ISO New England Operating Procedure No. 13
Standards for Voltage Reduction and Load Shedding Capability

Effective Date: draft

References:

NERC Reliability Standard EOP-003 - Load Shedding Plans

NERC Reliability Standard PRC-006-NPCC Automatic Underfrequency Load Shedding

Northeast Power Coordinating Council Inc. (NPCC) Regional Reliability Reference Directory #2 Emergency Operations (Directory #2)

Northeast Power Coordinating Council Inc. (NPCC) Regional Reliability Reference Directory #12 - Underfrequency Load Shedding Program Requirements (Directory #12)

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, Asset Related Demands and Alternative Technology Regulation Resources (OP-14)

Master/Local Control Center Procedure No. 2 - Abnormal Conditions Alert (M/LCC 2)

Market Rules and Procedures
Table of Contents

I. INTRODUCTION .................................................................................................................. 3

II. COMPLIANCE ..................................................................................................................... 4

III. REQUIREMENTS ................................................................................................................ 5
    A. Voltage Reduction ............................................................................................................. 5
    B. Load Shedding .................................................................................................................. 6

IV. TESTING ............................................................................................................................. 8
    A. Voltage Reduction ............................................................................................................. 8
    B. Load Shedding .................................................................................................................. 8

OP-13 Revision History .......................................................................................................... 9

Appendices:

    Appendix A - Holidays Applicable to Voltage Reduction Capability
    Appendix B - Underfrequency Load Shedding Program Requirements
    Appendix C - Retired (06/26/2015)
I. INTRODUCTION

This document establishes standards for the installation and testing for Market Participants (MPs)/Transmission Owners (TOs) with control over transmission/distribution facilities voltage reduction and load shedding capability. These standards require that all MPs/TOs with control over transmission/distribution facilities have the capability to reduce load demand when directed to do so for Bulk Electric System (BES) dispatching purposes. These load reducing capabilities are used by ISO New England (ISO) and/or the Local Control Centers (LCCs) to maintain system reliability during generating capacity deficiencies, energy deficiencies, and other emergency operating conditions as described in ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4) and ISO New England Operating Procedure No. 7 - Action in an Emergency (OP-7).
II. COMPLIANCE

MPs/TOs with control over transmission/distribution facilities are expected to comply with the standards established by this ISO Operating Procedure (OP). MPs/TOs not in compliance are expected to proceed immediately to achieve compliance.

MPs/TOs with control over transmission/distribution facilities may achieve compliance by arranging with another MP/TO with control over transmission/distribution facilities to provide on its behalf, voltage reduction and/or load shedding capability. The voltage reduction and/or load shedding capability provided by such arrangements must be in a similar electrical location to the MP/TO for which service is provided. Such arrangements must yield equivalent support to transmission system load and voltage as would be obtained if the MP/TO with control over transmission/distribution facilities had installed voltage reduction and load shedding capability on its own system.

Arrangements may also be made for one (1) MP/TO with control over transmission/distribution facilities to provide voltage reduction and/or load shedding capability for another MP/TO with control over transmission/distribution facilities during a portion of the day or week. For example, a MP/TO with control over transmission/distribution facilities not able to reduce voltage or shed load during the entire period of time that such capability is required may arrange for another MP/TO with control over transmission/distribution facilities, subject to the requirements of the previous paragraph, to provide such capability on its behalf during the deficient periods. MPs/TOs providing voltage reduction and/or load shedding capability for another MP/TO with control over transmission/distribution facilities must not count the capability dedicated to another MP/TO with control over transmission/distribution facilities toward meeting its own requirements.

The details of arrangements between MPs/TOs with control over transmission/distribution facilities for voltage reduction and/or load shedding services to meet the standards of this OP must be submitted to and approved by ISO.
III. REQUIREMENTS

A. VOLTAGE REDUCTION

1. Voltage reduction should take place on the distribution system wherever possible. It is recognized that in certain areas, voltage reduction is implemented on the subtransmission system. Voltage reduction should **not** be implemented on the transmission system operating at 69 kV and above.

2. Ideally, voltage reduction capability should be installed so that all loads are subject to a five (5) percent voltage reduction. However, it is recognized that it may **not** be practical to subject some loads to voltage reduction (e.g., loads served from the transmission system, voltage sensitive loads, etc.). It may be desirable to subject some loads to a voltage reduction of less than five (5) percent. However, each MP/TO with control over transmission/distribution facilities must have the capability to reduce system load demand at the time a voltage reduction is initiated by at least one and one-half (1.5) percent through implementation of a voltage reduction.

3. It is intended that voltage reductions be fully implemented within ten (10) minutes from the time ordered. However, it is recognized that it may **not** be practical for some MPs/TOs with control over transmission/distribution facilities to meet this requirement. In those circumstances, voltage reduction which can be implemented in thirty (30) minutes is permissible.

4. Each MP/TO responsible for providing voltage reduction capabilities within ten (10) minutes must make this capability available for use seven days a week during the period between 0800 to 2300 hours.

5. Each MP/TO responsible for providing voltage reduction capabilities that require longer than ten (10) minutes must be able to implement this voltage reduction on all non-holiday weekdays during the period between 0800 to 2300 hours. Holidays are those listed in Appendix A to this OP.

6. Upon application to and approval by ISO, the requirement for voltage reduction capability may be satisfied by an equivalent amount of interruptible loads. Such loads must be interruptible within ten (10) minutes of issuance of the voltage reduction order by ISO. Loads designated for this purpose must be dedicated to OP-4, must be under dispatch authority of ISO and/or the appropriate LCC, and do **not** qualify as ISO Demand Resources or Asset Related Demands under the provisions of ISO New England Operating Procedure No. 14 - Technical Requirements for Generators, Demand Resources, Asset Related Demands and Alternative Technology Regulation Resources (OP-14).
B. LOAD SHEDDING

1. In accordance with the provisions of the NERC Reliability Standard PRC-006-NPCC – Automatic Underfrequency Load Shedding, each Distribution Provider (DP)/Transmission Owner (TO) with 100 MW or more of peak net Load shall implement an UFLS program with attributes that include load shedding stages, frequency setpoints, block sizing, and total operating times as detailed in Attachment C, Table 1 of PRC-006-NPCC. (Refer to Appendix B of this OP for UFLS Program Requirements).

All DPs/TOs with 50 MW or more and less than 100 MW of peak net Load shall implement an UFLS program as prescribed in Attachment C, Table 2 of PRC-006-NPCC. (Refer to Appendix B of this OP for UFLS Program Requirements.)

All DPs/TOs with 25 MW or more and less than 50 MW of peak net Load shall implement an UFLS program as prescribed in Attachment C, Table 3 of PRC-006-NPCC. (Refer to Appendix B of this OP for UFLS Program Requirements.)

DPs/TOs with less than 25 MW of end-use load connected to its facilities are exempt from providing UFLS.

MPs/TOs may collectively implement by mutual agreement with one or more DPs/TOs within the same island and acting as a single DP/TO, provide, an aggregated automatic UFLS program that sheds their coincident peak aggregated net Load, based on the frequency thresholds, total nominal operating time and amounts specified in PRC-006-NPCC, Attachment C, Tables 1 through 3.

Load shed automatically by underfrequency relays shall not be automatically restored.

In accordance with NPCC Directory #12, Section 5.2.6, under frequency threshold relays shall be set to a nominal total operating time of 300 ms, from the time when frequency passes through the set point to the time of circuit breaker contact opening (including any communications time delay), with a minimum relay operating time to be no less than 100 ms when the rate of frequency decay is 0.2 Hz per second. This is consistent with the requirements of NERC Reliability Standard PRC-006-NPCC Attachment C.

2. Each MP/TO with control over transmission/distribution facilities must be capable of manually shedding at least fifty (50) percent of load in ten (10) minutes or less. The first half of the load shed manually should not include load which is part of any automatic load shedding plan unless following manual load shedding, the requirements of NERC Reliability Standard PRC-006-NPCC - Automatic Underfrequency Load Shedding, Attachment C can still be met.

3. Manual load shedding should not interrupt transmission paths. MPs/TOs with control over transmission/distribution facilities that include such interruptions in load shedding plans must demonstrate from system simulations that transmission interruptions will not degrade interconnected system reliability.
4. Manual load shedding plans may incorporate the use of digital pager systems, outside of normal business hours, to notify MPs/TOs with control over transmission/distribution facilities personnel that manual load shedding has been requested. MPs/TOs with control over transmission/distribution facilities whose plans include the use of such a system must coordinate those plans with the appropriate LCC. In addition, MPs/TOs with control over transmission/distribution facilities whose plans include use of a pager system will consider receipt of an Abnormal Conditions Alert, under Master/Local Control Center Procedure No. 2 - Abnormal Conditions Alert (M/LCC 2), as notification that their substations are to be staffed for possible implementation of manual load shedding during the period that the Alert is in effect.

This provision for the use of a digital display pager system is subject to review by the Reliability Committee relative to the overall manual load shedding capability of the New England Reliability Coordinator Area / Balancing Authority Area and the extent to which such systems are being used to provide coverage outside of normal business hours. The compliance surveys performed in accordance with Section IV of this OP will serve as the basis for such Reliability Committee reviews.

5. The plan should include the capability of shedding load proportionately over the whole system; however, it is recognized that this may not be practical in some areas.

Generation connected to sub-transmission or distribution systems will have an ever-increasing impact on load shedding plans. If a Generator is interrupted as part of a load shedding plan by a MP/TO with control over transmission/distribution facilities, an equivalent amount of additional load must be included in the load shedding plans.

6. Each MP/TO with control over transmission/distribution facilities must be capable of implementing automatic and manual load shedding twenty-four (24) hours a day.

7. Once manual load shedding has been implemented, the appropriate LCC will inform the MPs/TOs with control over transmission/distribution facilities of the estimated length of time that the load is expected to be interrupted. Depending on the time estimate, MPs/TOs with control over transmission/distribution facilities may choose to initiate feeder rotations. During the rotation process, load must be interrupted before an equivalent load can be restored.
IV. TESTING

A. VOLTAGE REDUCTION

At the discretion of ISO, a system-wide voltage reduction test will be conducted. An actual voltage reduction will be implemented. MPs/TOs with control over transmission/distribution facilities will record the load reduction attained within ten (10) minutes and/or thirty (30) minutes in the test. If such records are not possible, LCC load relief data may be used. Each MP/TO with control over transmission/distribution facilities will complete a questionnaire that will record load relief attained and identify operational, or customer problems that were encountered and should be resolved. The data will be used by ISO to update load relief estimates contained in OP-4, and to help verify each MP/TO with control over transmission/distribution facilities voltage reduction capability. Voltage reduction tests will be conducted in accordance with the following parameters:

1. A date will be established for the test.
2. MPs/TOs with control over transmission/distribution facilities will be given a written notice four (4) weeks in advance of the test date.
3. If system-operating conditions force cancellation of the test, a new date will be set in accordance with the above parameters.
4. Voltage reduction load relief capability shall be measured by each MP/TO with control over transmission/distribution facilities during system-wide voltage reduction tests.

B. LOAD SHEDDING

Every second month, ISO will conduct a simulated manual load shed test to train the ISO, LCC, and MPs/TOs with control over transmission/distribution facilities personnel in all aspects of manual load shedding procedures. These tests will be conducted in accordance with OP-7 to the maximum extent possible. Tests will deviate from actual load shed operations in the following manner.

1. All verbal load-shedding directives will be preceded and concluded with the statement, “This is a test. Do not shed load”.
2. Operators will not open breakers or disconnect actual load, but instead, will observe or estimate the amount of load that would have been shed on the circuit had it been an actual load shedding operation. These tests may be used to help verify a MP/TO with control over any transmission/distribution facility capability to reduce system load by as much as fifty (50) percent.
3. Operators will report the amount of load that would have been shed and the length of time to do it to their next highest dispatching authority. ISO will issue reports on each simulated manual load shedding test. The report will specify the amount of load relief attained and the time interval to attain the load shed during the test.
## OP 13 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.)*

<table>
<thead>
<tr>
<th>Rev. No.</th>
<th>Date</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rev 1</td>
<td>08/20/98</td>
<td></td>
</tr>
<tr>
<td>Rev 2</td>
<td>02/01/05</td>
<td>Updated to conform to RTO terminology</td>
</tr>
<tr>
<td>Rev 3</td>
<td>05/06/05</td>
<td>Update References for NERC Version 0 Standards</td>
</tr>
<tr>
<td>Rev 4</td>
<td>10/01/06</td>
<td>Updated for ASM 2</td>
</tr>
<tr>
<td>Rev 5</td>
<td>06/22/10</td>
<td>Biennial review by procedure owner;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reformatted entire document, changed font to Arial;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added disclaimer statement to 1st page footer and added “Uncontrolled” to all page footers;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In References section, changed NPCC A-3 to D2, added NPCC D12 and D12 Implementation Plan, deleted OP-8;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Added Appendices B and C to Appendices list section;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Globally: corrected various document titles, defined acronyms ISO &amp; LCC;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Updated to conform to new automatic UFLS program requirements as specified in NPCC Directory # 12</td>
</tr>
<tr>
<td>Rev 6</td>
<td>08/03/12</td>
<td>Biennial review by procedure owner;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1st page Footer, deleted 2nd paragraph of disclaimer, changed pagination format;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>New Section II.A.5, added;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section III. A.4, modified</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section III.B.1, removed 1st paragraph and moved wording regarding UF relaying to later in the document.</td>
</tr>
<tr>
<td>Rev 7</td>
<td>08/01/14</td>
<td>Biennial review by procedure owner;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>References Section and Section 3.A.6, OP-14 updated the title;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section III.B.2, deleted “Insofar as practical” and added reference to Section 5.2.1 of Directory 12;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Globally replaced first use “Market Participants” with “Market Participants (MPs)/Transmission Owners (TOs)” and used the defined acronym in all subsequent uses this OP ;</td>
</tr>
<tr>
<td>Rev 8</td>
<td>draft</td>
<td>Added reference for NERC Standard PRC-006-NPCC;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deleted Northeast Power Coordinating Council (NPCC) Regional Reliability Reference Directory #12 - Implementation Plan;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appendices; retired Appendix C;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>III.B.1. added NPCC to last paragraph before Directory #12 and added statement referring to PRC-006-NPCC Attachment C;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>III.B, modified language to line up with PRC-006-NPCC</td>
</tr>
</tbody>
</table>