

Compliance Application Notice – 0006

EOP-005 R7 Verification of Restoration Procedure

Posted: October 25, 2010

Reposted: November 11, 2011

Primary Interest Groups

Compliance Enforcement Authority (CEA)¹

NERC

Regional Entity

Balancing Authority (BA)

Transmission Operator (TOP)

Issue: In regard to evidentiary requirements regarding actual testing or by simulation, what constitutes an actual test and what constitutes a simulation?

For the purpose of aiding a CEA, this CAN provides instruction for assessing whether:

- 1) an entity has verified its restoration procedure “by actual testing or by simulation,” as required by EOP-005-1 R7, and
- 2) the use of a third-party vendor impacts a registered entity’s obligation under the standard.

Compliance Application

EOP-005-1 R7 provides, in pertinent part:

R7. Each Transmission Operator and Balancing Authority shall verify the restoration procedure by actual testing or by simulation.

CEAs are instructed to obtain evidence that a registered entity verified its restoration procedure by actual testing or by simulation.

A CEA is not to assess the circumstances under which actual testing or simulation has occurred. Rather, a CEA is to focus solely on the registered entity’s testing or simulation that verifies whether the entity’s restoration procedure restores its electric system in a stable and orderly manner in the event of a partial or total shutdown of its system.²

¹ Compliance Enforcement Authorities include ERO auditors, investigators, enforcement personnel or any person authorized to assess issues of concern, potential non-compliance, and possible, alleged or confirmed violations of NERC Reliability Standards or requirements.

² As specified in EOP-005-1 R1

The size of an entity **does not** determine whether actual testing or simulation is required; therefore, CEAs are to assess whether registered entities have verified their procedures by actual testing, simulation, or some combination of the two, by the instructions provided below.

Regarding actual testing: Actual testing is an option that a TOP or BA may use to verify steps of the restoration procedure to demonstrate the TOP's or BA's ability to establish a Cranking Path with clearly identified Loads and then starting a generating unit using that Cranking Path. The intent is to demonstrate that the Cranking Path can be successfully established.

Actual testing may also include use of the restoration procedure to restore a portion of the system where the responsible entity uses logs, Historian³ data, and other documentation to verify that the step(s) of the restoration procedure⁴ worked, based on actual operations (including things such as verification of fuel sources). While the actual testing may be different from what is expected to occur in an actual restoration, a CEA is to assess whether the attributes necessary to verify the adequacy of the system restoration procedure are included.

Regarding simulation: Simulation is an option that the TOP or BA may use to verify its restoration procedure. Simulation may include electronic simulation, which is a simulation of what is expected to actually occur during system restoration. Simulations may be conducted at a control center using the system operator's workstation or other facilities. Simulation may also include a walk-through simulation of a restoration procedure that has been tested using previous electronic simulation methods. In both cases, a CEA is to verify that the restoration scope and the results of the simulation replicate what would actually occur, including that decisions made during the simulation would be effective in actual restoration.

An **electronic simulation**⁵ may include an engineering analysis, which uses engineering analytical methods and practices that provide results that are consistent with actual measurements to verify the restoration procedure. The analysis is performed in a simulation environment, and the restoration procedure is verified by showing that the steps in the restoration procedure do not place load and generation out of balance. The level of simulation required depends on the actual restoration procedure, the facilities being simulated, and the contingencies considered. This may require the use of power flows⁶ to verify steady state conditions; transient stability analysis to verify the dynamic performance; electromagnetic transient analysis to verify switching operations; and an overall analysis to tie the results of these studies into a coherent determination of whether the proposed restoration actually achieves its desired goal.

³ Historian Software provides high-speed data capture

⁴ Restoration procedures are a guide to use during a restoration event and not a sequence of tasks to be performed in a numerical order. System conditions and other activities in other areas of the system will affect the restoration process.

⁵ Training or development systems should be visibly and distinctly different from the live EMS control screens. See NERC Lesson Learned, [EMS/SCADA Systems – Training System versus Live EMS Screen](#).

⁶ "Power flows" refers to power flow studies which, for the purpose of the CAN, are interchangeable with load flow studies.

A **walk-through simulation of the actual equipment** using the restoration procedure without actually performing the actions may include, but is not limited to, the use of equipment such as control room consoles, control panel illustrations, one line diagrams, or other diagrams that identify system components. The walk-through simulation can verify some attributes of the procedure by simulating procedure steps, such as staff pointing to physical breakers, one line drawings or light indicators and stating expected results when actions are taken. This type of simulation relies on the results of engineering studies performed using the same system conditions as proposed in the restoration procedure to verify expected steady state, transient stability and electromagnetic transient results. Regardless of the type of simulation, the desired outcome is to verify that the restoration procedure is viable in the event of a partial or total shutdown of the bulk power system (BPS).

A **simulated restoration exercise that takes place without actual equipment**⁷ (whether by electronic or walk-through simulation) would not normally be considered verification “by actual testing or simulation,” as required by the standard. As described below, a registered entity may fulfill the requirement by conducting a simulation restoration exercise(s) that takes place without actual equipment. For a walk-through simulation conducted without actual equipment, the CEA is instructed to verify that the registered entity has a letter from either its BA or a TOP whose restoration procedure includes the registered entity, stating that:

1. the registered entity does not have a technical component to its restoration plan and
2. the registered entity’s restoration is included in the BA’s or TOP’s restoration plan.

Regarding outsourcing of reliability requirements and coordination: A BA or TOP may use a third party to conduct a simulation of its restoration procedure. The third party may be a contractor or another registered entity, such as a TOP. In such cases, a CEA is to verify that the registered entity has a copy of the restoration procedure applicable to its facilities, documentation to show that the restoration procedure was verified by simulation, and the simulation results.

Additional information on compliance responsibility and accountability regarding the delegations of performance of reliability-related tasks is contained in the “NERC Compliance Public Bulletin #2010-004 Guidance for Entities that Delegate Reliability Tasks to a Third Party Entity.”⁸

Effective Period for CAN

This revised CAN supersedes the original CAN, as well as all prior communications. CEAs are to use this CAN to assess compliance from October 25, 2010, regardless of the start date of the violation. It will remain in effect until such time that a future version of a FERC or other applicable government authority approved standard or interpretation becomes effective and addresses the specific issue contained in this CAN.

⁷ Simulated restoration exercises conducted without actual equipment may be considered “tabletop exercises.”

⁸ <http://www.nerc.com/files/2010-004%20v1%200.pdf>

For any enforcement action in process and for audits that have been initiated,⁹ a CEA will apply the appropriate discretion, including consideration of the specific facts and circumstances of the non-compliance, in determining whether to assess compliance pursuant to this CAN.

Evidence of Compliance

CEAs are to assess evidence to obtain reasonable assurance of the entity's compliance. Such evidence may include:

- engineering analytical methods and practices
- power flows to verify steady state conditions
- transient stability analysis to verify the dynamic performance
- electromagnetic transient analysis to verify switching operations

CEAs are to verify that all of the evidence replicates actual events. Additionally, CEAs may accept actual responses to system disturbances, long-term dynamics, or other modeling tools or techniques not listed in this notice to obtain a reasonable assurance that a registered entity is compliant with this requirement.

For more information please contact:

Michael Moon
Director of Compliance Operations
michael.moon@nerc.net
404-446-2567

This document is designed to convey compliance monitoring instruction to achieve a measure of consistency among auditors and Compliance Enforcement Authorities. It is not intended to establish new requirements under NERC's Reliability Standards or to modify the requirements in any existing NERC Reliability Standard. Compliance will continue to be assessed based on language in the currently enforceable NERC Reliability Standards. This document is not intended to define the exclusive method an entity must use to comply with a particular standard or requirement, or foreclose a registered entity's demonstration by alternative means that it has complied with the language and intent of the standard or requirement, taking into account the facts and circumstances of a particular registered entity. Implementation of information in this document is not a substitute for compliance with requirements in NERC's Reliability Standards.

⁹ "Initiated" means that a registered entity has received notification of the upcoming audit.

Revision History

Posted Date	Action	Revision
October 25, 2010	Posted Final CAN	
November 11, 2011	Posted Revised CAN	Revised to provide for simulated restoration exercise that takes place without actual equipment and target audience to CEAs