



Operating Procedures

ISO New England Operating Procedure No. 8

Operating Reserve and Regulation

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REFERENCES:

North American Electric Reliability Corporation (NERC) Reliability Standard BAL-001 – Real Power Balancing Control Performance

North American Electric Reliability Corporation (NERC) Reliability Standard BAL-002 – Disturbance Control Performance

Northeast Power Coordinating Council Inc., Directory #5, Reserve

ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4)

ISO New England Operating Procedure No. 7 - Action In An Emergency (OP-7)

ISO New England Operating Procedure No. 14 - Technical Requirements for Generators, Demand Resources and Asset Related Demands (OP-14)

ISO New England - ISO New England Inc. Transmission, Markets and Services Tariff Section III, ISO New England Market Rule 1 - Standard Market Design (Market Rule 1)

ISO New England Manual for Market Operations Manual M-11 (M-11)

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PART I - INTRODUCTION

Operating Reserve, in addition to the Resources required to meet the actual New England Reliability Coordinator Area/Balancing Authority Area (RCA/BAA) load, is required to reliably operate the New England RCA/BAA. Reserve Requirements, provide for:

1. Loss of generating equipment within the New England RCA/BAA or within any other Northeast Power Coordinating Council Inc. (NPCC) RCA/BAA.
2. Loss of transmission equipment within or between NPCC RCA/BAAs that might result in a reduction of energy transfer capability within the New England RCA/BAA or between the New England RCA/BAA and any other RCA/BAA.
3. Regulation in the New England RCA/BAA.
4. Errors in forecasting New England RCA/BAA loads.

This Operating Procedure (OP) sets forth criteria for the establishment and administration of Operating Reserve and Regulation in the New England RCA/BAA.

The objective is to ensure that the New England RCA/BAA Bulk Electric System (BES) is operated at the prescribed level of reliability.

PART II - DEFINITIONS**FIRST CONTINGENCY LOSS -**

The largest capability outage (MW) that would result from the loss of a single element.

OPERATING RESERVE -

Operating Reserve shall mean Ten-Minute Spinning Reserve (TMSR), Ten-Minute Non-Spinning Reserve (TMNSR) and Thirty-Minute Operating Reserve (TMOR). [Market Rule 1]

RCA/BAA -

RCA/BAA is an electric power system or combination of electric power systems to which a common automatic generation control scheme is applied in order to:

- (i) Match, at all times, the power output of the generators within the electric power system(s) and capacity and energy purchased from outside the electric power system(s) with the load within the electric power system(s);
- (ii) Maintain scheduled interchange with other RCA/BAA's within the limits of Accepted Electric Industry Practice;
- (iii) Maintain the frequency of the electric power system(s) within reasonable limits in accordance with Accepted Electric Industry Practice and the criteria of the applicable regional reliability council or the North American Electric Reliability Corporation (NERC); and Provide sufficient generating capacity to maintain operating reserves in accordance with Accepted Electric Industry Practice. [Market Rule 1]

REGULATION -

Regulation shall mean the capability of a specific generating unit with appropriate telecommunications, control and response capability to increase or decrease its output in response to a regulating control signal, in accordance with the specifications in the ISO New England Manuals and ISO Administrative Procedures. [Market Rule 1]

REPLACEMENT RESERVE -

Replacement Reserve shall mean reserve other than TMSR, TMNSR or TMOR as defined in the ISO New England Manuals. [Market Rule 1]

REPORTABLE EVENTS -

System disturbances involving losses of load, generation, or transmission facilities, which equal or exceed the following criteria, are reportable events:

- Actual net (interchange) tie line flow deviations equal to or greater than 500 MW
- Loss of generation or load equal to or greater than 500 MW
- System frequency deviations equal to or greater than ± 0.03 Hz within a period of one (1) second or less

SECOND CONTINGENCY LOSS -

The largest capability outage (MW) that would result from the loss of a single element after allowing for the First Contingency Loss.

TEN-MINUTE RESERVE -

The sum of TMSR and TMNSR that is fully available within ten minutes from the time first requested.

TEN-MINUTE NON-SPINNING RESERVE (TMNSR) -

TMNSR shall mean the reserve capability of a generating unit that can be converted fully into energy within ten minutes from the request of the ISO New England (ISO), and is provided by generating units that are either electrically synchronized or not electrically synchronized to the New England Transmission System or the reserve capability of a Dispatchable Asset Related Demand (DARD) that can be fully utilized within ten (10) minutes from the request of ISO to reduce consumption. [Market Rule 1]

TEN-MINUTE SPINNING RESERVE (TMSR) -

TMSR shall mean the reserve capability of a generating unit that can be converted fully into energy within ten (10) minutes from the request of ISO or a DARD pump that can reduce energy consumption to provide reserve capability within ten minutes from the request of ISO, and is provided by generating units and DARD pumps electrically synchronized to the New England Transmission System. [Market Rule 1]

THIRTY-MINUTE OPERATING RESERVE (TMOR) -

TMOR shall mean the reserve capability of a generating unit that can be converted fully into energy within thirty (30) minutes from the request of ISO, and is provided by generating units that are either not electrically synchronized or synchronized to the New England Transmission System or the reserve capability of a DARD that can be fully utilized within thirty minutes from the request of ISO to reduce consumption. [Market Rule 1]

PART III - PROCEDURE

I. REAL TIME OPERATING RESERVE REQUIREMENTS

A. Ten-Minute Reserve Requirement

During normal conditions, ISO shall maintain a quantity of Ten-Minute Reserve at least equal to the amount required to replace the First Contingency Loss in the New England RCA/BAA multiplied by the Contingency Reserve Adjustment (CRA) Factor for the most recent completed quarter. ISO will increase its Ten-Minute Reserve requirement by the CRA Factor for the calendar quarter (offset by a month) if the Disturbance Control Standard (DCS) is not met during a given quarter (e.g., for the first calendar quarter of the year, the penalty is applied for May, June and July). The CRA Factor is calculated as follows:

$$CRA_{\text{quarter}} = 2 - \{\text{the average percentage DCS (expressed as a decimal) for the quarter of measurement}\}$$

The energy associated with regulation reserves (Section VI) that is available within ten (10) minutes may be utilized to satisfy Ten-Minute Reserve Requirements. Every available resource of generating capability, including regulation resources, DARD pumps, and capability made available by other qualifying load management techniques shall be considered for activation in an effort to maintain the required Ten-Minute Reserve at all times.

1. TMSR Requirement

One hundred percent (100%) of the New England RCA/BAA Ten-Minute Reserve Requirement shall be Synchronized Reserve except as described below.

To the extent that, in the judgment of the ISO New England Chief Operating Officer or an authorized designee, the New England RCA/BAA BES can be operated within NERC, NPCC, and ISO established reliability criteria and without unduly imposing more severe operating conditions (emergency starts, short-time running, etc.) on Nonsynchronized Capability, the TMSR Requirement may be decreased to a minimum of twenty-five percent (25%) of the Ten-Minute Reserve Requirement based upon ISO past performance in returning tie lines to pre-contingency values within fifteen (15) minutes following loss of generation, in accordance with the following relationship:

The TMSR Requirement may decrease by ten percent (10%) of the Ten-Minute Reserve Requirement for every time ISO successfully returns the New England RCA/BAA ACE to pre-contingency values, or to zero, following a reportable event where the resource loss is

equal to or less than the magnitude of the first contingency loss. Successful recoveries that occur in the same month as a failure shall not be counted that month towards a reduced TMSR Requirement. However, successful recoveries subsequent to a failure can be counted in the next month provided there are no failures in that month.

The TMSR Requirement shall increase by twenty percent (20%) for every time ISO fails to return the New England RCA/BAA ACE to pre-contingency values or to zero (0) within fifteen (15) minutes following a reportable event where the resource loss is equal to or less than the magnitude of the first contingency loss. The maximum TMSR Requirement shall be one hundred percent (100%) of the New England RCA/BAA Ten-Minute Reserve Requirement.

Changes in the TMSR Requirement caused by ISO performance in returning the New England RCA/BAA ACE to pre-contingency values or to zero (0) within fifteen (15) minutes following a reportable event where the resource loss is equal to or less than the magnitude of the first contingency loss shall be calculated at the end of each month and shall be applied at the beginning of the next month. The ISO New England Chief Operating Officer or an authorized designee may increase the Ten-Minute Synchronized Reserve Requirement above the amounts specified by the above provisions. If warranted to ensure recovery from a contingency, and to comply with established criteria, ISO will activate Operating Reserve based on economic priority to the extent possible, but should reliable operation of the power system require it, ISO will activate Operating Reserve, as it deems necessary.

During periods when system conditions threaten to reduce actual Ten-Minute Reserve and/or TMSR quantity below the current prescribed levels, the actual Ten-Minute Reserve and/or TMSR requirement may be increased by System Operators to a value greater than 100% of the current requirement in order to maintain system reliability.

B. TMOR Requirement

In addition to the Ten-Minute Reserve Requirement, ISO shall maintain a quantity of TMOR at least equal to fifty percent (50%) of the Second Contingency Loss. Any excess Ten-Minute Reserve can be counted as Thirty-Minute Reserve.

During periods when system conditions threaten to reduce Ten-Minute Reserve below prescribed levels, TMOR may be re-dispatched to maintain Ten-Minute Reserve.

During periods when system conditions threaten to reduce actual TMOR quantity below the current prescribed levels, the actual TMOR requirement may be increased by System Operators to a value greater than 100% of the current requirement in order to maintain system reliability.

C. Locational Reserve Requirements

Locational Reserve requirements are established for Reserve Zones and are further explained in Market Rule 1, Section III.9.2.3. The locational reserve requirements reflect the need for 30-minute contingency response to provide 2nd contingency protection for each import constrained Reserve Zone. The locational reserve requirements can be satisfied only by Resources that are located within a Reserve Zone and that are capable of providing 30-minute or higher quality reserve products.

II. OPERATING RESERVE DISTRIBUTION

Operating Reserve shall be distributed to ensure that it can be fully utilized by ISO for any probable contingency without exceeding transmission system limitations and to ensure operation in accordance with NERC, NPCC, and ISO Manuals, operating policies and procedures.

III. OPERATING RESERVE RESTRICTIONS

ISO shall be responsible for designating the First Contingency Loss and the Second Contingency Loss in the New England RCA/BAA. Frequent review of system configurations shall be made to ensure that all probable capability losses that could be caused by a First Contingency and resulting relay actions are considered.

When a generating unit is the largest First Contingency in the New England RCA/BAA and, therefore, used to calculate the Ten-Minute Reserve Requirement, the capability of the unit, in excess of its output, cannot be considered as Operating Reserve. However, when a generating unit is the largest Second Contingency in the New England RCA/BAA, the net capability of the unit, in excess of its output, may be considered as Operating Reserve.

When allocating Operating Reserve to the various resources throughout the New England RCA/BAA, particular attention must be given to temporary limitations and de-ratings. Only that capability that can actually supply MW in the applicable period shall be classified as Operating Reserve.

Operating Reserve, if activated, shall be sustainable for at least one (1) hour from the time of activation or the published NERC/NPCC criteria. It is recognized that units called upon to activate reserve will operate without relief until ISO determines they are no longer needed.

IV. SHORTAGE OF OPERATING RESERVE

Normally, Operating Reserve will be provided to prescribed levels of Synchronized and Nonsynchronized reserve from within the New England RCA/BAA. If available capability is insufficient to provide adequate Operating Reserve, ISO will implement the various Actions of ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4) as appropriate to maintain Operating Reserve Requirements. During shortages of Operating Reserve, Thirty-Minute Reserve shall be re-dispatched to maintain Ten-Minute Reserve at the prescribed value.

If ISO is arranging to purchase available emergency capacity and energy, or energy only in accordance with OP-4, and a shortage of Ten-Minute Reserve is forecast, ISO will recognize that voltage reduction load relief available in ten minutes (10) provides Nonsynchronized Reserve.

Ten-Minute Non-synchronized Reserve will be synchronized to the system and brought to Ten-Minute Synchronized Reserve status whenever Ten-Minute Reserve falls below the full ten-minute requirement.

V. OPERATING RESERVE - CAPABILITY UNDER TEST CONDITIONS

Frequently, some capability is used to supply energy needs while it is in a test condition. This test energy normally is not released for ISO dispatch and must be added, megawatt-for-megawatt, to the Operating Reserve Requirement. However, based on the assumed degree of risk for the sudden loss of the total energy, ISO may recognize the test energy risk as being similar to other non-test capability and count the test energy as firm. In such cases, Operating Reserve Requirements need not be increased due to the test energy.

VI. REGULATION RESERVE REQUIREMENT

ISO shall maintain a portion of its Synchronized Capability on Regulation sufficient to satisfy the NERC Control Performance Criteria. The specific Regulation requirements are identified in ISO New England Manual for Market Operations, Manual M-11.

VII. REAL-TIME REPLACEMENT RESERVE REQUIREMENT

In addition to the Operating Reserve Requirements, ISO will maintain a quantity of Replacement Reserves in the form of additional TMOR for the purposes of meeting the NPCC requirement to restore its Ten-Minute Reserve within 105 minutes if it becomes deficient as a result of a contingency that is a reportable event and within 90 minutes if it becomes deficient and the deficiency is not a result of a contingency that is a reportable event, as described in NPCC Document C-09, Monitoring Procedures For Operating Reserve Criteria.

ISO will not activate emergency procedures, such as OP-4 or ISO New England Operating Procedures No. 7 - Action In An Emergency (OP-7), in order to maintain the Replacement Reserve Requirement.

To the extent that, in the judgment of the ISO New England Chief Operating Officer or an authorized designee, the New England RCA/BAA can be operated within NERC, NPCC, and ISO established criteria, the Replacement Reserve Requirement may be decreased to zero based upon ISO capability to restore Ten-Minute Reserve within NPCC requirements.

VIII. TESTING OF RESPONSE RATES

As outlined in ISO New England Manual for Market Operations, Manual M-11, ISO has the responsibility to conduct tests of response rates of both synchronized and non-synchronized resources.

The ability of generating and DARD pump resources to demonstrate Operating Reserve capability shall be tested at regular intervals. ISO will attempt to coordinate these tests with system conditions and Market Participants' normal testing practices.

IX. RESPONSIBILITY

ISO is responsible for operating the New England RCA/BAA in accordance with established NERC, NPCC, and ISO criteria. This includes the responsibility for determining when Operating Reserve above minimum levels prescribed will be retained. Further, ISO is responsible for determining how best to meet Regulation and tie line response criteria.

ISO is also responsible for identifying the First Contingency Loss and the Second Contingency Loss; for determining the required amount of Operating Reserve; for specifying the type, location, and quantity to be maintained; for selecting the number of units as well as the location of units to be assigned to Regulation; for determining the required amount of Replacement Reserve and for communicating the directive to units for activating Operating Reserve in response to contingencies in the New England RCA/BAA and/or NPCC.

LOCAL CONTROL CENTERS (LCCs)/MARKET PARTICIPANTS (MPs) are responsible for communicating to ISO current system conditions affecting Operating Reserve. The LCCs/MPs are also responsible for activating Operating Reserve for localized problems within a local area when time does not permit communication with ISO. When Operating Reserve is used by any LCC, ISO is to be notified as soon as practicable and ISO will take action to restore Operating Reserve as soon as possible.

OP 8 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	10/23/98	
Rev 2	06/21/02	
Rev 3	02/01/05	Updated to conform to RTO
Rev 4	10/01/06	Updated for ASM Phase 2
Rev 5	06/05/09	Annual review by Procedure Owner; Corrected titles in References section; Global change of Control Area to Control Area/Balancing Authority Area and to define its acronym CA/BAA; Defined acronym for ISO New England as ISO (per M-35); defined Local Control Center as LCC and Market Participant as MP; Updated to note that Ten Minute Reserve/TMSR or TMOR requirements may be increased to values above 100% and a change made to bring procedure into line with OP4
Rev 6	06/01/10	Modifications to align with the OP4 changes for Demand Response Integration.
Rev 7	01/07/11	Biennial review by procedure owner; Globally editorial changes including changing font to Arial, adding the uncontrolled disclaimer to the 1 st page footer and adding "Hard Copy is Uncontrolled" to every page footer, assigned heading styles to major and minor sections to allow for automatic generation of a Table Of Contents, arranged Definition Section terms to be in alphabetical order, minor grammar changes for clarification; References Section: added BAL-001, BAL-002, NPCC C-11, OP 7, M-11 and corrected title for Market Rule 1; Globally replaced Control Area/Balancing Authority Area (CA/BAA) with Reliability Coordinator Area/Balancing Authority Area (RCA/BAA) and replaced bulk power supply system with Bulk Electric System and used acronym BES; Part II Definitions: clarified Reportable Events, 3 rd bullet; Part III I. A added text to include the use of Contingency Reserve Adjustment (CRA) Factor to determine Ten-Minute Reserve requirement,