operator** operating with insufficient generation or transmission capacity must have the capability and authority to shed load rather than risk an uncontrolled failure of the **Interconnection**. (EOP-003)

4.5. COMMUNICATION AND COORDINATION

4.5.1. Effective Communication

Effective communication is critical during an **emergency** or as an **emergency** situation evolves. In order to mitigate the consequences of the event, NPCC **Reliability Coordinators** are required to issue directives in a clear, concise and definitive manner.

Communication shall be coordinated at the appropriate authority level as required in Reliability Standard. (COM-002)

4.5.2. Notification of Potential Problems

NPCC **Reliability Coordinator** who foresees a transmission problem (such as an **SOL** or **IROL** violation, loss of reactive reserves, etc.) within its **Reliability Coordinator Area** shall issue an alert to all impacted **Transmission Operators** and **Balancing Authorities** in its **Reliability Coordinator Area**, and all impacted **Reliability Coordinators** within the **Interconnection** via the **Reliability Coordinator Information System (RCIS)** without delay. (IRO-005)

4.5.3. Disseminating/Sharing Information

NPCC **Reliability Coordinators** use the NERC Hotline to disseminate information and exercise coordination with other **Reliability Coordinators**. Appropriate information is then relayed to individual **Balancing Authorities** and **Transmission Operators** within their **Reliability Coordinator**. (IRO-005)

4.5.4. NERC Hotline

For **emergencies** and near **emergency** situations that involve or affect the **BPS** or when time is of essence in recognition, prevention, mitigation or resolution of the **emergency**, **Reliability Coordinators** are required to use the NERC Hotline. (IRO-005)

4.5.5. NERC RCIS

NPCC **Reliability Coordinators** use the **RCIS** to provide notification of potential or actual **emergency** conditions. Such notification shall include information regarding abnormal system conditions, which have the potential to **burden** neighboring **Reliability Coordinators Areas** such as:

- Extreme weather conditions that are likely to adversely impact the reliability of the **BPS**;
- **Energy Emergency Alerts** (EOP-002);
- Request for **emergency** energy assistance;
- Major forced transmission and generation outages that have, or are likely to have, an adverse impact on the reliability of the **BPS**;
- Abnormal voltage and frequency conditions.

4.5.5.1. NPCC Emergency Preparedness and Security Conference Calls

To quickly exchange information about the current status of the **BPS** and to facilitate inter-**Area emergency** assistance, **Reliability Coordinators** in NPCC may initiate an NPCC **Emergency Preparedness Conference Call** as outlined in NPCC Document C-01. In the event of a physical threat to the security of the **BPS**, **Reliability Coordinators** in NPCC, as well as their counterparts in PJM and MISO, may initiate an NPCC Security Conference Call as described in NPCC Document C-01.

4.5.6. Communication During Extended Emergencies

During extended **emergencies**, NPCC **Reliability Coordinators** are required to ensure that effective, timely and accurate information is provided, as appropriate, to key entities such as media, government and regulatory bodies to facilitate public awareness and cooperation. (EOP-002)

4.5.7. Energy Emergency Alerts

A **Reliability Coordinator** that is forecasting a potential or experiencing an actual **Energy Emergency** within its **Reliability Coordinator Area** shall initiate an **Energy Emergency Alert** via **RCIS**. (EOP-002)

4.6. EMERGENCY OPERATIONS CRITERIA

4.6.1. Unknown Operating State

If the **Transmission Operator** enters an unknown operating state (e.g. any state for which valid operating limits have not been determined), it will be considered to be in **emergency** and shall restore operations to respect proven reliable power system limits within 30 minutes. (TOP- 004)

4.6.2. Disconnecting Facilities

NPCC **Transmission Operators** and **Generator Operator** are required to notify and coordinate with their **Reliability Coordinator** and adjacent **Transmission Operator** before removing **BPS** facilities from service if removing those facilities would **burden** a neighboring **Area**. (TOP-001)

For a generator outage, the **Generator Operator** shall notify and coordinate with the **Transmission Operator**. The **Transmission Operator** shall notify the **Reliability Coordinator** and other affected **Transmission Operators**, and coordinate the impact of removing the **BPS** facility.

For a transmission facility, the **Transmission Operator** shall notify and coordinate with its **Reliability Coordinator**. The **Transmission Operator** shall notify other affected **Transmission Operators**, and coordinate the impact of removing the **BPS** facility.

When time does not permit such notifications and coordination, or when immediate action is required to prevent a hazard to the public, lengthy customer service interruption, or damage to facilities, the **Generator Operator** shall notify the **Transmission Operator**, and the **Transmission Operator** shall notify its **Reliability Coordinator** and adjacent **Transmission Operators**, at the earliest possible time.

NPCC Document C-13 provides notification procedures for removal from service of critical facilities as well as a list of critical facilities that, if removed from service, may directly or indirectly **burden** a neighboring **Transmission Operator**. (TOP-001)

4.6.3. Operating Within Limits

The **Reliability Coordinator** shall make available to its operators a comprehensive set of **operating limits** for both normal and **emergency** conditions along with clear instructions describing the circumstances when these limits are to be used (NPCC Document A-03).

Where inter-**Area** reliability is affected, the **Reliability Coordinator** is required to establish limits and operate so that the **contingencies** can be withstood without adversely affecting other **Areas**. During **emergencies**, the **Reliability Coordinator** is required to operate within the applicable **emergency System Operating Limits (SOL)** and **Interconnection Reliability Operating Limits (IROL)**. The **Reliability Coordinator** is required to implement **emergency** measures, including shedding of firm load, to maintain the operation of the power system within the applicable **emergency** limits. (NPCC Document A-02)

The **Reliability Coordinator** shall ensure that a **disturbance**, action or non-action, will not result in a **SOL** or **IROL** violation in their **Area** or another **Area**. In instances where there is a difference in derived limits, the **Reliability Coordinator** is required to operate the **BPS** to the most limiting parameter. (IRO-005)

The **Reliability Coordinators** and **Transmission Operators** shall have sufficient real time information and analysis tools to determine potential **SOL** or **IROL** violations. This analysis shall be conducted in all operating timeframes. The **Reliability Coordinator** shall use the results of these analyses to determine the causes of the violations and identify mitigating actions. (IRO-005 and TOP-008)

Each **Reliability Coordinator** shall identify the cause of any potential or actual **SOL** or **IROL** violations. The **Reliability Coordinator** shall initiate the control action or **emergency** procedure to relieve the potential or actual **IROL** violation without delay, and no longer than 30 minutes. The **Reliability Coordinator** shall be able to utilize all resources, including load shedding, to address an **IROL** violation. (IRO-005)

Following a **contingency** that results in a **SOL** or **IROL** violation, NPCC **Reliability Coordinators** are required to direct their **Transmission Operators**, **Generation Operators** and **Balancing Authority** to return the transmission system to within the **SOL** or **IROL** as soon as possible, within 30 minutes. (IRO-005)

When an **SOL** or **IROL** violation is imminent, **Reliability Coordinators** must be aware that Transmission Loading Relief (TLR) procedures may not be able to address the violation in a timely fashion. In such circumstances the **Reliability Coordinators** have the authority and obligation to immediately direct their **Transmission Operators**, **Generation Operators** and **Balancing Authorities** to re-dispatch generation, reconfigure transmission, manage **interchange** transactions, or reduce system demand which may include shedding of firm load. These actions shall be used in conjunction with the TLR procedure to restore the system to normal state. The **Reliability**

Coordinator shall coordinate these **emergency** control actions with other **Reliability Coordinators** as needed. (NPCC Documents A-03 and C-20) (IRO-005)

4.6.4. Frequency Control

Reliability Coordinator Areas are required to maintain **automatic generation control (AGC)** equipment operational and in service as specified in NPCC Document A-03. (BAL-003 and BAL-005)

The **Reliability Coordinator** shall identify sources of large **Area Control Error** that may be contributing to **frequency error, time error, or inadvertent interchange** and shall discuss corrective actions with the appropriate **Balancing Authority**. If a **Frequency Error, Time Error, or inadvertent problem** occurs, the **Reliability Coordinator** shall initiate a NERC hotline call to discuss the **frequency error, time error, or inadvertent interchange** with other **Reliability Coordinators**, as appropriate. The **Reliability Coordinator** shall direct its **Balancing Authorities** to comply with **CPS and DCS**. (IRO-005)

If a **Reliability Coordinator** detects an Interconnection **frequency error** in excess of ± 0.03 Hz for more than 20 minutes, the **Reliability Coordinator** is required, to provide notification to all appropriate parties. If a **Reliability Coordinator** determines **frequency error**, the **Reliability Coordinator** must direct those contributing **Balancing Authority Areas** to immediately comply with **CPS and DCS** requirements by using all their available resources, including shedding of firm load.

During a system **emergency**, the **Reliability Coordinator** shall comply with NERC **Control Performance and Disturbance Control Standards**. The **Reliability Coordinator** may not rely on the frequency bias of the other **Transmission Operators, Generation Operators and Balancing Authorities** provide energy during the **emergency** because doing so reduces the **Interconnection's** ability to recover its frequency following additional generator failures. (BAL-002)

If the **Reliability Coordinator** determines that **Balancing Authorities** within its **Area** cannot comply with the **Control Performance or Disturbance Control Standards**, then it must immediately declare an **Energy Emergency** and implement remedies such as requesting assistance from other **Reliability Coordinators**, or implementing load reduction through public appeals, **voltage reductions**, curtailing interruptible loads and shedding firm load to return **ACE** to acceptable **CPS and DCS** criteria. (EOP-002)

4.6.5. Reactive Power Balance and Voltage Control

When an **Area** is experiencing abnormal voltage conditions, its **Reliability Coordinator** is required to immediately take action to restore the reactive power balance. The **Reliability Coordinator** is required to implement corrective control actions, which include requesting **emergency** assistance. If these actions are still not adequate to mitigate the reactive power imbalance then the **Reliability Coordinator** is required to take all necessary steps to relieve the abnormal voltage conditions including firm **load shedding**. (VAR-001)

4.6.6. Inter-Area Voltage Coordination

Adjacent **Reliability Coordinator Areas** are required to be familiar with each other's voltage criteria and procedures and mutually agree upon procedures for inter-**Reliability Coordinator Area** voltage control. (VAR-001)

4.6.7. Parallel Flows

If an **emergency** is caused in whole or in part by parallel power flows, the **Reliability Coordinator Area** or **Areas** contributing to parallel power flows shall take all steps, including firm **load shedding**, to eliminate the circulating power flow contributing to the **emergency**. The **Area** experiencing the **emergency** is required to implement all steps up to and including the firm **load shedding** in accordance with local or NERC TLR procedures. (NPCC Document A-03)

4.6.8. Maintaining Adequate Operating Reserve

Specific instructions are provided in NPCC Document C-20 for the redistribution of **Operating Reserve** among **Areas** when any **Area** is forecasting or experiencing an **Operating Reserve** deficiency. It describes the NYISO's role in coordinating the re-dispatch of available resources among **Areas** when the NPCC **operating reserve** becomes deficient. NPCC Document C-20 also outlines the obligations of each NPCC **Area** with respect to inter-**Area operating reserve** assistance. (EOP-002)

4.6.9. Emergency Operating Plans

Reliability Coordinator, Transmission Operators, Generation Operators and Balancing Authorities are required to develop, maintain and, implement a set of plans to resolve operating **emergencies**. These plans must be coordinated with each other, as appropriate.

The purpose of these plans is to present the basic factors to be considered in formulating procedures to be followed in an **emergency** or during conditions which could lead to an **emergency**, in order to facilitate mutual assistance and coordination within NPCC. Objectives, principles and requirements are presented in NPCC Document A-03 to assist the **Area** formulating plans and procedures to achieve desired results. (EOP-001)

4.7. PLANS FOR LOSS OF PRIMARY CONTROL CENTER FUNCTIONALITY

Each **Reliability Coordinator, Transmission Operator and Balancing Authority** shall have a plan to continue reliability operations in the event its primary control center becomes inoperable. The contingency plan must meet the requirements specified in Reliability Standard EOP-008. The plan shall be reviewed and updated annually. Interim provisions must be included if it is expected to take more than one hour to implement the contingency plan for loss of primary control facility. (EOP-008)

4.8. ESTABLISH, MAINTAIN AND DOCUMENT A REGIONAL BLACKSTART CAPABILITY PLAN

A System **Blackstart Capability** Plan (BCP) is necessary to ensure that the quantity and location of system blackstart generators are sufficient and that they can perform their expected functions as specified in overall coordinated Regional System Restoration Plans (SRP).

Each **Regional Reliability Organization** shall establish and maintain a system BCP, as part of an overall coordinated Regional SRP. The Regional SRP shall include requirements for verification through analysis how system blackstart generating units shall perform their intended functions and shall be sufficient to meet SRP expectations. The **Regional Reliability Organization** shall coordinate with and among other **Regional Reliability Organizations** as appropriate in the development of its BCP. (EOP-007)

5. SYSTEM RESTORATION

After a system collapse, the **Reliability Coordinator** and its affected responsible entities shall coordinate their restoration actions. Restoration priority shall be given to establishing the transmission system and providing station service supply to power plants. Even though the restoration is to be expeditious, **Transmission Operators, Generation Operators and Balancing Authorities** shall avoid any action that would cause a subsequent collapse of the **BPS**. Customer load shall be restored as generation and transmission equipment becomes available, recognizing that load and generation must remain in balance at normal frequency. (EOP-005)

5.1. REGIONAL RESTORATION PLANS

The **Regional Reliability Organizations** shall establish and maintain a coordinated Regional System Restoration Plan. Each **Regional Reliability Organization** shall establish and maintain a system BCP, as part of an overall coordinated Regional System Restoration Plan. (EOP-007)

5.2. RELIABILITY COORDINATOR RESTORATION PLAN

The **Reliability Coordinator** shall be aware of and have a copy of the restoration plan for each **Transmission Operator** in its **Reliability Coordinator Area** in accordance with NERC and Regional requirements. During system restoration, the **Reliability Coordinator** shall monitor restoration progress and coordinate any needed assistance. (EOP-006)

The **Reliability Coordinator** shall have an **Area** restoration plan that provides for the reliable restoration of its **Area** and coordination with its responsible operating entities and the neighboring **Reliability Coordinators**. (EOP-006)

5.3. RELIABILITY COORDINATOR IS THE PRIMARY CONTACT

The **Reliability Coordinator** shall serve as the primary contact for disseminating information regarding restoration to neighboring **Reliability Coordinators** and to responsible entities within its **Reliability Coordinator Area** not immediately involved in restoration. (EOP-006)

5.4. REESTABLISHING NORMAL OPERATIONS

The **Reliability Coordinator** shall take actions in accordance with its restoration plan to restore normal operations once the operating **emergency** has been mitigated. Following a **disturbance** that caused the electrical isolation of one or more parts of the **BPS**, control actions shall be immediately implemented to return the **BPS** to normal (EOP-006). These actions include:

5.4.1. Evaluate the Condition of the Bulk Power System

The affected **Transmission Operators** and **Balancing Authorities** shall work in conjunction with their **Reliability Coordinator(s)** to determine the extent and condition of the isolated areas. (EOP-005)

5.4.2. Restore Frequency

The affected **TOPs and BAs** under the direction of **Reliability Coordinator** shall take the necessary action to restore the **BPS** frequency to normal, including adjusting generation, placing additional generators on line, or shedding load. (EOP-005)

5.4.3. Review Interchange Schedule

The **Reliability Coordinator** shall immediately review the **interchange schedules** within the affected areas and make the necessary adjustments to facilitate restoration. The **Reliability Coordinator** shall make all attempts to maintain the adjusted **interchange schedules** irrespective of whether generation control is manual or automatic. (EOP-005)

5.4.4. Re-synchronize

The **Reliability Coordinator** shall approve, communicate, and coordinate the re-synchronization of major system **islands** or synchronization points so that the adjacent **Reliability Coordinator Areas** are not **burdened**. (EOP-006)

The affected **Transmission Operators** may resynchronize the isolated area(s) with the surrounding area(s) when the following conditions are met (EOP-005):

- Voltage, frequency, and phase angle permit.
- The size of the area being reconnected and the capacity of the transmission lines effecting the reconnection and the number of synchronizing points across the system are considered.
- **Reliability Coordinator(s)** and adjacent **Areas** are notified and **Reliability Coordinator** approval is given.
- Load is shed in neighboring **Areas**, if required, to permit successful interconnected system restoration.

5.5. PRIORITY TO SUPPLY POWER TO NUCLEAR PLANTS

The affected **Transmission Operators** and **Balancing Authorities** shall work in conjunction with their **Reliability Coordinator** to give the highest priority to restore the power supply to nuclear stations. (EOP-005)

5.6. COMMUNICATION AND COORDINATION

Effective communication and coordination is critical during the restoration process. **Reliability Coordinators** are required to issue directives in a clear, concise and definitive manner.

6. RELIABILITY MONITORING AND COORDINATION

6.1. COORDINATION AGREEMENTS

The **Reliability Coordinator** must have clear, comprehensive coordination agreements with adjacent **Reliability Coordinators** to ensure that the actions of adjacent **Reliability Coordinator Areas** are coordinated to mitigate **SOL** or **IROL** violations. (IRO-001 and IRO-014)

6.2. DATA REQUIREMENTS

Each **Reliability Coordinator** shall determine the data requirements to support its Reliability Coordination tasks and shall request such data from its **Transmission Operators, Balancing Authorities, Transmission Owners, Generation Owners, Generation Operators, and Load-Serving Entities**, or adjacent **Reliability Coordinators**. (IRO-002)

6.3. DATA EXCHANGE

Each **Reliability Coordinator** shall provide, or arrange provisions for, data exchange to other **Reliability Coordinators** or **Transmission Operators** and **Balancing Authorities** via a secure network. (IRO-002 and IRO-015)

6.3.1. Voice Communications

Each **Reliability Coordinator, Transmission Operator** and **Balancing Authority** shall provide adequate and reliable telecommunication facilities to ensure the exchange of interconnection and operating information necessary to maintain reliability. These facilities shall be provided between the **Reliability Coordinator** and its responsible entities and with other **Reliability Coordinators** as necessary to maintain reliability. Where applicable these facilities shall be redundant and diversely routed. (COM-001)

Each **Reliability Coordinator** and its responsible entities shall manage alarm, test and/or actively monitor vital telecommunications facilities. Special attention shall be given to **emergency** telecommunications facilities and equipment not used for routine communications. (COM-001)

6.3.2. Data Monitoring

Each **Reliability Coordinator** shall have detailed real-time monitoring capability of its **Reliability Coordinator Area** and sufficient monitoring capability of its surrounding **Reliability Coordinator Areas** to ensure that potential or actual **System Operating Limit** or **Interconnection Reliability Operating Limit** violations are identified. Each **Reliability Coordinator** shall have monitoring systems that provide information that can be easily understood and interpreted by the **Reliability Coordinator's** operating personnel, giving particular emphasis to alarm management and awareness systems, automated data transfers, and synchronized information systems, over a redundant and highly reliable infrastructure. (IRO-002)

6.3.3. Performance

Facilities shall be subject to performance criteria to maintain the reliability of the **BPS** within the NERC Reliability Standards.

6.4. LEVELS OF COORDINATION AND MONITORING

Appendix A contains a Table that summarizes the monitoring and coordination done within NPCC and with neighboring **Regions**. (IRO-016)

Level I – Intra-Area Monitoring and Coordination

Each of the five **Areas** in NPCC (New York, New-England, Ontario, Québec and the Maritimes) monitors and controls operating problems and events affecting reliability within their jurisdiction. Each **TOP, TO and BA** is responsible for notifying their respective **Reliability Coordinator** of any abnormal conditions that require Inter-Area/Regional action.

The **Reliability Coordinator** shall coordinate with other **Reliability Coordinators** in accordance with NPCC documents A-03 This includes actions to mitigate abnormal operating conditions, actions to contain an **emergency**, and actions for system restoration.

Level II – Regional Monitoring and Coordination

This level refers to the monitoring and coordination performed by each **Reliability Coordinator** within its own **Area**. **Reliability Coordinators** are responsible to take immediate actions through the **TOP, TO and BA** under their control to contain an operating problem and coordinate assistance with other **Reliability Coordinators**, when needed.

NYISO, on behalf of the NPCC **Region**, performs the following monitoring and coordination functions:

- Actions to achieve NPCC Reserve Requirements as per NPCC Document C-20, and
- Request **Areas** to provide assistance to a deficient **Area** and to coordinate energy transfers between **Areas** to restore the ten-minute reserve as required by NPCC Document C-20.

Level III – Inter-Area/Inter-Regional Monitoring and Coordination

a) Real-time:

Monitoring and coordination for most operating concerns between **RCs, TOPs and BAs** either within the Region or with **RCs, TOPs, TOs and BAs** in other Regions, are carried out by the **Reliability Coordinators**. This includes both foreseen and unforeseen events.

Through use of the ISN, **RCs, TOPs and BAs** will share specific operating information relevant to Inter-Regional operation as prescribed by NERC Reliability Standard such as Inter-tie flows, line and **flowgate** limits, **ACE**, generator status, load and frequency (TOP-005).

In addition, **Reliability Coordinators** use the NERC **Reliability Coordinator Information System (RCIS)**, System Data Exchange (SDX) and the NERC Transaction Information System (TIS) or **Interchange Distribution Calculator (IDC)** for providing reliability and transaction information. Each communication tool is used to share and monitor essential operating parameters and/or system reliability status between **Reliability Coordinators** and respective **Reliability Coordinator Areas**. Information exchanged includes peak load, expected and required reserve, largest **single contingency**, MW available in 24 hours, generator and major transmission outages, unusual operating and weather conditions. The **RCIS** is used to send, in template format, text information to report on **emergencies** and share critical operating information between **Reliability Coordinators**.

b) Monitoring and Coordination Beyond Real-time:

In 2006, the six Regional Managers within the Eastern **Interconnection** developed and executed an agreement that governs the interregional assessment studies in the Eastern **Interconnection**. That agreement replaced the previous unilateral interregional agreements and established an Eastern **Interconnection** Reliability Assessment Group (ERAG) Management Committee (MC) that now oversees all of the interregional study activities. The former MACC-ECAR-NPCC (MEN) and VACAR-ECAR-MACC (VEM) forums have evolved to become the Reliability First Corporation (RFC)-NPCC and RFC-SERC Reliability Corporation study forums, respectively. The former studies in the western portion of the Eastern **Interconnection** have formed the RFC-Midwest Reliability Organization (MRO)-Southwest Power Pool (SPP)-SERC West forum. The activities of these three forums are now directed by the ERAG MC. NPCC staff and representatives from some NPCC **Areas** are members of the ERAG MC and the RFC-NPCC Steering Committee and Working Group and participate in all activities.

The study forums appraise the anticipated near-term and future performance of the **BPS** within their respective **Regions**. That appraisal work can utilize interregional power flows, inertial responses, transient **stability** studies, and other appropriate program packages which may be available to appraise the ability of the interregional network to withstand representative severe **contingencies** without causing widespread cascading outages. The goal of these appraisals is to provide assurance that system developments and **operating procedures** within each **Region** are being properly coordinated so they do not adversely affect other **Regions**.

In late 2006, the NERC Planning Committee (PC) transferred oversight of the Multiregional Modeling Working Group (MMWG) to ERAG, which now reports to the ERAG MC. The MMWG has responsibility for all power flow and dynamic simulation base case model development activities, including a series of future year models and seasonal updates to summer and winter study models. NPCC staff has membership on the MMWG and participates in all activities.

The NPCC Task Force on Coordination of Operation (TFCO) reviews and coordinates operational considerations among NPCC members and, as required, members of ECAR, MAPP and RFC. The TFCO is open to participation from the other **Regions**. In addition, the IESO is as an associate member of ECAR and attends their coordination meetings.

6.5. NPCC CONFERENCE CALLS

6.5.1. Daily Area Control Room Coordination Conference Calls

Each morning, the NPCC **Reliability Coordinator** control rooms also take part in a regularly scheduled conference call. The goal of this call is to alert all neighboring **Reliability Coordinators** of any potential emerging problems which could lead to reliability concerns in the course of the day's operations.

Subjects for discussion are limited to credible events which could impact the ability of a **Reliability Coordinator** to serve its load and meet its **operating reserve** obligations, or which would impose a burden to the neighboring NPCC **Areas** or the **Eastern Interconnection**.

6.5.2. Weekly Conference Calls

NPCC convenes weekly conference calls to discuss expected operating conditions for the coming 10-day period, as required by NPCC Document C-13. PJM and MISO participates in these conference calls (IRO-015).

6.5.3. Emergency Conference Calls

NPCC has procedures in place to initiate an **emergency** conference call whenever one or more **Reliability Coordinators** feel it would serve to preclude or mitigate an **emergency**. The steps and procedures for these calls are included in NPCC Document C-01 Operational Planning Coordination (IRO-015).

7. RELIABILITY APPLICATIONS

7.1. ANALYSIS TOOLS

Each **Reliability Coordinator** shall have adequate analysis tools such as state estimation, pre and post-**contingency** analysis capabilities (thermal, **stability**, and voltage), and **Wide Area** overview displays as required for maintaining **BPS** reliable operations. (IRO-002) (NPCC C-17)

7.2. COMMUNICATION FACILITIES

Each **Reliability Coordinator** shall have adequate communications facilities (voice and data links) to appropriate entities within its **Reliability Coordinator Area**. These communications facilities shall be staffed and available to act in addressing a real-time **emergency** condition. (IRO-002)

7.3. REAL TIME MONITORING

Each **Reliability Coordinator** shall continuously monitor its **Reliability Coordinator Area**. Each **Reliability Coordinator** shall have provisions for backup facilities that shall be exercised if the main monitoring system is unavailable. Each **Reliability Coordinator** shall ensure **SOL** and **IROL** monitoring and derivations continue if the main monitoring system is unavailable. (IRO-002)

8. CRITICAL INFRASTRUCTURE PROTECTION

In order to reduce risks to the reliability of the **BPS** from any compromise of **critical assets**, each Responsible Entity (**Reliability Coordinator, Balancing Authority, Interchange Authority, Transmission Service Provider, Transmission Operator, Transmission Owner, Generator Owner, Generator Operator** or **Load-Serving Entity**) will adhere to the Critical Infrastructure Protection Standards and requirements as follows:

8.1. SABOTAGE REPORTING

Disturbances or unusual occurrences, suspected or determined to be caused by sabotage, shall be reported to the appropriate systems, governmental agencies, and regulatory bodies.

Each Responsible Entity shall have procedures for the recognition of and for making their operating personnel aware of sabotage events on its facilities and multi-site sabotage affecting larger portions of the Interconnection. Each Responsible Entity shall have procedures for the communication of information concerning sabotage events to appropriate parties in the Interconnection. Each Responsible Entity shall provide its operating personnel with sabotage response guidelines, including personnel to contact, for reporting **disturbances** due to sabotage events. Each Responsible Entity shall establish communications contacts, as applicable, with local Federal Bureau of Investigation (FBI) or Royal Canadian Mounted Police (RCMP) officials and develop reporting procedures as appropriate to their circumstances. (CIP -001)

8.2. CYBER SECURITY — CRITICAL CYBER ASSET IDENTIFICATION

Responsible Entities shall identify and document its **critical cyber assets** that support the reliable operation of the **BPS** through the application of a risk-based assessment. (CIP-002)

8.3. CYBER SECURITY — SECURITY MANAGEMENT CONTROLS

Responsible Entities shall have minimum security management controls in place to protect **Critical Cyber Assets**. Responsible Entities shall document and implement a Cyber Security Policy, an Information Protection program, an Access Control program and shall assign a senior manager with overall responsibilities for leading and managing the entity's implementation of, and adherence to, Standards CIP-002 through CIP-009. (CIP-003)

8.4. CYBER SECURITY — PERSONNEL AND TRAINING

Responsible Entities shall ensure that personnel having authorized cyber or authorized unescorted physical access to **Critical Cyber Assets**, including contractors and service vendors, have an appropriate level of personnel risk assessment, training, and security awareness. (CIP-004)

8.5. CYBER SECURITY — ELECTRONIC SECURITY PERIMETER

Responsible Entities shall identify and protect its **Electronic Security Perimeter(s)** inside which all **Critical Cyber Assets** reside, as well as all access points on the perimeter. (CIP-005)

8.6. CYBER SECURITY — PHYSICAL SECURITY

Responsible Entities shall implement a physical security program for the protection of **Critical Cyber Assets**. (CIP-006)

8.7. CYBER SECURITY — SYSTEMS SECURITY MANAGEMENT

Responsible Entities shall define methods, processes, and procedures for securing those systems determined to be **Critical Cyber Assets**, as well as the non-critical **Cyber Assets** within the **Electronic Security Perimeter(s)**. (CIP-007)

8.8. CYBER SECURITY — INCIDENT REPORTING AND RESPONSE PLANNING

Responsible Entities shall identify, classify, respond, and report **Cyber Security Incidents** related to **Critical Cyber Assets**. (CIP-008)

8.9. CYBER SECURITY — RECOVERY PLANS FOR CRITICAL CYBER ASSETS

Responsible Entities shall have recovery plan(s) in place for **Critical Cyber Assets** and ensure that these plans follow established business continuity and disaster recovery techniques and practices. (CIP-009)

9. VEGETATION MANAGEMENT

Transmission Owners shall have a vegetation management program to improve the reliability of the electric transmission systems by preventing outages from vegetation located on transmission **rights-of-way (ROW)** and minimizing outages from vegetation located adjacent to **ROW**, maintaining clearances between transmission lines and vegetation on and along transmission **ROW**, and reporting vegetation related outages of the transmission systems to the respective **Regional Reliability Organizations (RRO)** and the North American Electric Reliability Council (NERC).(FAC-003)

9.1. VEGETATION RELATED OUTAGES

All vegetation related outages have to be classified as one of the following: Category 1 (Grow-ins: Outages caused by vegetation growing into lines from vegetation inside and/or outside the **Right-of-Way**), Category 2 (Fall-ins: Outages caused by vegetation falling into lines from inside the **Right-of-Way**), or Category 3 (Fall-ins: Outages caused by vegetation falling into lines from outside the **Right-of-Way**). All sustained vegetation-related transmission line outages on lines of 200kV or higher and any other lower voltage lines designated by NPCC (TFCO) to be critical to the reliability of the electric system will be reported by each RC and **Transmission Owner** to NPCC, or the **RRO's** designee on a quarterly basis.

Those category 3 vegetation related outages that result from (1) vegetation falling into lines from outside the **Right-of-Way (ROW)** that result from natural disasters shall not be considered reportable (examples of disasters that could create non-reportable outages include, but are not limited to, earthquakes, fires, tornados, hurricanes, landslides, wind shear, major storms as defined either by the **Transmission Owner** or an applicable regulatory body, ice storms, and floods), and (2) Vegetation-related outages due to human or animal activity shall not be considered reportable (examples of human or animal activity that could cause a non-reportable outage include, but are not limited to, logging, animal severing tree, vehicle contact with tree, arboricultural activities or horticultural or agricultural activities, or removal or digging of vegetation) (FAC-003).

10. STAFFING AND TRAINING

10.1. RELIABILITY COORDINATOR STAFFING REQUIREMENTS

The **Reliability Coordinator** shall be staffed with adequately trained and NERC-Certified **Reliability Coordinator** operators, 24 hours/day, seven days/week. (PER-004)

10.2. CERTIFICATION

Each **Transmission Operator, Balancing Authority, and Reliability Coordinator** shall staff all operating positions that meet either one or both of the following criteria with personnel that are NERC-certified for the applicable functions (PER-003):

- Positions that have the primary responsibility, either directly or through communications with others, for the real-time operation of the interconnected **BPS**.
- Positions directly responsible for complying with NERC standards.

While in training, an individual without the proper NERC certification credential may not independently fill a required operating position. Trainees may perform critical tasks only under the direct, continuous supervision and observation of the NERC certified individual filling the required position. (PER-003)

10.3. STAFF EXPERTISE

Reliability Coordinator operating personnel shall have an extensive understanding of the **Balancing Authorities, Transmission Operators, and Generation Operators** within the **Reliability Coordinator Area**, including the operating staff, operating practices and procedures, restoration priorities and objectives, outage plans, equipment capabilities, and operational restrictions. **Reliability Coordinator** operating personnel shall place particular attention on **SOLs and IROLs** and inter-tie facility limits. The **Reliability Coordinator** shall ensure protocols are in place to allow **Reliability Coordinator** operating personnel to have the best available information at all times. (PER-004)

10.4. TRAINING

10.4.1. Training Requirements

All **Reliability Coordinators, Transmission Operators and Balancing Authorities** shall provide their **System Operators** with a coordinated training program that is designed to promote the reliable operation of the **BPS**. This program shall include objectives based on the NERC Standards, NPCC Criteria, Guidelines and Procedures and applicable regulatory requirements. (PER-002)

All **Reliability Coordinators, Transmission Operators and Balancing Authorities** shall provide their **System Operators** with a minimum of 5 days per year of training and drills using realistic simulations of system **emergencies**, in addition to other training required to maintain qualified operating personnel. (PER-002)

Training staff must be identified, and the staff must be competent in both knowledge of system operations and instructional capabilities. (PER-002)

10.4.2. Training Plan

All Transmission Operators and Balancing Authorities shall have a plan for initial and continuing training that addresses required knowledge and competencies and their application in system operations. (PER-002)

10.4.3. Verification of Achievement

All **Reliability Coordinators, Transmission Operators and Balancing Authorities** shall have a process in place to verify that all **System Operators** have successfully achieved all of required training objectives and that their training progress is documented.

10.4.4. Training Program Review and Evaluation

All **Reliability Coordinators, Transmission Operators and Balancing Authorities** shall evaluate the effectiveness of the training and perform periodic reviews to ensure that training materials are technically accurate and complete and to ensure that the training program continues to meet its objectives.

11. NPCC OPERATING CONSIDERATIONS

11.1. ISO-NE

- a) Is the **Reliability Coordinator** for the New England **Area**.
- b) Has the coordination responsibility to provide interconnection protection against large source **contingencies** in ISO-NE. The specific **contingencies** ISO-NE monitors and protects for are:
 - Loss of HQT to ISO-NE deliveries on the Phase II HVDC interconnection.
 - Loss of multiple generating units at the Millstone station.
 - Loss of Mystic 8 and 9.
 - Loss of Seabrook.
- c) The ISO-NE reliability role is to limit the magnitude of the **contingencies** noted above to levels which will not result in violation of NYISO and PJM (RFC) operating criteria and will not jeopardize the reliability of the **BPS**. ISO-NE is responsible to control the size of these potential **contingencies** to achieve this objective. If necessary, ISO-NE will reduce imports on Phase II HVDC, or order reduction of generation at Millstone station.

11.2. NYISO

- a) Is the **Reliability Coordinator** for the New York **Area**.
- b) Is the coordinator for “Shared Activation of Reserve” (SAR) in accordance with NPCC Procedure C-12, which involves IESO, NYISO, ISO-NE and the Maritimes **Area** in NPCC and PJM. As SAR coordinator, NYISO monitors critical **interfaces** with due consideration of conditions in other **Areas**, and will assure that allocations assigned to assisting **Areas** are within their response capabilities.
- c) Interacts closely with PJM and IESO to monitor and control parallel flow effects on the Michigan-Ontario, New York–Ontario, and New York-PJM **flowgates** as well as NY’s internal **interfaces** (such as West Central and Central East) which may be impacted by Lake Erie circulation.
- d) Coordinates changes with adjacent **Reliability Coordinators** on the phase shifters with IESO, ISO-NE and PJM.

11.3. THE INDEPENDENT ELECTRICITY SYSTEM OPERATOR (IESO)

- a) Is the **Reliability Coordinator** for the Ontario Area.
- b) Interacts closely with NYISO, MISO and PJM to monitor and control parallel flow effects on the Michigan – Ontario, New York – Ontario, and New York – PJM **flowgates** as well as Ontario’s internal **flowgates** (such as Queenstown Flow West and Bruce Longwood Input) which may be impacted by lake Erie circulation
- c) Coordinates with adjacent **Reliability Coordinators** changes on the phase shifters with Manitoba Hydro, Minnesota Power and Light, MISO, NYISO and PJM.

11.4. SYSTEM CONTROL DEPARTMENT (DIRECTION CONTRÔLE DES MOUVEMENTS D’ÉNERGIE), HYDRO-QUÉBEC TRANSÉNERGIE

- a) Is the **Reliability Coordinator** for the Québec **Interconnection**.
- b) Is connected to the **BPS** thru DC facilities only and selected isolated generation or isolated load.
- c) Coordinates operations with NYISO, ISO-NE, IESO and the Maritimes.

11.5. NEW BRUNSWICK SYSTEM OPERATOR

- a) Is the **Reliability Coordinator** for the Maritimes Area.
- b) Coordinates operations with ISO-NE through its synchronous ties to the Eastern **Interconnection**, and with HQT through DC facilities.
- c) The NBSO serve as the **Reliability Coordinator** for New Brunswick Power, Nova Scotia Power Incorporated, the province of Prince Edward Island, Maine Public Service Company and the Eastern Maine Electric Cooperative. The NBSO serves as the **Balancing Authority** for New Brunswick Power, the province of Prince Edward Island, Maine Public Service Company and the Eastern Maine Electric Cooperative. The province of Prince Edward Island, Maine Public Service Company and the Eastern Maine Electric Cooperative are not part of the **Bulk Power System**.

11.6. DESCRIPTIONS OF SPECIFIC OPERATING CONSIDERATIONS

The specific operating conditions within the NPCC Region are summarized in Appendix B “**Area** Operating Considerations within NPCC”. The table in Appendix B also provides a brief description of the actions taken in consideration of those conditions. The following paragraphs provide highlights of these operating considerations:

11.6.1. Central-East Interface (NYISO)

This **interface** consists of two 345 kV, two 230 kV and three 115 kV transmission lines in Mohawk Valley region of upstate New York. Central –East tends to load in an easterly direction. **Contingencies**, such as large generation loss east of the **interface** can lead to voltage collapse or instability in the New York **Area** if the established limits are not respected. The Central-East **interface** is monitored by the NYISO and procedures are in place (NYISO Emergency Operations Manual) such that generation re-dispatch and/or curtailment of transactions or **load shedding** can be initiated by NYISO as required to maintain (or regain) a safe margin on the **interface**. In addition to NYISO, the impact of these changes can involve IESO, ISO-NE, HQT and/or PJM depending on conditions in effect at the time.

11.6.2. Hydro-Québec TransÉnergie Phase II HVDC Exports

The size of the largest credible loss of exports from HQT into the remainder of NPCC is monitored by ISO-NE to ensure that **interface** or voltage limits ranging from the west of PJM through NYISO will not be violated. Using real-time data from both PJM and NYISO, ISO-NE coordinates with the Québec **Reliability Coordinator** the maximum allowable exports from HQT in order to maintain the interconnected system in a secure operating state (as per ISO-NE Transmission Operating Guides “Procedure to Protect for the Loss of Phase II Imports”).

11.6.3. Maritimes Area-New England Minimum Tie Flow

During facility out conditions the 345 kV **interface** from northern New England to the Maritimes **Area** may require that minimum export levels be maintained from the Maritimes **Area** in order to avoid **stability** and voltage problems in both **Areas** following large source **contingencies** in the Maritimes **Area**. The amount of power flow required is dynamically monitored by ISO-NE and NBSO. The calculated flows are based on a number of variables including: size of the largest Maritimes **Area contingency**, generator dispatch in Maine, ISO-NE load level, status of the Chester SVC, Orrington Series Capacitor and New England capacitor banks.

11.6.4. New Brunswick – Nova Scotia Interconnection Controlled Separation and Under Frequency Load Shedding

The province of Nova Scotia is radially connected to the Eastern **Interconnection** through synchronous ties with New Brunswick. During heavy **interface** flows from NB to NS, a single **contingency** will initiate a controlled separation of Nova Scotia from NB and the Eastern **Interconnection**. Upon separation, the generation deficiency in Nova Scotia may be significant enough for NS to experience frequency decline to the point of triggering the first and possibly second stage of under frequency **load shedding**. The risk associated with separation and under frequency **load shedding** has been deemed acceptable to the province of Nova Scotia. The separation of Nova Scotia and the potential for under frequency **load shedding** does not have a significant adverse impact on the Eastern **Interconnection** as the loss of **load** due to controlled separation of NS is taken into consideration for all planning and operational studies within the Maritimes **Area**.

IV. APPENDICES

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APPENDIX A: RELIABILITY MONITORING AND COORDINATION

	WHO	WHAT	AUTHORITY
LEVEL I Intra-Operating Authority Area Coordination and Monitoring	Operating Authorities	<ul style="list-style-type: none"> All aspects including, schedule changes, re-dispatch, transmission reconfiguration, voltage cuts, load shedding 	C-20
LEVEL II Regional Coordination and Monitoring	NYISO	<ul style="list-style-type: none"> Shortfall of Reserve Shared Activation of Reserve 	C-20 C-12
	ISO-NE & NBSO	<ul style="list-style-type: none"> Min flow Maritimes Area 	OP Procedures
	Each OA	<ul style="list-style-type: none"> Unforeseen events 	C-20
	NPCC	<ul style="list-style-type: none"> Daily conference RC conference call Weekly conference call Emergency Conference call 	C-13 C-20
LEVEL III Inter Regional Coordination and Monitoring	Reliability Coordinators	<ul style="list-style-type: none"> NERC Hotline /RCIS NYISO/PJM Phase Angle Regulator IESO/MISO Phase Angle Regulator TLR or Local Line Loading Relief procedure Unforeseen events 	C-03 Good utility practice Good utility Practice NERC IRO-006 C-03
	ISO-NE	<ul style="list-style-type: none"> Loss of HQT Phase II HVDC Loss of Millstone units Loss of Mystic 8 and 9. Loss of Seabrook. 	OP Procedures OP Procedures
	IESO, NYISO, PJM & MISO	<ul style="list-style-type: none"> Lake Erie circulation 	LEER
	NPCC RC/OA /often PJM & MISO	<ul style="list-style-type: none"> Weekly conference call Emergency Conference call 	C-13 C-20

APPENDIX B: AREA OPERATING CONSIDERATIONS WITHIN NPCC

Appendix B has been removed from the redacted version of this document for confidentiality purposes.

APPENDIX C: REFERECES TO NERC RELIABILITY STANDARDS AND NPCC DOCUMENTS

- NERC Reliability Standards: http://www.nerc.com/~filez/standards/Reliability_Standards.html
- NPCC Reliability Directories: <http://www.npcc.org/documents/regStandards/Directories.aspx>
- NPCC “A” Documents (Criteria): <http://www.npcc.org/documents/regStandards/Criteria.aspx>
- NPCC “B” Documents (Guides): <http://www.npcc.org/documents/regStandards/Guide.aspx>
- NPCC “C” Documents (Procedures): <http://www.npcc.org/documents/regStandards/Procedure.aspx>