



Operating Procedures

ISO New England Operating Procedure No. 6

System Restoration

Effective Date: May 6, 2011
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REFERENCE:

1. NERC Reliability Standard EOP-005 - System Restoration Plans
2. NPCC Regional Reliability Reference Directory #2 Emergency Operations
3. NPCC Regional Reliability Directory #8 System Restoration
4. ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4)
5. ISO New England Operating Procedure No. 7 - Action in an Emergency (OP-7)
6. ISO New England Operating Procedure No. 8 - Operating Reserve and Regulation (OP-8)
7. ISO New England Operating Procedure No. 12 - Voltage and Reactive Control (OP-12)
8. ISO New England Operating Procedure No. 19 - Transmission Operations (OP-19)

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Local Control Center Instruction No:

CONVEX:	CONVEX Operating Instruction # 0006 - System Restoration
MAINE:	Maine Operating Procedure-6 - System Restoration
NEW HAMPSHIRE:	OP-0006 System Restoration
NSTAR:	NSTAR Electric Operating Procedure OP-6 - System Restoration
REMVEC II:	Operating Procedure No. 6 - System Restoration
VELCO:	VELCO Operating Procedure OP-6 - Vermont Black Start Restoration Plan

Table of Contents

I.	INTRODUCTION.....	4
II.	RESPONSIBILITIES.....	4
A.	LCCs.....	4
B.	ISO.....	5
OP 6	REVISION HISTORY.....	8

Appendix A - System Restoration Guidelines

Appendix B - Restoration Sequence for Establishing a 345kV Backbone after a Total System Blackout within New England (Confidential)

Appendix C - Charging of 345 kV Circuits in the New England Control Area

Appendix D - Inter-Local Control Center Ties

Appendix E - Inter-Area Ties

Appendix F - Phone Numbers of Control Centers

Appendix G - 345 kV Restoration Event Worksheet (Confidential)

I. INTRODUCTION

This procedure addresses restoration of the Bulk Electric System (115 kV and above) after a partial or complete system blackout. Expedious restoration of the Bulk Electric System depends on independent actions and interactions by Market Participants, Local Control Centers (LCCs) and ISO New England (ISO). Depending on the expanse of the blackout (local area or widespread) numerous Market Participant and LCC restoration procedures, and this procedure, may need to be implemented simultaneously. NPCC Regional Reliability Directory #8 System Restoration provides more detailed information on how system operators should establish and maintain Inter-Area tie lines.

During system restoration, a high priority must be given to the restoration of off-site AC power sources to nuclear Generators. Also, technical aspects of system restoration (i.e. Generator startups, load pickups, switching surges, voltages, frequency, synchronization of islands, etc.) will be crucial. Recognizing these concerns, this procedure and all LCC and Market Participant restoration procedures have been developed in a coordinated fashion. This document:

1. Outlines the responsibilities of the LCCs and ISO (including independent actions and interactions between these organizations) and,
2. Provides technical guidelines for the restoration of transmission and generation facilities. Appendix G - 345 kV Restoration Event Worksheet should be used to assist in system restoration.

Responsibilities are outlined in the body of this procedure. Each LCC relationship to the ISO is the same; therefore, their responsibilities during system restoration are the same. Details on the interactions of the LCCs and their companies can be found in the individual LCC restoration procedures.

Technical guidelines for restoration are provided in Appendix A.

II. RESPONSIBILITIES

A. LCCs

1. Determine the extent of the blackout within the LCC areas and inform ISO as soon as possible of existing generation and transmission capabilities. (ISO will determine the extent of the blackout within the New England Reliability Coordinator Area/Balancing Authority Area (RCA/BAA) and adjacent power systems and inform the LCCs.)
2. Assess the need for additional support staff to aid in system restoration.
3. Assign scribes to key positions in the control room to help System Operators document events related to system restoration.
4. Implement the LCC restoration procedures (including necessary coordination with ISO and adjacent LCCs).

5. If the blackout is severe and Generator dispatch must be temporarily shared with the LCC(s), assign a loader to direct the startup and loading of Generator. The loader must;
 - a) Follow the technical guidelines which relate to Generator startups, synchronizations and loading and,
 - b) Closely coordinate Generator/Dispatchable Asset Related Demand (DARD) operations with switching operations. If Generator loading by any LCC is warranted, the LCC can request assistance from the ISO operator for Generator loading. Once the LCC is sufficiently restored and interconnected, ISO will resume Generator/DARD dispatch.
6. Assign LCC restoration coordinators to perform the following duties:
 - a) Establish communications with restoration coordinators at ISO and adjacent LCCs to provide a flow of information that promotes coordinated system restoration.
 - b) Monitor, advise and help coordinate with ISO and adjacent LCCs, the following;
 - (1) Energizations of 345 kV circuits,
 - (2) Energizations of inter-LCC and inter-Area tie lines
 - (3) Generator startups, load pickups, generation reserves and load shedding within interconnected systems after an inter-LCC or inter-Area tie has been established
 - c) Maintain records of work done to coordinate restoration.
 - d) Provide updates on LCC status.
7. Monitor transmission and generation facilities and, as practical, take action to promote system reliability.
8. Should communications with ISO fail, 345 kV circuits and inter-LCC and inter-Area tie lines may be energized if prudent to total system restoration and communications between the affected parties exist.
9. Conduct regular meetings to keep operations staff apprised of system conditions and restoration activities.

B. ISO

1. Determine the extent of the blackout throughout the New England RCA/BAA and adjacent power systems and inform all LCCs of existing generation and transmission capabilities.
2. Assess the need for additional support staff to aid in system restoration.
3. Assign scribes to key positions in the control room to help System Operators document events related to system restoration.

4. Implement the ISO restoration procedure (including necessary coordination with the LCCs and adjacent power systems).
5. If the blackout is severe and Generator dispatch responsibility must be temporarily shared with the LCCs, ISO shall assist with the loading function if the LCCs request such assistance. Loaders must ensure that:
 - a) The technical guidelines which relate to Generator startups, synchronizations and loadings are followed.
 - b) Generator dispatch instructions are communicated between the LCCs and ISO to ensure that ISO maintains over all Area coordination, balance between load and generation occurs and area reliability concerns are met.
 - c) Generator operations are closely coordinated with switching operations. Once the LCCs are sufficiently restored and interconnected, Generator dispatch will be resumed by ISO.
 - d) Generator dispatch will be resumed by ISO when mutually agreed upon by the LCC and ISO restoration coordinators. After a widespread blackout, Generator dispatch should be resumed by ISO when total New England load has reached approximately 9000 MW or when reliable dispatch can be obtained.
6. Assign a restoration coordinator to perform the following duties:
 - a) Establish communications with restoration coordinators in the LCCs and adjacent power systems and a flow of information that promotes coordinated system restoration.
 - (1) The establishment of restoration efforts will be coordinated and monitored in the Restoration Coordinator workroom. The Restoration Coordinator workroom is located in the control room, behind the Operations Shift Supervisor workstation.
 - b) Monitor, advise and help coordinate with the LCCs and adjacent power systems, the following;
 - (1) Energizations of 345 kV circuits,
 - (2) Energizations of inter-LCC and inter-Area tie lines,
 - (3) Generator startups, load pickups, generation reserves and load shedding within interconnected systems after an inter-LCC or inter-Area tie has been established.
 - c) Maintain records of work done to coordinate restoration.
 - d) Provide updates on the status of the New England RCA/BAA to the LCCs and adjacent power systems.
 - e) Assign support staff to survey Blackstart Generators to determine the following:
 - (1) Amount of fuel available on-site (hours at full load operations)
 - (2) Approximate time to have the Blackstart Generator station manned

7. Authorize the closing of inter-LCC and inter-Area transmission lines.
8. Once inter-LCC or inter-Area tie lines are energized, oversee and coordinate load pickups within the interconnected parties.
9. Select priority for start-up power supply to generating stations when the choice is to supply a station in one LCC area or a station in another LCC area from the same source.
10. Direct load shedding, if necessary, to enable continued reliable restoration of interconnected parties or the closing of inter-LCC or inter-Area tie lines.
11. Monitor Bulk Electric System transmission and generation facilities and, as practical, take action to promote system reliability.
12. Conduct regular meetings to keep operations staff apprised of system conditions and restoration activities.

OP 6 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	06/11/2004	
Rev 3	02/01/2005	Updated to conform to RTO terminology
Rev 4	05/06/05	Update for initiation of VELCO Local Control Center and NERC Version 0 Standards
Rev 5	10/13/06	Deleted Appendices D and E since the material is duplicated in OP 12 Appendix B
Rev 6	04/13/07	Revised to clarify terminology and comply with NERC audit findings
Rev 7	05/21/08	Updated for NSTAR Local Control Center status, which results in all LCCs performing similar functions
Rev 8	06/05/09	In References list Corrected NPCC document titles for new Directory # 2 and Directory #8; & Corrected LCC Instruction titles; In Section I. Introduction, corrected NPCC document title in the 1 st paragraph, last sentence; In Section II. A.: added new Step A.2. & Section II.A.6.b) (2), Section II.B.b) (2) & II.B.10.changed ties to tie lines In Section II. A.: added new Step A.2. & In Section II.B: added new sub-Step B.6.a) (1) and new sub-Step B.6.e.(1) & (2)
Rev 9	06/06/11	Annual review by procedure owner; Change document text font to Arial, added uncontrolled disclaimer to 1 st page Footer and “Hard Copy is Uncontrolled” to all footers, replaced page numbers with Page X of Y format; Minor editorial change e.g., defined acronym for ISO New England as ISO and for Local Control Center as LCC in first use and used acronym for future uses; Replaced Resource with Generator or Generator/DARD where applicable; Replaced Control Area with Reliability Coordinator Area/Balancing Globally replaced “bulk power system” with “Bulk Electric System”; Step II.A.5.1.) added Dispatchable Asset Related Demand to define 1 st use of acronym DARD