

ISO New England Operating Procedure No. 19 - Transmission Operations

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REFERENCES:

1. NERC Reliability Standard EOP-011, Emergency Operations
2. NERC Reliability Standard FAC-010, System Operating Limits Methodology for the Planning Horizon
3. NERC Reliability Standard FAC-011, System Operating Limits Methodology for the Operation Horizon
4. NERC Reliability Standard IRO-001, Reliability Coordination - Responsibilities and Authorities
5. NERC Reliability Standard IRO-002, Reliability Coordination - Monitoring and Analysis
6. NERC Reliability Standard IRO-008, Reliability Coordinator Operational Analyses and Real-time Assessments
7. NERC Reliability Standard IRO-009, Reliability Coordinator Actions to Operate Within IROLs
8. NERC Reliability Standard IRO-010, Reliability Coordinator Data Specification and Collection
9. NERC Reliability Standard IRO-014, Coordination Among Reliability Coordinators
10. NERC Reliability Standard IRO-017, Outage Coordination
11. NERC Reliability Standard IRO-018, Reliability Coordinator Real-time Reliability Monitoring and Analysis Capabilities
12. NERC Reliability Standard PRC-001, System Protection Coordination
13. NERC Reliability Standard TOP-001, Transmission Operations
14. NERC Reliability Standard TOP-002, Operations Planning
15. NERC Reliability Standard TOP-010, Real-time Reliability Monitoring and Analysis Capabilities

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16. NERC Reliability Standard VAR-001 Voltage and Reactive Control
17. NPCC Regional Reliability Reference Directory #1, Design and Operation of the Bulk Power System (Directory 1)
18. NPCC Regional Reliability Reference Directory #1, Design and Operation of the Bulk Power System (Directory 1) Appendix F: Procedure for Operational Planning Coordination, Facilities Notification List - Attachment D
19. NPCC Regional Reliability Reference Directory #2, Emergency Operations
20. Capacity Rating Procedures - System Design Task Force
21. ISO New England Operating Procedure No. 3 - Transmission Outage Scheduling (OP-3)
22. ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4)
23. ISO New England Operating Procedure No. 7 - Action In an Emergency (OP-7)
24. ISO New England Operating Procedure No. 8 - Operating Reserve and Regulation (OP-8)
25. ISO New England Operating Procedure No. 16 - Transmission System Data - Appendix A – Explanation of Terms and Instructions for Data Preparation of NX-9A (OP-16A)
26. ISO New England Operating Procedure No. 18 - Metering and Telemetry Criteria (OP-18)
27. Master/Local Control Center Procedure No. 1 - Nuclear Plant Transmission Operations (M/LCC 1)
28. Master/Local Control Center Procedure No. 4 - Emergency Load Reduction Plans for Mitigating IROL Violation (M/LCC 4)
29. Master/Local Control Center Procedure No. 15 - System Operating Limits Methodology (M/LCC 15)
30. ISO Planning Procedure No. 7, Procedures for Determining and Implementing Transmission Facility ratings in New England (PP7)
31. ISO New England Transmission Operating Guides

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I. INTRODUCTION

This Operating Procedure (OP) describes reliability criteria for the analysis and operation of the New England Transmission System. Prescribed operator actions are further detailed in several ISO New England (ISO) Transmission Operating Guides.

The provisions in this OP are used to determine data, methods and limits for operation of the New England Transmission System. ISO, as the System Operator, is responsible for, among other things, matters pertaining to the central dispatch of each transmission facility over which it has operational control pursuant to the Transmission Operating Agreement (TOA). ISO is responsible for operating all transmission facilities rated 115 kV and above. Local Control Centers (LCC) are responsible for operating all transmission facilities rated 69 kV and below; they have exclusive operating responsibility for all 69 kV facilities with the exception of certain facilities listed in Attachment F, List of 69kV Facilities Currently Under ISO-NE Operational Control of Master / Local Control Center Procedure No.15 - System Operating Limit Methodology (M/LCC 15). The New England Transmission System is defined in the ISO Tariff and includes the Reliability Coordinator Area/Balancing Authority Area (RCA/BAA), Bulk Electric System and bulk power system elements found within New England on the transmission network.

This OP describes how ISO and each LCC plan to operate within all System Operating Limits (SOLs) and Interconnection Reliability Operating Limits (IROLs).

A. PURPOSE

The purpose of this OP is to describe how each Transmission Owner (TO), the ISO and each LCC [as Transmission Operators (TOP)]:

- Monitors the New England Transmission System and determines ratings, criteria and limits for its operation under NORMAL and EMERGENCY System Conditions.
- Analyzes and operates the New England Transmission System under these two sets of system conditions.

This OP provides for the reliability of the New England Transmission System and addresses the execution and coordination of activities that impact inter- and intra-Regional reliability, including:

- Monitoring and controlling voltage levels and real / reactive power flows
- Switching transmission elements
- Planned outages, including outages of protection systems
- Responding to IROL and SOL exceedances

II. RELIABILITY RATINGS, CRITERIA AND LIMITS FOR TRANSMISSION OPERATIONS

A. BACKGROUND

ISO operates the New England Transmission System to account for contingencies. A contingency is the unexpected failure or outage of a system component such as a generator, transmission line, circuit breaker, switch or other electrical element. The New England Transmission System is operated reliably to avoid adverse impacts, pre-contingency, and after single-element and certain multiple-element contingencies. Adverse impacts may include, but are not limited to:

- Equipment damage due to thermal overload
- Cascading thermal overloads
- Excessively high or low voltage or voltage collapse
- Unit or area instability
- Unacceptable post-transient voltage sag
- Uncontrolled system separation
- Unacceptable damping

A single contingency may result in the loss of one or more elements. Single contingencies within the New England RCA/BAA should not result in a violation of the operating reliability criteria of another RCA/BAA. Loss of small portions of the New England Transmission System (such as radial portions) may be tolerated provided these do not jeopardize the reliability of the remaining New England Transmission System and the Interconnection.

This OP includes specific definitions, ratings, limits and criteria for two categories of system conditions (NORMAL and EMERGENCY) and two associated levels of transmission transfer capabilities for the New England Transmission System. During NORMAL System Conditions, a higher level of prescribed reliability is maintained. During EMERGENCY System Conditions, a lower level of reliability is permitted to allow for increased operating flexibility.

Facility ratings, for the purposes of this OP, are the maximum or minimum voltage, current, frequency, or real or reactive power flow through a facility that does not violate the applicable equipment rating of any equipment comprising the facility. Facility ratings and ratings will be used synonymously throughout this document. Facility ratings or ratings are commonly provided by the Transmission Owner.

Facility limits or "limits", for the purposes of this OP, are the ratings used for facilities in system operations. For example, a Transmission Owner may offer a facility thermal rating for a transmission line, but once the thermal rating is put into use by the Transmission Operator, that facility rating becomes a facility limit. Transmission Owners provide ratings, while Transmission Operators provide limits. A Transmission Operator may directly provide a facility limit to ISO.

Criteria, for the purposes of this OP, are guidelines or rules that are applied. An example of criteria would be those applied to establish stability limits (i.e., no loss of synchronism, acceptable damping and post-fault voltage performance). Criteria are not ratings or limits.

This OP utilizes the following thermal capacity ratings for transmission facilities, as described in ISO Operating Procedure No. 16 Transmission System Data - Appendix A - Explanation of Terms and Instructions for Data Preparation of NX-9A (OP-16A):

- Normal
 - Normal is a continuous 24 hour rating
- Long Time Emergency (LTE)
 - LTE is a 12 hour summer rating and 4 hour winter rating
- Short Time Emergency (STE)
 - STE is a 15 minute rating
- Drastic Action Limit (DAL)
 - DAL is a 5 minute rating

The use of these ratings requires the pre-contingent facility loading to be at or below the Normal rating and that the facility loading be returned to or below the Normal rating after the daily load cycle. For the New England Transmission System, a load cycle is defined as:

- A continuous 12 hour period during the summer
- A continuous 4 hour period during the winter

A summer (April 1 to October 31) and winter (November 1 to March 31) facility rating is established for each of these categories of ratings. These categories of ratings are as prescribed in ISO Planning Procedure No. 7, Procedures for Determining and Implementing Transmission Facility Ratings in New England (PP7), which contains the facility ratings methodology that is used by all transmission facility owners in the New England RCA/BAA.

For any facility that has two or more sets of thermal limits applicable (due to multiple Transmission Owners, for example), the most conservative thermal limits will be used.

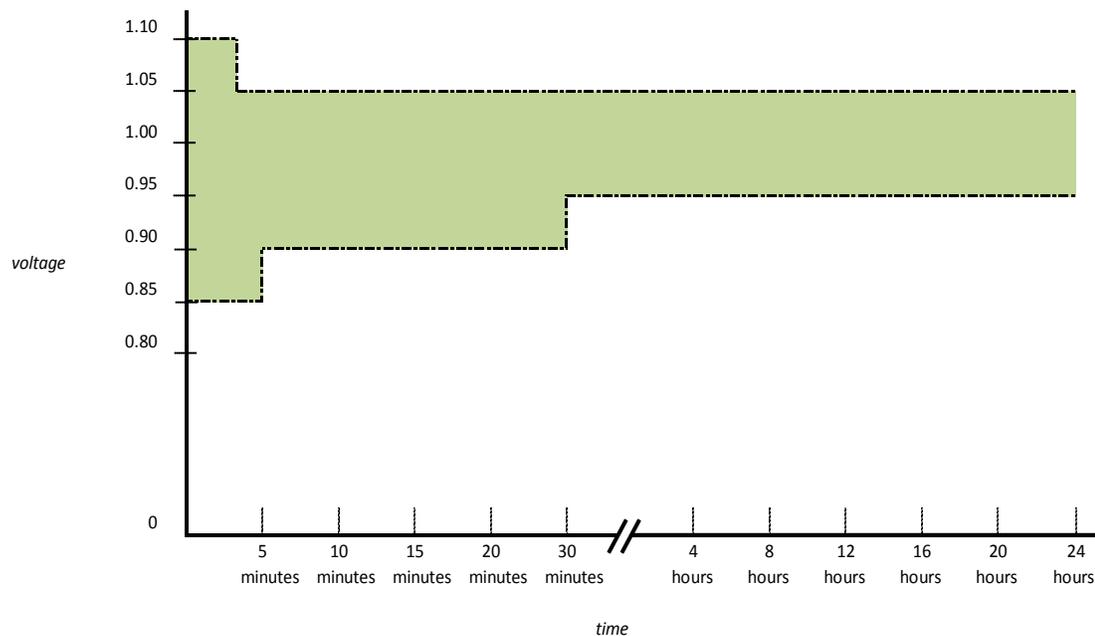
This OP utilizes the following high and low voltage limits for transmission substations, as supplied by the Transmission Owners:

- Normal Voltage Limit (NORMVL)
 - NORMVL is a continuous 24 hour voltage limit
- Long Time Emergency Voltage Limit (LTEVL)

- LTEVL is a voltage limit for a **minimum** of 30 minutes (duration provided by Transmission Owner)
- Short Time Emergency Voltage Limit (STEVL)
 - STEVL is a 15 minute voltage limit
- Drastic Action Voltage Limit (DAVL)
 - DAVL is a 5 (five) minute voltage limit

Figure 1 below shows an example set of voltage limits, with both the allowed voltage level and acceptable time duration indicated in the figure. Operation at voltage levels and time durations within the shaded area, including the boundaries, is within the limits and reliable, and therefore does not result in an SOL exceedance. Operation at voltages and time durations outside of the shaded area may result in an SOL exceedance. For any facility that has two or more sets of voltage limits applicable (due to multiple Transmission Owners, for example), the most conservative limits will be used. OP-19 Appendix K, Operating Voltage Limits by LCC and M/LCC 15 Attachment H, Voltage SOL Identification Procedure, provides these limits

Figure 1
Voltage limit exam



The set of voltage limits, NORMVL, LTEVL, STEVL, and DAVL, can include both “high” and “low” limits, but does not need to include both limits, except for the NORMVL set. Each set of NORMVL limits has a high and low limit, which together describe the voltage operating bandwidth using the NORMVL. The example, shown in Figure 1 above, shows a “high” NORMVL of 1.05 per unit and a “low” NORMVL of 0.95 per unit; it also shows an apparent LTEVL “low” limit of 0.90 per unit with no corresponding LTEVL “high” limit.

Actions should be taken by ISO and each LCC to establish and maintain NORMAL System Conditions. Regular cycling between NORMAL and EMERGENCY System Conditions should be avoided. Operations should not intentionally position daily operations into EMERGENCY System Conditions for first contingency coverage.

1. IROs and SOLs

ISO establishes limits for the most critical system operating parameters of the New England Transmission System which preclude, on a pre- and post-contingency basis, adverse impacts, as described above.

a. SOLs

An SOL is a value (such as MW, MVar, Amperes, Frequency or Volts) that satisfies the most limiting of the prescribed operating limits for a specified system configuration to operate within acceptable reliability criteria and ratings. ISO SOLs are based upon the following operating limits:

- Facility limits (applicable pre- and post-contingency equipment or facility limits)
- Transient stability limits (applicable pre- and post-contingency stability limits)
- System voltage limits (applicable pre- and post-contingency voltage limits, i.e. steady-state voltage limits)

In ISO determination of SOLs, the New England Transmission System conditions shall reflect current or expected system conditions and shall reflect changes to system topology such as facility outages, including outages of protection systems, and de-ratings. ISO SOL methodology requires that SOLs provide New England Transmission System performance consistent with the following:

- In the pre-contingency state:
 - The New England Transmission System shall demonstrate acceptable transient, dynamic, stability, and voltage performance;
 - All facilities shall be within their facility limits (i.e., thermal, voltage and stability limits).
- Following the single contingencies identified in Table 1 of Appendix J - Contingency List and Criteria/Limits (Appendix J):
 - The New England Transmission System shall demonstrate acceptable transient, dynamic, stability, and voltage performance;
 - All facilities shall be operating within their facility limits and within their thermal, voltage and stability limits; and
 - Cascading or uncontrolled separation shall not occur.

- In determining the New England Transmission System response to a single contingency, the following are acceptable:
 - Planned or controlled interruption of electric supply to radial customers or some local network customers connected to or supplied by the faulted facility or by the affected area.
 - Interruption of other network customers, if the real-time operating conditions are more adverse than anticipated in the corresponding studies
 - System reconfiguration through manual or automatic control or protection actions.
 - To prepare for the next contingency, ISO may take or direct one or more of the following actions to adjust the New England Transmission System: re-dispatch of generation, demand, and external transactions, and reconfiguration of the transmission system topology.
- b. IROLs

ISO and each LCC operate the New England Transmission System so that, in the pre- and post-contingent state, the system shall demonstrate thermal, voltage and stability performance within accepted limits. Any SOL that has been identified by ISO to have an adverse impact beyond the New England Transmission System is considered to be an IROL. Examples of unacceptable system performance that may result in an IROL include:

- System instability
- An oscillatory or negatively damped system response.
- An inability to determine if a discrete bounded sub-area of the system is susceptible to voltage collapse or uncontrolled separation from the rest of the system.
- Analysis results indicate the isolation of a sub-area supplying more than 1,200 MW to the rest of the system, or absorbing more than 1,200 MW of power from the rest of the system.
- Uncontrolled islanding would be classified as an IROL. Controlled islanding as a result of proper operation of an SPS to a contingency for which it was designed would be not be considered an IROL (e.g., islanding of Bangor, ME area transmission and/or Maritimes systems).
- An identified sub-area of the system, that includes portions of the New England Transmission System and/or another RCA/BAA, that is susceptible to an exceedance of voltage limits or voltage collapse. This determination will be coordinated with the applicable RC to determine whether the event remains classified as an IROL.
- Facilities of another RCA that exceed their applicable facility limits for a

contingency within the New England Transmission System. This determination will be coordinated with the applicable RC to determine whether the event remains classified as an IROL.

These IROLs require studies or post event analysis for identification.

Changes in network load, topology, and generation dispatch may alter the system response to an event and make what is normally an SOL into an IROL, or make what is normally an IROL into an SOL. ISO methodologies for determining which SOLs are IROLs will rely upon predictive analysis techniques and may utilize day-ahead / real-time information to assess the system.

2. Transmission System Analysis

Analysis and modeling of the New England Transmission System is required for reliable operation. ISO conducts next-day reliability analyses for the New England Transmission System for reliable operation in anticipation of NORMAL and EMERGENCY system and contingency event conditions. ISO conducts contingency analysis studies to identify potential interface and other SOL/IROL exceedances.

Under NORMAL System Conditions, the New England Transmission System is operated to a level of reliability such that the loss of a major portion of the system, or unintentional separation of a major portion of the system, will not result from any contingencies referred to in Table 1 of Appendix J. Under EMERGENCY System Conditions, the New England Transmission System is operated to a level of reliability such that the loss of a major portion of the system, or unintentional separation of a major portion of the system, will not result from any contingencies referred to in Table 2 of Appendix J.

B. NORMAL SYSTEM

1. NORMAL System Conditions

The highest level of transmission reliability is achieved during NORMAL Conditions on the New England Transmission System. In general, this level of reliability is accomplished by satisfying NORMAL Ratings, Criteria and Limits for a wide range of contingencies (NORMAL System Contingencies) using a limited set of operator actions (NORMAL System Actions). The set of contingencies respected under NORMAL System Conditions is described in Table 1 of Appendix J for operators. Information about simulating the contingencies is located in Table 3 of Appendix J.

2. NORMAL System Ratings, Criteria and Limits

Normal transfer capabilities are to be observed unless EMERGENCY System Conditions are declared.

2.1. NORMAL System Thermal Limits

- a. For pre-contingency system conditions, including planned outages, transmission line and equipment loadings should not exceed the Normal

limit.

- b. NORMAL System Contingencies shall not cause, or result in, loadings beyond the STE limits. Flows between the LTE and STE limits must be reduced to or below the LTE limit as soon as possible but in a time not to exceed 15 minutes from the event. If studies show that operators would not be able to reduce flows to or below the LTE limit within 15 minutes, pre-contingent actions should be taken such that following any NORMAL System Contingency flows can be reduced to or below the LTE limits within 15 minutes. Actions that may be taken pre or post-contingent to reduce flow are listed under NORMAL System Actions.

Previously established/provided DAL limits may be used but only if authorized by the Transmission Operator whose transmission facilities would be affected and flows between the STE and DAL limits can be reduced to or below the LTE limit immediately and in a time not to exceed 5 minutes from the event.

After a contingency and all appropriate NORMAL System Actions are taken, the following shall occur:

- i. Flows must return to or below the Normal limit within the appropriate SOL or IROL timer, if the next contingency results in flow exceeding the LTE limit but below the STE limit or
- ii. Flows can remain between the Normal and LTE limits provided the next contingency does not result in flow exceeding the LTE limit
- iii. Loadings must be returned to or below the normal limit after the daily load cycle

If the Transmission Operator does not know if the next contingency will result in an IROL or SOL, then the IROL timer will be used.

If Operations determines neither of the above flow requirements (i. or ii.) can be achieved after all appropriate NORMAL System Actions are taken, ISO shall consider implementation of EMERGENCY System Conditions

- c. System condition allowances for switching activities that are typically completed within 15 minutes are as follows:
 - i. Pre-contingent system conditions during switching:
 - During the time period when switches are open, a transmission facility may not exceed the LTE limit
 - ii. Contingency protection during switching:
 - During brief switching activities (typically 15 minutes or less, but not to exceed 30 minutes), ISO will only provide first-contingency coverage as long as restoring the outage is not the corrective action.
- d. Without prior approval to operate to the STE limits, NORMAL System

Contingencies should not cause, or result in, loadings on New York ISO (NYISO) transmission facilities, including NYISO - ISO-NE RCA/BAA tie lines, beyond the LTE limits.

2.2. NORMAL System Stability Criteria

- a. NORMAL System Contingencies should not cause instability of any single unit, the system or unacceptable system oscillations. When determining acceptable system response, applicable criteria will be applied, such as post-transient voltage sag and damping.
- b. Following a NORMAL System Contingency, unless specific instructions describing alternate actions are in effect, system flows shall be adjusted such that manual reclosing or automatic reclosing of a faulted element can be carried out without affecting the stability of the New England Transmission System.
- c. Without prior approval to operate otherwise, NORMAL System Contingencies should not cause, or result in, neighboring RCA / BAA to exceed their stability criteria

2.3. NORMAL System Voltage Limits

- a. NORMAL System Contingencies shall not cause unacceptably high or low voltage in violation of limits or voltage collapse. The applicable voltage limits are described in Appendix K of this OP and Attachment E of MLCC 15.
- b. Without prior approval to operate otherwise, NORMAL System Contingencies should not cause, or result in, neighboring RCA / BAA to exceed their voltage limits

2.4. NORMAL System Miscellaneous Criteria

- a. Generation and transmission service is scheduled to provide the New England RCA/BAA load and operating reserve as prescribed in ISO New England Operating Procedure No. 8 - Operating Reserve and Regulation (OP-8) while covering NORMAL System Contingencies.
- b. An LCC may request more stringent system operating limits. If such a request is made, ISO will evaluate the request and honor it if there is no adverse system reliability consequence.

3. NORMAL System Contingencies

Table 1 of Appendix J identifies each type of contingency respected under NORMAL Conditions, whether it is respected for SOLs or IROLs, and the appropriate thermal limits, voltage limits and stability criteria applied. These limits and criteria are respected by ISO in real-time and off-line system analyses. Appendix K describes the voltage limits each LCC applies to their system by voltage class.

Certain M/LCC15 Attachments address specific identified contingencies,

study methodologies and criteria:

- a. Attachment A (Confidential) lists 345kV stuck-breaker contingencies that can have unacceptable Inter-RCA/BAA impacts
 - b. Attachment B (Confidential) lists 345kV double circuit tower line contingencies.
 - c. Attachment C documents the procedure to be followed in determining if a contingency would have unacceptable Inter-RCA/BAA impact.
 - d. Attachment D (Confidential) lists bus fault contingencies that can have unacceptable Inter-RCA/BAA impact or cause single- or multi-Generator instability.
 - e. Attachment E of M/LCC15 documents exceptions to the voltage limits noted in Appendix K of OP-19.
 - f. Attachment G of M/LCC15 documents primary and backup High Speed Pilot Protection Schemes in 345kV transmission lines and the communication media
 - g. Attachment H of M/LCC15 documents the processes for voltage SOL identification
 - h. Attachment I of M/LCC15 documents the Primary and Secondary SCADA voltage measurements for specified transmission substations
4. NORMAL System Actions

ISO and each LCC will continuously assess system conditions and implement the NORMAL System Actions described below to maintain or restore transmission reliability to NORMAL System Conditions. Actions for SOL and IROL contingencies within the New England RCA/BAA should use the following NORMAL System Actions as required:

- a. Weather Sensitive Transmission Facility Ratings

There are times when actual ambient conditions (temperature and wind speed) are significantly different from those used to establish standard seasonal facility ratings. During those times, the use of temporary ratings based on actual ambient conditions may be warranted. Depending on the ambient conditions, the temporary ratings may be higher or lower than the standard seasonal facility ratings. When such weather conditions exist and a transmission facility is limiting, ISO, the appropriate LCC or appropriate Transmission Owner will identify the need for a temporary transmission facility limit based on actual weather conditions. In cases where the Transmission Owner has supplied pre-defined weather sensitive ratings, such ratings will be used by ISO and the appropriate LCC after the LCC and/or Transmission Owner has gathered/established the actual weather conditions. If pre-defined weather sensitive ratings are not available, the involved Transmission Owner will be informed of the circumstances. That Transmission Owner may elect to provide the

appropriate LCC with temporary ratings along with any pertinent qualifications for their use. The appropriate LCC will forward and document all temporary rating information to ISO. Such temporary ratings will then be used in operations as limits for the time period specified by the Transmission Owner or until rescinded by the Transmission Owner.

b. Deviation from Economic Dispatch

If the local area cannot be protected by economic dispatch, ISO and each LCC will utilize a non-economic dispatch if it will provide improved system security. ISO will deviate from economic dispatch and schedule resources to maintain NORMAL System transmission reliability.

c. Use of an SPS or the Preplanned Opening of a Circuit Breaker

- i. Where possible, with ISO approval, the LCC will arm each SPS that would relieve transmission limitations. When adequate facilities are not available, an SPS may be employed to maintain system security. When operating as designed, it is acceptable for an SPS to interrupt flows on a system element should loading be in excess of an element DAL limit.
- ii. Manually set up tripping of a Generator or a DARD. This preplanned option of opening a circuit breaker is limited to a situation where previously documented studies have demonstrated that the breaker opening reliably mitigates the specific existing operating condition and does not result in the loss of single-contingency protection for another contingency/facility.

d. Switch Transmission Circuits

Open or close a circuit to relieve transmission constraints. This action can only be implemented when documented studies have demonstrated that the circuit opening or closing reliably relieves the specific existing condition and does not result in the loss of protection for another contingency/facility and are agreed to by all applicable TOPs.

e. OP-4 Actions

Implement selected Actions from OP-4 (Normal Actions of OP-4 include Actions 1 through 5). These Actions utilize Generator maximum capabilities, voluntary load curtailment of Market Participant's facilities, capacity/energy purchases, contracted customer generation and depletion of 30 minute reserves.

f. Utilization of Enhanced Ratings or Limits

With the exception of all IROLs, if an SOL cannot be protected after utilizing the applicable NORMAL System Actions (a through e), a Transmission Owner or Transmission Operator may elect to modify the limiting thermal or voltage limit with an enhanced rating or limit; when such a limit is provided the LCC will provide a post-contingent action plan for contingency protection. All coordination required with the impacted

Transmission Owner(s) to provide contingency protection with enhanced ratings or limits and a post-contingent action plan for the SOL is the responsibility of the LCC. All enhanced ratings or limits and post-contingent action plans utilized under this provision must be communicated to ISO electronically prior to implementation. Use of a recorded line is acceptable for these purposes. Written documentation of the enhanced ratings or limits and action plans shall be provided to ISO in a timely manner, not to exceed 24 hours. If this option is not taken or is insufficient, pre-contingent load shedding (OP-7) will be required.

C. EMERGENCY SYSTEM

1. EMERGENCY System Conditions

The system is in an EMERGENCY System Condition if any of the NORMAL System Ratings Criteria or Limits is exceeded. Recognizing the limited exposure to EMERGENCY System Conditions, a revised set of contingencies is respected provided that all appropriate NORMAL System Actions have been initiated to restore NORMAL System Ratings Criteria or Limits. This level of protection meets EMERGENCY System Criteria for a less stringent set of contingencies (EMERGENCY System Contingencies) using EMERGENCY System Actions. Exposure to EMERGENCY System Conditions that do not meet EMERGENCY System Ratings, Criteria or Limits shall not exist for more than 30 minutes for an IROL. The set of contingencies respected under EMERGENCY System Conditions is described in Table 2 of Appendix J. Information about simulating the contingencies is located in Table 4 of Appendix J.

2. EMERGENCY System Ratings, Criteria and Limits

2.1. EMERGENCY System Thermal Limits

- a. After a contingency, and all appropriate EMERGENCY System Actions are taken, the following shall occur:
 - i. Flows must return to or below the Normal limit within the appropriate SOL or IROL timer if the next contingency results in flow exceeding the LTE limit but below the STE limit or
 - ii. Flows can remain between the Normal and LTE limits provided the next contingency does not result in flow exceeding the LTE limit
 - iii. Loadings must be returned to or below the Normal limit after the daily load cycle
- b. If the Transmission Operator does not know if the next contingency will result in an IROL or SOL, then the IROL timer will be used.

2.2. EMERGENCY System Stability Criteria

- a. EMERGENCY System Contingencies shall not cause instability of any single unit, the system or unacceptable system oscillations. When determining acceptable system response, applicable criteria will be

applied, such as post-transient voltage sag and damping.

- b. Following an EMERGENCY System Contingency, unless specific instructions describing alternate actions are in effect, system flows shall be adjusted such that manual reclosing or automatic reclosing of a faulted element can be carried out without affecting the stability of the New England Transmission System.
- c. Without prior approval to operate otherwise, EMERGENCY System Contingencies should not cause, or result in, neighboring RCA/BAA to exceed their stability criteria.

2.3. EMERGENCY System Voltage Limits

- a. EMERGENCY System Contingencies shall not cause unacceptably high or low voltage in violation of Limits or voltage collapse. The applicable voltage limits are described in Appendix K of this OP and Attachment E of M/LCC15.
- b. Without prior approval to operate otherwise, EMERGENCY System Contingencies should not cause, or result in, neighboring RCA/BAA to exceed their voltage limits.

2.4. EMERGENCY System Miscellaneous Criteria

- a. In EMERGENCY System Conditions, ISO will maintain Generation and transmission facilities adequate to supply the New England RCA/BAA customer electricity demand and energy requirements and at least minimum reserve requirements (10 minute requirements) as prescribed in OP-8 while covering only EMERGENCY System Contingencies.
- b. An LCC may request more stringent system operating limits. If such a request is made, ISO will evaluate the request and honor it if there is no adverse system reliability consequence.

3. EMERGENCY System Contingencies

Table 2 of Appendix J identifies each type of contingency respected under EMERGENCY System Conditions, whether it is respected for SOLs or IROLs, and the appropriate thermal limits, voltage limits and stability criteria applied. These limits and criteria are respected by ISO in real-time and off-line system analyses. Appendix K describes the pre and post-contingency voltage limits each LCC applies to their system by voltage class. Attachment E of MLCC 15 documents exceptions to the voltage limits noted in Appendix K of this OP.

4. EMERGENCY System Actions

EMERGENCY System Actions should be taken to maintain or restore system conditions to at least those prescribed for operations under EMERGENCY System Conditions. In general, all appropriate and timely NORMAL System Actions should be exhausted before taking EMERGENCY System Actions. EMERGENCY System Actions should be taken before NORMAL System Actions if the NORMAL System Actions cannot be completed in time to

relieve a thermal overload above the LTE limit, prevent voltage collapse, or restore protection for EMERGENCY System Contingencies within 30 minutes for an IROL. Any unused long-term NORMAL System Actions should be taken to allow for the cancellation of EMERGENCY System Actions.

EMERGENCY System Actions may be needed to meet EMERGENCY System Ratings, Criteria or Limits even though a contingency has not occurred. Such pre-contingency EMERGENCY System Actions will be taken when NORMAL System Actions are exhausted or cannot be completed in a timely manner and there would be insufficient time after an EMERGENCY System Contingency to contain the impact to an SOL.

Pre-contingency EMERGENCY System Actions are also to be initiated when a potential EMERGENCY System Contingency threatens to cause an IROL violation. Pre-contingency EMERGENCY System Actions should also be taken when a potential EMERGENCY System Contingency poses the same threats to RCAs/BAA's outside of New England or jeopardizes the reliability of the Eastern Interconnection.

Management at ISO and at each appropriate LCC, to the extent that time permits, should consult with affected Transmission Owners when developing pre-contingency strategies.

The following is a list of EMERGENCY System Actions:

a. Transmission Circuit Switching Actions

Where it is clear that opening a transmission facility will alleviate a problem existing for a specific emergency situation, consideration will be given to opening such facility. This action, without pre-determined studies, documentation, and authority will only be initiated to prevent more severe EMERGENCY System Action and must be reported immediately to the Transmission Owner.

b. OP-4 and OP-7 Actions

i. Implement selected Actions from OP-4 (i.e. Emergency Actions of OP-4 include Actions 6 through 11). These Actions utilize voltage reductions, additional utilization of Generator maximum capabilities, appeals for customer generation not contractually available to market participants, voluntary load curtailment (large industrial and commercial customers, radio and television appeals) and notices to state Governors to reinforce Power Warning appeals.

ii. OP-7 Action - Load shedding

c. Planned Immediate Post-Contingency EMERGENCY System Actions

If an EMERGENCY System Contingency does not risk system stability but would result in low or gradually declining voltages or thermal loadings between STE and DAL, specific voltage reduction or load shedding plans should be established before the contingency for implementation immediately after the contingency. Post-contingency EMERGENCY

System Action should be established and coordinated with each appropriate LCC before the need for implementation arises. If automatic devices are being used, their actions should be completed in a matter of cycles or seconds after the contingency. Manual actions should be completed as soon as possible after the contingency. Post-contingent circuit loadings between STE and DAL must be reduced below LTE as soon as possible and in a time not to exceed 5 minutes from the event.

d. Utilization of Enhanced Facility Ratings or Limits

With the exception of all IROLs, if an SOL cannot be protected after utilizing the applicable EMERGENCY System Actions (a through c), a Transmission Owner may elect to modify the limiting thermal or voltage limit with an enhanced rating or limit and provide a post-contingent action plan for contingency protection. All coordination required with the impacted Transmission Owner(s) to provide contingency protection for the SOL is the responsibility of the LCC. All enhanced ratings or limits and post-contingent action plans utilized under this provision must be communicated to ISO electronically prior to implementation. The use of a recorded line is acceptable for these purposes. Written documentation of the enhanced ratings or limits and action plans shall be provided to ISO in a timely manner, not to exceed 24 hours. If this option is not taken or is insufficient, pre-contingent load shedding (OP-7) will be required.

D. POST-CONTINGENCY OPERATION

If a contingency involves the loss of a transmission circuit(s), operators should attempt to reclose the circuit(s) within 5 minutes unless otherwise specified in specific policies and/or procedures. If reclosure is unsuccessful or the contingency involved the loss of generation or load, operators should assess system conditions and perform appropriate NORMAL and EMERGENCY System actions to restore NORMAL and EMERGENCY System Conditions. When possible, coverage for NORMAL System Contingencies should be restored using NORMAL System Actions.

Post-contingency Actions should meet the following time requirements:

- Rapidly declining critical transmission voltages should be stabilized as quickly as possible (within one or two minutes) and returned to operation within system voltage limits using pre-determined NORMAL and/or EMERGENCY System Actions.
- Post-contingent transmission facility thermal loadings between the STE and DAL limits should be reduced below the LTE limit immediately and in a time not to exceed 5 minutes from the event using pre-defined NORMAL and/or EMERGENCY System Actions.
- Post-contingent transmission facility thermal loadings between the LTE and STE limits should be reduced below the LTE limit as soon as possible and in a time not to exceed 15 minutes from the event using appropriate NORMAL and/or EMERGENCY System Actions.
- Post-contingent transmission facility thermal loadings between the Normal and LTE limits should be reduced below the Normal limit as soon as

possible and in a time not to exceed a load cycle using appropriate NORMAL and/or EMERGENCY System Actions.

- Coverage for EMERGENCY System Contingencies shall be restored within the appropriate time for an SOL/IROL using appropriate NORMAL System and/or EMERGENCY System Actions.

III. OP-19 REVISION HISTORY

Document History (This Document History documents action taken on the equivalent NEPOOL Procedure prior to the RTO Operations Date as well revisions made to the ISO New England Procedure subsequent to the RTO Operations Date.)

Rev. No.	Date	Reason
Rev 1	07/22/98	
Rev 2	02/01/05	Updated to conform to RTO
Rev 3	02/03/06	Updated to clarify actions taken in OP-3 for scheduled switching activities that are typically completed within 15 minutes
Rev 4	04/13/07	Incorporated Appendix I for Bus Faults and made language clarifications
Rev 5	06/01/10	Updated for the changes to OP-4 actions for FCM
Rev 6	09/02/12	Complete document rewrite
Rev 7	06/11/14	Periodic Review performed by procedure owner, Step II.A.1.b replaced "Bangor Hydro" with "Bangor, ME area transmission: Added Step II.3.f; Steps II.B.4.f and II.C.4.d deleted and or replaced language related to TO waivers of contingency protection with language for TO modifications of contingency protection;
Rev 7.1	03/04/15	Periodic review performed by procedure owner, requiring no change; Completed the administrative changes required to publish this Minor Revision per SOP-RTMKTS.0210.0010 Section 5.6;
Rev 8	06/15/15	Modified document to clarify description of voltage SOLs
Rev 9	06/03/16	Annual review by procedure owner completed resulted in the following changes to resolve inconsistencies in SOL vs IROL timer use in thermal limit section and to remove inconsistent thermal limit use in switching: Section II.B.2.1.b, ,modified sub-steps; Section II.B.2.1.c, deleted sub-steps text; Section II.B.3.b, modified; Section II.B.4.a, modified; Section II.C.2.1.a.i, modified; Section II.C.2.1.b, added new sub-step; Section II.C.4.a modified; Section II.D modified last bullet; References Section, corrected TOP-007 title;
Rev 9.1	04/14/17	Periodic review performed by procedure owner, requiring no change; Made administrative changes required to publish a Minor Revision (including adding required corporate document identity to all page footers);
Rev 9.2	01/29/18	Periodic review performed by procedure owner, requiring no change; Made administrative changes required to publish a Minor Revision;
Rev 10	06/01/18	Made PRD-related changes (updated Reference and deleted RTDR and RTEG actions;

IV. APPENDICES

- A. Retired (09/02/12)
- B. Retired (09/02/12)
- C. Retired (09/02/12)
- D. Retired (09/02/12)
- E. Extreme Contingencies
- F. Retired (09/02/12)
- G. Retired (09/02/12)
- H. Retired (09/02/12)
- I. Retired (09/02/12)
- J. Contingency List and Criteria/Limits
- K. Operating Voltage Limits by LCC