Standard Development Roadmap

This section is maintained by the drafting team during the development of the standard and will be removed when the standard becomes effective.

Development Steps Completed:

1. SAR version 1 posted on November 6, 2006.
2. SAR version 1 comment period closed on December 5, 2006.
3. SAR version 2 and comment responses for SAR version 1 posted on February 8, 2007.
4. SAR version 2 comment period closed on March 9, 2007.
5. SAR version 3 and comment responses for SAR version 2 accepted by SC and SDT appointed on April 9, 2007.
6. First posting of revised standards on August 15, 2007 with comment period closed on September 28, 2007.

Proposed Action Plan and Description of Current Draft:

The SDT began meeting in mid-April 2007 immediately following the approval of the SAR by the SC with the goal of completing work in approximately one year's time. The current draft is the second posting of the proposed standards. Only the requirements, violation risk factors, time horizons, and measures have been completed at this time. All compliance elements will be completed after the requirements have been reviewed. Requirements in EOP-007 and EOP-009 have been incorporated into the revised EOP-005 and EOP-006. Therefore, EOP-007 and EOP-009 will be retired when this project is approved and EOP-005-2 and EOP-006-2 go into effect.

Future Development Plan:

Anticipated Actions	Anticipated Date
1. Third posting of draft standards.	March 2008
2. Standards posted for first ballot.	April 2008
3. Standards posted for second ballot.	May 2008
4. Standards sent to BOT for approval.	June 2008

Definitions of Terms Used in Standard

This section includes all newly defined or revised terms used in the proposed standard. Terms already defined in the Reliability Standards Glossary of Terms are not repeated here. New or revised definitions listed below become approved when the proposed standard is approved. When the standard becomes effective, these defined terms will be removed from the individual standard and added to the Glossary.

Blackstart Capability Plan: Existing definition is retired.

Blackstart Resource: A generation Facility and associated set of equipment which has the ability to be started without support from the System or to remain energized without connection to the remainder of the System, with the ability to energize a dead (de-energized) bus, meeting the Transmission Operator's restoration plan needs for real and reactive power capability, frequency and voltage control, and that has been included in the Transmission Operator's restoration plan.

A. Introduction

1. **Title:** **System Restoration from Blackstart Resources — Operations**

2. **Number:** EOP-005-2

3. **Purpose:** Ensure plans and Facilities are established, and personnel are in place to enable System restoration from Blackstart Resources to ensure reliability is maintained during restoration and priority is placed on restoring the Interconnection.

4. **Applicability:**

   4.1. Transmission Operators.

   4.2. Generator Operators.

5. **Proposed Effective Date:** TBD

B. Requirements

R1. Each Transmission Operator shall have a restoration plan approved by its Reliability Coordinator. The restoration plan shall allow for restoring the Transmission Operator's System following a Disturbance in which one or more areas of the Bulk Electric System (BES) shuts down and the use of Blackstart Resources is required to restore the shut down area to service, to a state whereby the choice of the next Load to be restored is not driven by the need to control frequency or voltage regardless of whether the Blackstart Resource is located within the Transmission Operator's System. The restoration plan shall include: [Violation Risk Factor = High] [Time Horizon = Operations Planning]

R1.1. A description of the manner in which all obligations for off-site power requirements of nuclear power plants will be fulfilled.

R1.2. Procedures for restoring the integrity of the Interconnection under the direction of the Reliability Coordinator.

R1.3. Identification of each Blackstart Resource and its characteristics including the following: the name of the Blackstart Resource, location, megawatt and megavar capacity, and type of unit.

R1.4. Identification of Cranking Paths and initial switching requirements between each Blackstart Resource and the unit(s) to be started.

R1.5. Identification of acceptable operating voltage and frequency limits during restoration.

R1.6. A statement accounting for the possibility that restoration can not be completed as expected indicating that in situations where the actual conditions do not match the studied conditions, the System Operator shall use professional judgment to deviate from the System restoration plan.

R1.7. Operating Procedures to reestablish connections within the Transmission Operator's System for areas that have become separated.

R1.8. Operating Procedures to restore Loads, such as station service for substations, units to be restarted or stabilized, the Load needed to stabilize generation and frequency, and provide voltage control for restoring the System.

R2. Each Transmission Operator, in order to ensure the reliability of the Interconnection, shall distribute its approved restoration plan to the entities identified in its restoration plan, and to it's Reliability Coordinator. [Violation Risk Factor = Lower] [Time Horizon = Operations Planning]

R3. Each Transmission Operator shall review its restoration plan and submit it to its Reliability Coordinator on an annual (rolling 365 days) basis. [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R3.1. If there are no changes to the previously submitted restoration plan, the Transmission Operator shall confirm annually (rolling 365 day basis) to its Reliability Coordinator that it has reviewed its restoration plan and no changes were necessary.

R4. Each Transmission Operator shall update its restoration plan within ninety calendar days after identifying any permanent System modifications that would change the implementation of its restoration plan. [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R4.1. Each Transmission Operator shall submit its revised restoration plan to its Reliability Coordinator within the same ninety calendar day period.

R5. Each Transmission Operator shall have a copy of its latest approved restoration plan within each of its control centers and available to all of its control room personnel. [Violation Risk Factor = Lower] [Time Horizon = Operations Planning]

R6. Each Transmission Operator shall verify through a combination of analysis of actual events, steady state and dynamic simulations or testing that its documented restoration plan accomplishes its intended function. This shall be completed every five years at a minimum. Such simulations or testing shall analyze: [Violation Risk Factor = Medium] [Time Horizon = Long-term Planning]

R6.1. The ability of Blackstart Resources to meet the Reactive Power requirements of the Cranking Paths and to supply initial Loads.

R6.2. The Loads required to stabilize the Blackstart Resources and other resources being utilized until the restoration state has ended.

R6.3. The Loads and generating resources required to control voltages and frequency within acceptable operating limits (documented in Requirement R1.5) as the BES is restored.

R7. Following a Disturbance in which one or more areas of the BES shuts down and the use of Blackstart Resources is required to restore the shut down area to service, each affected Transmission Operator shall implement its restoration plan. [Violation Risk Factor = High] [Time Horizon = Real-time Operations]

R7.1. Each affected Transmission Operator shall work in conjunction with its Reliability Coordinator to determine the extent and condition of the isolated area(s).

R7.2. Each affected Transmission Operator shall give high priority to restoration of off-site power to nuclear power plants as directed by the Reliability Coordinator and in agreement with reliability standard NUC-001.

R7.3. Each affected Transmission Operator shall notify its Reliability Coordinator of restoration progress as required in the Reliability Coordinator's restoration plan.

R8. Following a Disturbance in which one or more areas of the BES shuts down and the use of Blackstart Resources is required to restore the shut down area to service, each affected Transmission Operator shall resynchronize shut down area(s) with neighboring Transmission Operator area(s) only with the authorization of the Reliability Coordinator or in accordance with the established procedures of the Reliability Coordinator. [Violation Risk Factor = Medium] [Time Horizon = Real-time Operations]

R9. Each Transmission Operator shall have Blackstart Resource testing requirements to verify that each Blackstart Resource is capable of meeting the requirements of its restoration plan. These Blackstart Resource testing requirements shall include: [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R9.1. The frequency of testing such that each Blackstart Resource is tested at least once every three years.

R9.2. A list of required tests including:

R9.2.1. The ability to start the unit when isolated with no support from the BES.

R9.2.2. The ability to energize a dead (de-energized) bus. If it is not possible to energize a dead (de-energized) bus during the test, the testing entity must affirm that the unit has the capability to energize a dead (de-energized) bus such as verifying that the breaker close coil relay can be energized with the voltage and frequency monitors disconnected.

R9.3. The minimum duration of each of the required tests.

R10. Each Transmission Operator shall distribute its Blackstart Resource testing requirements to each Generator Operator in its area that operates a Blackstart Resource. [Violation Risk Factor = Lower] [Time Horizon = Operations Planning]

R11. Each Transmission Operator shall include within its operations training program, annual System restoration training to its control room personnel to ensure the proper execution of its restoration plan. This training program shall include the following: [Violation Risk Factor = Medium] [Time Horizon = Long-term Planning]

R11.1. System restoration philosophy.

R11.2. Restoration priorities.

R11.3. Building of cranking paths.

R11.4. Synchronizing (re-energized sections of the System).

R11.5. Review of the restoration plan.

R12. Each Transmission Operator shall provide a minimum of two hours of System restoration training per year for field switching personnel identified as performing unique tasks associated with its restoration plan and outside of their normal tasks. [Violation Risk Factor = Lower] [Time Horizon = Operations Planning]

R13. Each Transmission Operator shall participate in its Reliability Coordinator's restoration drills, exercises, or simulations as requested by its Reliability Coordinator. [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R14. Each Transmission Operator and Generator Operator with a Blackstart Resource shall have a written Blackstart Resource agreement document specifying the terms and conditions of their arrangement. [Violation Risk Factor = High] [Time Horizon = Operations Planning]

R15. Each Generator Operator with a Blackstart Resource shall have documented procedures for starting the Blackstart Resource and energizing a dead (de-energized) bus. [Violation Risk Factor = High] [Time Horizon = Operations Planning]

R16. Each Generator Operator of a Blackstart Resource shall notify its Transmission Operator of any known changes to the capabilities of that Blackstart Resource within ninety calendar days following such change. [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R17. Each Generator Operator of a Blackstart Resource shall perform Blackstart Resource tests, and maintain records of such testing, in accordance with the testing requirements set by the Transmission Operator to verify that the Blackstart Resource can perform as specified in the restoration plan. [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R17.1. Testing records shall include at a minimum: name of the Blackstart Resource, unit tested, date of the test, duration of the test, time required to start the unit, an indication of any testing requirements not met under Requirement R6.

R17.2. Each Generator Operator shall provide the blackstart test results within thirty calendar days following a request from its Reliability Coordinator or Transmission Operator.

R18. Each Generator Operator of a Blackstart Resource shall provide a minimum of two hours of training per year to each of its operating personnel responsible for the startup and synchronization of its Blackstart Resource generation units. The training program shall include the following: [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

R18.1. System restoration philosophy including coordination with the Transmission Operator.

R18.2. Special actions required to enable blackstart and synchronization to the System.

R19. Each Generator Operator shall participate in the Reliability Coordinator's restoration drills, exercises, or simulations as requested by the Reliability Coordinator. [Violation Risk Factor = Medium] [Time Horizon = Operations Planning]

C. Measures

M1. Each Transmission Operator shall have a documented System restoration plan developed in accordance with Requirement R1 that has been approved by its Reliability Coordinator as shown with the written approval letter from its Reliability Coordinator.

M2. Each Transmission Operator shall have evidence such as e-mails with receipts or registered mail receipts, that it distributed its restoration plan to the appropriate entities in accordance with Requirement R2.

M3. Each Transmission Operator shall have documentation such as a review signature sheet, revision histories, e-mails with receipts, or registered mail receipts, that it has annually reviewed and submitted its restoration plan to its Reliability Coordinator in accordance with Requirement R3.

M4. Each Transmission Operator shall have documentation such as a review signature sheet, revision histories, e-mails with receipts, or registered mail receipts, that it has updated its restoration plan with its Reliability Coordinator in accordance with Requirement R4.

M5. Each Transmission Operator shall have documentation such as e-mail receipts that it has made the latest approved copy of its restoration plan available in each of its control rooms and to each of its control room personnel in accordance with Requirement R5.

M6. Each Transmission Operator shall have documentation such as power flow outputs, that it has verified that its restoration plan accomplishes its intended function in accordance with Requirement R6.

M7. If there has been a Disturbance in which Blackstart Resources have been utilized in restoring the shut down area of the System to service, each Transmission Operator involved shall have evidence such as voice recordings, e-mail, or operator logs, that it implemented its restoration plan in accordance with Requirement R7.

M8. If there has been a Disturbance in which Blackstart Resources have been utilized in restoring the shut down area of the System to service, each Transmission Operator involved in such an event shall have evidence, such as voice recordings, e-mail, or operator logs, that it resynchronized shut down areas in accordance with Requirement R8.

M9. Each Transmission Operator shall have documented Blackstart Resource testing requirements on file in accordance with Requirement R9.

M10. Each Transmission Operator shall have evidence, such as e-mails with receipts or registered mail receipts, that it has distributed its Blackstart Resource testing requirements to each Generator Operator in its area that operates a Blackstart Resource in accordance with Requirement R10.

M11. Each Transmission Operator shall have a copy of its training records available showing that it has provided training in accordance with Requirements R11 and R12.

M12. Each Transmission Operator shall have evidence, such as training records, that it participated in the Reliability Coordinator's restoration drills, exercises, or simulations as requested in accordance with Requirement R13.

M13. Each Transmission Operator shall have on file the Blackstart Resource agreements with all Generator Operators with Blackstart Resources included in its restoration plan in accordance with Requirement R14.

M14. Each Generator Operator with a Blackstart Resource shall have documented procedures on file for starting the units and energizing a dead bus in accordance with Requirement R15.

M15. Each Generator Operator with a Blackstart Resource shall provide evidence, such as e-mails with receipts or registered mail receipts, showing that it notified its Transmission Operator of any known changes to its Blackstart Resource capabilities within ninety calendar days of such changes in accordance with R16.

M16. Each Generator Operator shall maintain documentation of its Blackstart Resource test results and shall have evidence such as e-mails with receipts or registered mail receipts, that it provided these records to its Reliability Coordinator and Transmission Operator when requested in accordance with Requirement R17.

M17. Each Generator Operator shall have a copy of its training records on file showing that it has provided training in accordance with Requirement R18.

M18. Each Generator Operator shall have evidence, such as training records, that it participated in the Reliability Coordinator's restoration drills, exercises, or simulations if requested to do so in accordance with Requirement R19.