

NEI-NERC White Paper
Nuclear Power Plant Loss of Offsite Power Events
NERC Reporting Guidelines

Purpose

This document provides guidelines to be used by Nuclear Power Plants (NPP) when assessing Loss of Offsite Power (LOOP) events to determine requirements for reporting to two NERC programs, Event Analysis and NERC Standard EOP-004-2.

Goal

Use of these guidelines will help ensure that NERC receives the appropriate Bulk Electric System (BES) operating experience related to loss of offsite power to an NPP. The outcome of this paper is that some NPP LOOP events may be reported to the NRC but not to NERC.

Background

Currently, two NERC programs include requirements for reporting of loss of offsite power events at a nuclear plant. The NRC also requires reporting of loss of offsite power events. This paper will clarify the relationship among the three reporting requirements and establish the guidelines to ensure proper reporting while minimizing the need for duplicate reporting. This paper was a joint effort between the NEI-NITF (NEI NERC Issues Task Force) and the NERC EA Working Group.

Discussion

NERC LOOP Reporting Requirements

This section defines the two NERC programs that include requirements for reporting of LOOP events, Event Analysis and EOP-004-2. The NERC EOP-004-2 and EA Process LOOP reporting requirements are limited to complete LOOP events that are caused by Transmission Owner/Transmission Operator equipment and/or actions.

[NERC Electric Reliability Organization Event Analysis Process](http://www.nerc.com/pa/rrm/ea/Pages/default.aspx)

<http://www.nerc.com/pa/rrm/ea/Pages/default.aspx>

The Event Analysis Process (EA) Version 2 was published in July 2013. The EA Process Introduction defines the process as *"The Event Analysis Process document is intended to be used as a guideline to promote a structured and consistent approach to performing event analyses in North America. This document presents a six step process that will facilitate greater communication and information exchange between registered entities, regional entities, and NERC."* EA Version 2 Step 1, Categorizing Events, identifies reliability events to be reported within the EA Program. Text within Step 1 states, *"Qualifying events are assigned to one of five categories based on the impact to the reliability of the Bulk-Power System (BPS)."* One Category 2 event is *"Complete loss of off-site power (LOOP) to a nuclear generating station per the Nuclear Plant Interface Requirements."*

The EA Categorizing Events (Step 1) notes that a weather-related or external natural events occurrence that falls within any category should be reported. EA Version 2 states, *"If a weather-related occurrence falls within any of the categories, it should be communicated to the Regional Entity. The affected registered entities should focus on restoration efforts."*

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NERC Reliability Standard EOP-004-2, "Event Reporting"

<http://www.nerc.net/standardsreports/standardssummary.aspx>

This standard is FERC approved and enforceable on January 1, 2014. It requires responsible entities, including NPPs, to report certain events. EOP-004-2 Attachment 1: Reportable Events includes one event type defined as, *"Complete loss of off-site power to a nuclear generating plant (grid supply)"*. The Entity with Reporting Responsibility is identified as the TO, TOP. The Threshold for Reporting is *"Complete loss of off-site power affecting a nuclear generating station per the Nuclear Plant Interface Requirements."*

Both NERC programs focus on LOOP events involving the Bulk Power System (BPS).

Nuclear LOOP Event Definition: The nuclear definition of LOOP involves the loss of offsite power to essential plant safety loads. LOOP at an NPP can result from events that involve more than the grid offsite power supplied to the NPP. An NPP will declare a LOOP if issues within the plant cause the loss of offsite power to the essential plant safety loads.

In NUREG/CR-6890, Reevaluation of Station Blackout Risk at Nuclear Power Plants Analysis of Loss of Offsite Power Events: 1986-2004, LOOP events are analyzed by four specific categories. Those categories are defined as follows.

NUREG CR 6890 categories for the cause of LOOPS:

Plant centered

Plant-centered LOOP events occur within the plant, up to but not including the auxiliary or station transformers. For such events, plant personnel perform the actions to restore offsite power to the safety buses.

Switchyard centered

Switchyard-centered events occur within the switchyard, up to and including the output bus bar. Plant and switchyard personnel coordinate to perform the restoration actions.

Grid related

Grid-related LOOP events include those in which the initial failure occurs in the interconnected transmission grid that is outside the direct control of plant personnel. In such cases, restoration of offsite power is performed mainly by transmission grid personnel (with plant personnel restoring power from the switchyard to the safety buses).

Weather related

Weather-related events have the potential to affect areas larger than one site but typically impact a single site. In such events, restoration of offsite power often requires a longer time because of either the extent of the damage caused by the weather or the continuing effects

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of the weather hampering restoration efforts. Note that some weather-related events are included in the plant-centered and switchyard-centered categories."

NPP LOOP Reporting Guidelines: Since the nuclear definition of a LOOP is broader than the events addressed in the two NERC programs defined above, this paper provides guidelines to ensure compliance to the NERC reporting requirements while minimizing duplicate reporting that creates confusion and unnecessary burden on all involved parties. The following chart uses the NRC defined categories of LOOP events and identifies the NERC reporting requirements. The criteria following the table below provide additional guidance for the shaded items.

NRC LOOP Categories	EA Reporting	EOP-004-2 Reporting
Plant Centered Events	No Reporting	No Reporting
Switchyard Centered Events	Possible Reporting depending on equipment ownership	Possible Reporting depending on equipment ownership
Grid Related Events	Reportable	Reportable
Weather Related Events	Possible Reporting depending on equipment ownership	Possible Reporting depending on equipment ownership

For items identified as Possible EA Reporting, the registered entity should discuss with the Regional Entity to agree if EA reporting will be beneficial to the industry

Switchyard Centered Events

- If an event occurs in the switchyard for equipment owned by the Transmission Owner/Transmission Operator and the event results in the offsite power source from the BES being completely lost to the NPP, this event is reported in accordance with EA process and the EOP-004-2 Standard.
- If an event occurs in the switchyard for equipment owned by the Generator Owner and the event results in the offsite power source from the BES being completely lost to the NPP, this event is not reportable in accordance with EA process and the EOP-004-2 Standard.
- If a switchyard event occurs that only impacts one offsite power source, this event is not reportable under the NERC programs.
- LOOP reporting in accordance with standard EOP-004-2 and EA process is the responsibility of the Transmission Owner and the Transmission Operator.
- The Transmission Owner/Transmission Operator should contact the NPP for assistance in the determination of a LOOP (i.e., complete loss of off-site power affecting a nuclear generating station per the Nuclear Plant Interface Requirement)

Weather Related Events (Switchyard Centered or Grid Related)

- If a weather event occurs that results in the complete loss of offsite power from the BES (Switchyard Centered depending on equipment ownership or Grid Related) to the NPP, this event is reported in accordance with EOP-004-2 standard and the EA process.

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- If the weather event causes a loss of offsite power within the plant, the event is not currently reportable under standard EOP-004-2 and the EA process.
- LOOP reporting in accordance with standard EOP-004-2 and EA process, is the responsibility of the Transmission Owner and the Transmission Operator.
- The Transmission Owner/Transmission Operator should contact the NPP for assistance in the determination of a LOOP (i.e., complete loss of off-site power affecting a nuclear generating station per the Nuclear Plant Interface Requirement)