

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Electric Reliability Organization Event Analysis Process

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RELIABILITY | ACCOUNTABILITY



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Introduction

In June 2010 the NERC Operating Committee and NERC Planning Committee approved the creation and the scope of the Event Analysis Working Group (EAWG). The Committees recognized the need to create a process to ensure the timely dissemination of event analyses and actionable lessons learned from significant bulk power system (BPS) events. Furthermore technical reliability guidance is needed to promote greater reliability by recognizing and reacting to identified risks and vulnerabilities that could recur elsewhere within the BPS.

The EAWG was tasked with developing a cohesive and coordinated event analysis (EA) process in coordination with industry stakeholders for use across North America. As a defined part of this process, the EAWG will deliver a mechanism that ensures quality, timely, and actionable lessons learned are disseminated to registered entities.

As per its scope, the EAWG was expected to provide the following deliverables:

1. A consistent set of processes and procedures for use by the industry to report, categorize, analyze, identify conclusion and recommendations and disseminate lessons learned from BPS events.
2. A revised version of the “Event Analysis Classifications and Typical Event Analysis Levels”.
3. A clearly defined process to separate compliance issues from EA.
4. An annual summary report that presents events analyzed and lessons learned.
5. Milestones and an associated timeline.

Within the body of this document the first three deliverables are addressed. The remaining two are handled outside of the process document.

This 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 for addressing event analysis and provides a robust lessons learned process and facilitates communication and information exchange among registered entities, NERC and its Regional Entities.

The NERC Operating and Planning Committees will maintain the document under the existing Electric Reliability Organization (ERO) documentation process. The document will be reviewed once each calendar year.

Sixty days before the annual revision is to begin, the NERC Operating and Planning Committees will solicit feedback, comments and opportunities for improvement to consider.

Goals of the Event Analysis Process

Promoting Reliability

The principal goal of the Electric Reliability Organization (ERO) is to promote the reliability of the bulk power system (BPS)¹ in North America. This goal is directly supported by evaluating BPS events, undertaking appropriate levels of analysis to determine the causes of the events, promptly assuring tracking of corrective actions to prevent recurrence, and providing lessons learned to the industry. The event analysis process also provides valuable input for training and education, reliability trend analysis efforts and reliability standards development, all of which support continued reliability improvement.

Developing a Culture of Reliability Excellence

Through the event analysis process, the ERO strives to develop a culture of reliability excellence that promotes aggressive critical self review and analysis of operations, planning, and critical infrastructure protection (CIP) processes. This self-critical focus must be ongoing, and the industry must recognize that registered entities are linked together by their individual and collective performances. This focus is the root of understanding the underlying cause of events and avoiding similar or repeated events through the timely identification and correction of event causes and through the sharing of lessons learned.

Collaboration

Successful event analysis depends on a collaborative approach in which registered entities, Regional Entities and NERC work together to achieve a common goal. The process requires clarity, certainty and consistent adherence to reliability principles by BPS owners, operators and users who perform a wide array of reliability functions.

Being a Learning Organization

As a learning organization, event analysis serves an integral function of providing insight and guidance by identifying and disseminating valuable information to owners, operators and users of the BPS who enable improved and more reliable operation. As such, event analysis is one of the pillars of a strong ERO.

¹ The term BPS is used throughout this document on the recommendation of NERC General Counsel. The term BES (Bulk Electric System) is considered to be a subset of BPS.

Philosophy and Key Ingredients of the ERO Event Analysis Process

The ERO enterprise-wide event analysis process is based on the recognition that BPS system events that occur, or have the potential to occur, have varying levels of significance. The manner in which registered entities, Regional Entities and NERC evaluate, respond and process these events is intended to reflect either the significance of the event or specific system conditions germane to the reliability of the BPS and the circumstances involved, or both.

When a BPS event occurs, the entities involved must first recognize it, then respond to it, and ultimately stabilize the system. Once the system has been stabilized, event analysis can begin.

Event analysis is the aggressive critical self analysis of BPS events that have occurred or have the potential to cascade. This analysis produces findings, lessons learned and best practices that provide experience-based insight to prevent repeat occurrences, provide informational material for entity training and industry learning, and institutionalize knowledge.

Event analysis begins with the registered entities that experienced the event or circumstances surrounding a potential event and depends upon collaboration between these entities, the Regional Entities, and NERC. The delineation between event categories is based on event significance and potential impact to the BPS. The significance and potential impact will drive the level of analysis for a particular event.

Critical components of an effective event analysis effort include the following:

- Prioritization of events affecting reliability of the BPS – detailed analysis for significant events and concise reviews for minor events
- Establishment of a clear timeline illustrating the sequence of events
- Specific identification of the causal factors of the event
- Identification and timely implementation of corrective actions
- Development and dissemination of alerts, quality lessons learned and best practices to the industry
- Emphasis on an aggressive critical self analysis by registered entities
- Emphasis on being a learning organization, including proactive improvement of BPS reliability
- Process transparency and predictability
- Proper confidentiality of data and information
- Identification of emerging trends discovered through event analysis

- Clarity and certainty about event analysis roles, responsibilities, and expectations for respective entities, including target timeframes for completing certain actions
- Appropriate Regional Entity and NERC review and oversight of registered entity event analysis results

Purpose of the Event Analysis Process Document

The purpose of the event analysis process document is to provide a clear and concise description of the analysis process structure. This structure includes event identification, reporting (as per applicable standards), categorization, and analysis processes. Once the causal factors of these events are identified and corrective actions are implemented, any significant lessons learned will also be shared with the industry so that actions may be taken to minimize the possibility of similar events occurring.

This document is not intended to be an all-inclusive checklist or procedure applicable to all possible events. It does, however, describe a defined and repeatable process for identifying BPS events that warrant a further level of analysis. The document also establishes clear roles, responsibilities and expectations for registered entities, Regional Entities and NERC in regard to the event analysis process.

The event analysis process document also aims to promote consistency, comparability, flexibility, and timeliness among the various existing event analysis processes. The process detailed within provides registered entities guidance in determining which events need to be reported, as well as guidance regarding the extent of further analysis of specific events.

The appendices and references of this document contain valuable tools and templates to help identify, categorize, analyze and report on events.

ERO Event Analysis Process

Introduction

The ERO Event Analysis Process provides a method by which entities document information concerning:

- What happened during an event and why
- How the event happened, including causal factors
- What corrective actions were taken
- Whether there were any recommendations for preventing reoccurrence
- Whether there were lessons learned to be shared with the industry

The output or deliverables from the process are:

- Brief Report (**Appendix A: Brief Report Template**)
- Event Analysis Report (**Appendix B: Event Analysis Report Template**)
- Lessons Learned (**Appendix D: Lessons Learned Template**)

Registered entities are required to report the occurrence of defined BPS disturbances and unusual occurrences to the applicable Regional Entity and NERC in accordance with various NERC and Regional reliability standards. **It should be noted that following the event analysis process does not relieve the registered entity from mandatory reporting requirements dictated by regulatory authorities or NERC standards.**

Basic Event Analysis Process Steps

1. The registered entity makes an initial assessment of an event, which includes determining the initial event category.
2. If the event is a “qualifying event” (*i.e.* Category 1-5), a planning meeting is held with all involved parties.
3. A brief report is submitted.
4. If the qualifying event is a Category 3 or higher, an event analysis report (EAR) is to be submitted. (An EAR may be requested for a Category 2 event.)
5. Lessons learned and best practices (if any) are developed and shared with industry.
6. The event is closed.

Categorizing Events (Step 1)

When a registered entity experiences an event, it will recommend to the Regional Entity a category for the event as outlined in **Appendix E: Categorization of Events**. By referencing the five event categories, entities can quickly and unambiguously identify the appropriate level of analysis based on the impact of an event.

CIP, EMS and Other Events - The categories listed in **Appendix E: Categorization of Events** do not cover all possible events including those related to CIP, EMS loss of functionality, or loss of BPS “visibility” that could occur. When these types of events occur, the need for analysis may be discussed by all affected registered entities, the appropriate Regional Entities and NERC.

Weather-Related Occurrences - If a weather-related occurrence falls within any of the categories it should be reported. The affected entities should focus on restoration efforts. After restoration is complete, the affected entities, in coordination with Regional Entities, will determine if any additional information or event analysis steps are needed.

Event Analysis Planning Meeting/ Coordination (Step 2)

For lower tiered events, registered entities are expected to perform the event analysis. Coordination of the analysis becomes more complicated for events that involve a broader geographic area, involve multiple registered entities, or include a complex set of facts and circumstances.

A planning meeting should be held by the registered entity and the applicable Regional Entity as soon as possible following the occurrence of a qualifying event (i.e. Categories 1-5). During the meeting, agreement should be reached on the event category, the level of analysis, a timeline for completion of the report, and the need for a data retention hold and draft or preliminary reports. **Appendix F: Planning Meeting Scope Template** can be used as an outline in the planning meeting. The event analysis should have a level of detail and target timeframe commensurate with the nature and scope of the event. Although the category of the event provides general guidance on the level of analysis needed, these guidelines may be adjusted by the EA team based on the overall significance of the event and the potential for valuable lessons learned.

Registered entities that reside in two Regional Entity footprints should notify both Regional Entities of an event that spans both Regions. Following the notification, the two Regional Entities and NERC will determine which one will coordinate the remaining steps of the event analysis process. When multiple registered entities are involved in or affected by an event, they should collaborate with the Regional Entity to determine if it is appropriate for each entity to prepare a report or for the entities to work together to prepare a single report.

A summary of roles, responsibilities, and expectations for event reporting and analysis is available in **Appendix H: Summary of Roles, Responsibilities, and Expectations for Event Reporting and Analysis**.

Event Analysis Process Reports (Steps 3 and 4)

There are two types of reports used in the event analysis process. Timeframes for submitting the requisite reports are found in **Appendix C: Target Timeframes for Completion of Brief Reports, Event Analysis Reports and Lessons Learned**.

The brief report is prepared by impacted registered entities for all qualifying events. It is sent to the applicable Regional Entity for review. The Regional Entity then forwards it to NERC. A brief report includes items identified in **Appendix A: Brief Report Template**. The brief report template may also be used for non-qualifying events, which may provide useful lessons learned for the industry.

An EAR is required for more significant events (Category 3 and above) and may be requested for lower-level events. An EAR is prepared by the impacted entity, a group of impacted entities, or an event analysis team as defined in the event analysis process. It addresses in detail the sequence of events as they happened, the identified causal factors and the appropriate corrective actions. The EAR is sent to the applicable Regional Entities for review and is then sent to NERC. **Appendix B: Event Analysis Report Template** can be used as a guideline for its layout.

In the brief report or EAR, registered entities are encouraged to include one-line diagrams or other diagrams or representations of the facility(ies) involved in the event, if applicable and helpful in enhancing the understanding of what happened in the event.

The final EAR should address corrective actions and recommendations related to the event's causal factors and any identified lessons learned. Positive outcomes identified during an event should be documented as a best practice. These are key parts of a continuous learning and improvement program.

NERC encourages registered entities that complete an EAR for events Category 3 and above to draft them in a manner so they can be shared with other stakeholders via a secure event analysis portal on the NERC web site. The sharing of detailed event analysis reports will be a valuable learning tool for stakeholders. Access to the secure portal requires a signed NERC non-disclosure agreement and approval by the Director of Reliability Risk Management.

Special Considerations for Category 4 and 5 Events

Following the occurrence of a Category 4 or Category 5 event, a planning meeting involving the affected registered entities, applicable Regional Entities, NERC, and other applicable governmental authorities (AGA) is held to discuss the event and to determine how the event analysis should proceed. **Appendix G: Contributory Factor Assessment** may be used for Category 4 and 5 events. The analysis of Category 4 or 5 events will be conducted by an event analysis team led by the applicable Regional Entities or NERC. As a note, if any AGA initiates a formal review process in conjunction with NERC, the decision on the composition of the event analysis team, the team lead, the information needed from affected registered entities, and the required scope of the analysis will be discussed and agreed upon by the AGA and NERC executive staff.

As specified in the ERO Rules of Procedure, Section 807.f, the NERC President and CEO has the authority to determine whether any event warrants analysis at the NERC level. A Regional Entity may request that NERC elevate an analysis of a major event to the NERC level.

As with the other categories, the target timeframe for completion of EARs for Category 4 and 5 events will vary with the nature and extent of the event. Timelines for preliminary or draft reports will be established by the event analysis team, the applicable Regional Entities and NERC. The use of interim reports should be considered for longer, more detailed event analyses for major events.

Lessons Learned from Events (Step 5)

Lessons learned as a result of an event analysis should be shared with the industry as soon as practical. Proposed lessons learned should be drafted by a registered entity utilizing **Appendix D: Lessons Learned Template** and should be submitted to the applicable Regional Entity. The lessons learned should be detailed enough to be of value to others and should not contain data or information that is deemed confidential. When possible, one-line diagrams, other diagrams and representations should be included to enhance the information provided in the lessons learned. Vendor-specific information should not be included unless it is discussed and coordinated with the vendor. If dissemination of vendor-specific information is beneficial, it may be pursued outside the event analysis process.

Lessons learned will be reviewed by selected technical groups and NERC staff for completeness and appropriateness prior to posting.

The steps for processing lessons learned are as follows:

1. Registered entity and applicable Regional Entity will work together to prepare lessons learned using the template in **Appendix D: Lessons Learned Template**.
2. Registered entity and applicable Regional Entity will redact the lessons learned to remove all indication of the entity involved in the event and any other event details that are confidential.
3. Regional Entity to submit lessons learned to NERC
4. NERC staff will review lessons learned.
5. NERC staff will prioritize lessons learned and identify common themes.
6. NERC staff will distribute priority draft lessons learned to selected technical groups for review and comment.
7. NERC and the Regional Entity will make revisions based on the technical group's input.
8. Regional Entity will send lessons learned to the applicable registered entity for review, if needed, based on any major changes made.
9. NERC will publish lessons learned on the NERC website and send an announcement to industry.

Lessons Learned from Other Occurrences (Step 5)

Any occurrence on the BPS may yield lessons of value to the industry. Lessons learned can include the adoption of unique operating procedures, the identification of generic equipment problems, or the need for enhanced personnel training. In such cases, an event analysis would not be required, but the ERO event analysis process encourages registered entities to share with their Regional Entity any potential lessons learned that could be useful to others in the industry and to work with the Regional Entity and NERC to develop the lessons for dissemination.

Event Closure (Step 6)

Following the receipt of Event Analysis Process reports, NERC and the Regional Entity will evaluate and close the event within the timeframes established in **Appendix C: Target Timeframes for Completion of Brief Reports, Event Analysis Reports and Lessons Learned** unless NERC or the Regional Entity requests additional information or analysis from the registered entity.

Retention of Event-Related Data

Registered entities should capture relevant data for the event analysis. Regional Entities will formally send a Data Retention Hold Notice for events in Category 3 or higher. **Appendix I: Data Retention Hold Notice** provides an example of a Data Retention Hold Notice. Copies of these notices will be made available to NERC.

Reliability Standards Assessment

Registered entities are to perform a critical self-assessment of standards and to develop a compliance self-assessment report proportional to the significance of the event/risk to the BPS.

It may be helpful for registered entities to establish a liaison between their internal event analysis and compliance functions. This will provide a clearer understanding and a more efficient transfer of information from both an operational and a compliance standpoint, and it will facilitate a thorough Reliability Standards analysis by the registered entity.

For information regarding compliance related issues and the completion of a compliance assessment please refer to the ERO Compliance Monitoring and Enforcement Program (CMEP) and the current CMEP Implementation Plan.

Confidentiality Considerations

Certain data and information gathered during the course of an event analysis may need to be labeled CONFIDENTIAL and protected from disclosure beyond the event analysis team if the registered entity providing the data and information, the Regional Entity or NERC believe it to be Critical Energy Infrastructure Information (CEII) or commercially sensitive information. See Section 1500 of the NERC Rules of Procedure for further details on the definition and protection of “Confidential Information.”

Portions of draft and final EARs may also be subject to confidentiality restrictions as warranted. However, every effort should be made to make as much of these reports available to the industry as possible in order to promote the dissemination of lessons learned from events.

The rights and responsibilities of all entities participating in an event analysis or receiving a draft or final EAR will be specified in signed confidentiality agreements, if necessary, and in the foreword of draft and final reports.

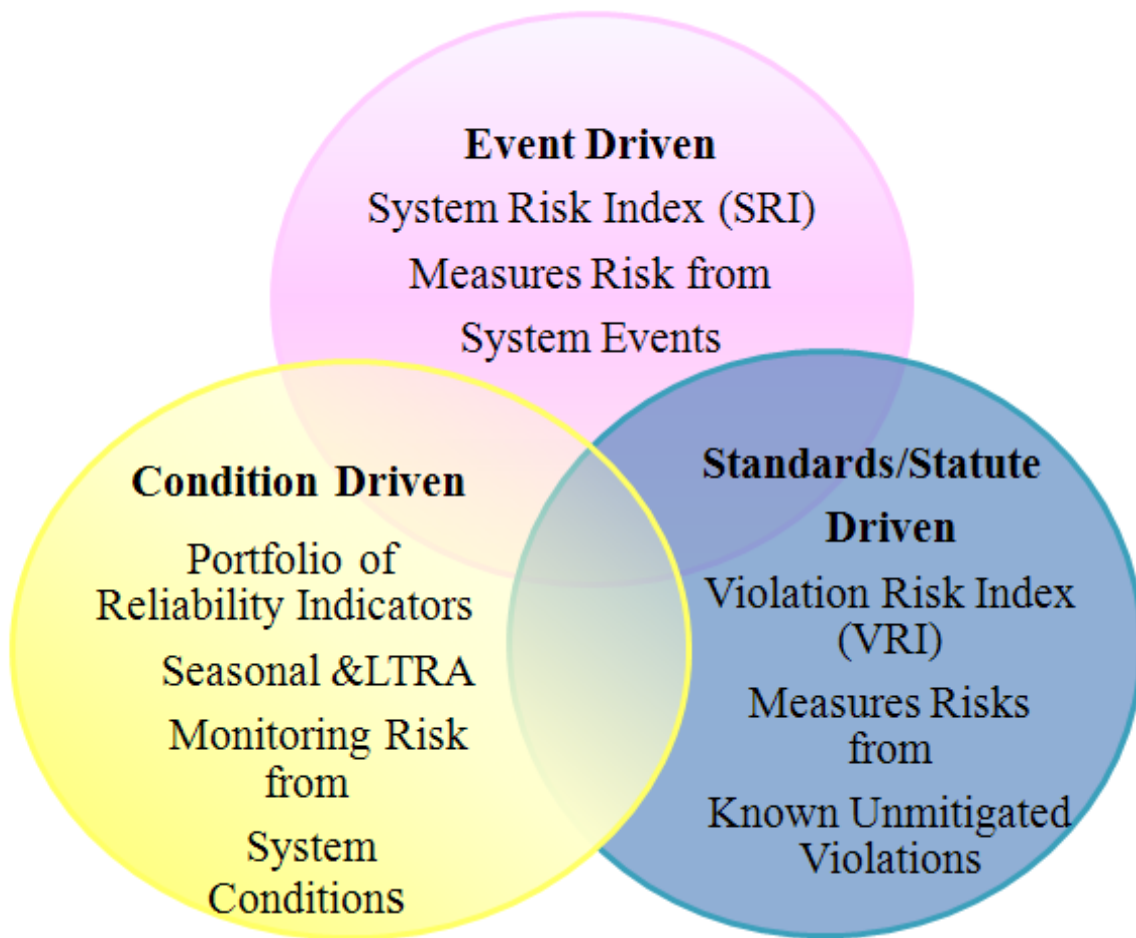
Special procedures may need to be implemented in the case of CIP issues related to an event.

Data and information provided to the Regional Entity and/or NERC for analysis of a cross-border event will be maintained separately for U.S. and Canadian entities and only shared with AGAs for the jurisdiction within which the entities operate, consistent with applicable memorandums of understanding (MOUs) or other agreements.

Event Analysis Trends

Over time, the ERO with industry participation will be able to collect, analyze and categorize events arising from this ERO Event Analysis Process. This will facilitate the proactive identification of emerging reliability trends across the industry. Further, this event information, including lessons learned, can be cross-referenced with other data collection efforts (such as TADS, GADS, metric and benchmarking databases, etc.). This could identify and help mitigate an underlying trend and further improve BPS performance.

The following is a visual perspective that represents the ERO's integration of risk concepts, assessments and tools.

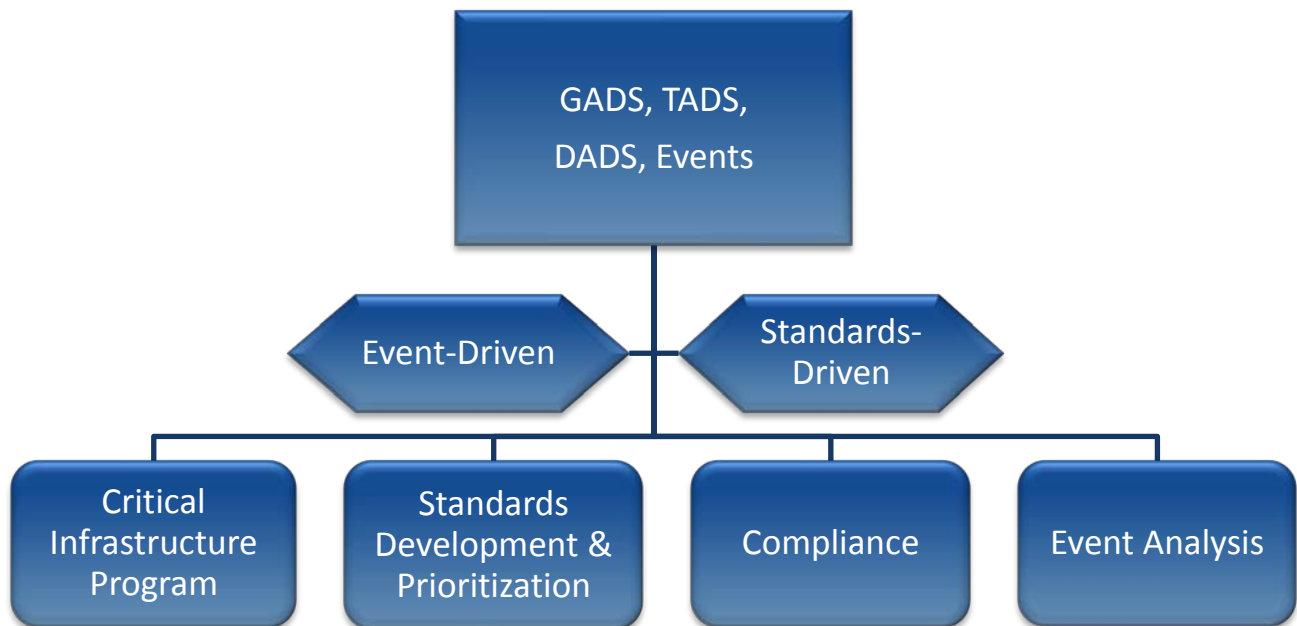


Future Vision

With this information and by working together, the registered entities, Regional Entities and NERC will be able to:

- Communicate the effectiveness of reliability improvement programs
- Estimate effectiveness of either risk reduction, mitigation strategies, or both
- Identify trends and lessons learned
- Support industry analysis of root causes
- Prioritize standards and other activities

The diagram below presents the various sources of information and how the work products must come together.



Appendices and Other Suggested References

Appendix A: Brief Report Template

Appendix B: Event Analysis Report Template

Appendix C: Target Timeframes for Completion of Brief Reports, EARs and Lessons Learned

Appendix D: Lessons Learned Template

Appendix E: Categorization of Events

Appendix F: Planning Meeting Scope Template

Appendix G: Contributory Factor Assessment

Appendix H: Summary of Roles, Responsibilities and Expectations for Event Reporting and Analysis

Appendix I: Data Retention Hold Notice

Other References:

- NERC Blackout and Disturbance Analysis Objectives, Analysis Approach, Schedule, and Status – Attachment D from Appendix 8 of NERC Rules of Procedure.
- Causal Analysis Methods for NERC, Regional Entities and registered entities

Appendix A: Brief Report Template

Registered entities are requested to use the brief report template as a guideline for submitting event information to their applicable Regional Entity and NERC in accordance with **Appendix C: Target Timeframes for Completion of Brief Reports, Event Analysis Reports and Lessons Learned**. The template may also be used for less significant events.

In some cases, a revised or updated brief report may need to be submitted as additional information is learned about an event or questions are raised by the Regional Entity or NERC. In those cases, the registered entity should indicate this in any subsequent event report.

Template instructions:

Reported Event: Provide a title that will be used to further identify the event. The title should include the date of the event (YYYYMMDD), entity name, substation name or location as appropriate.

Within five business days of the event:

Submit the brief report to the respective Regional Entity. The Regional Entity will collaborate with the registered entity submitting the Brief Report and will then provide the report to NERC within ten business days of the event.

The business day count starts on the next business day **after** the event.

Submittal Date: Should be updated with every Brief Report update.

Brief Description (3): Provide a concise description of the event.

Questions 6 -11: If the event did not involve generation, frequency, transmission facilities, and/or load question (6 – 11), may be left blank.

Generation Tripped Off-line (6): Provide a total MW loss and the names of the units that tripped off-line due to the event.

Restoration Time (11): Provide the times that affected transmission, generation, and/or were restored, or an estimate of pending restoration.

Sequence of Events (12): The sequence of events should provide a timeline of the events that took place leading up to and through the event.

Narrative (15): This section should expand on the brief description by providing additional detail as needed to more clearly describe the event and immediate corrective actions taken.

Brief Report Template

Reported Event: _____

Submittal Date: _____

Region: _____

1. Entity Name: _____

2. Contact Person: _____

Contact Email: _____

Phone Number: _____

3. Date and time of disturbance

Date: _____

Time: _____

Time Zone: _____

4. Brief Description of Event:

Status (initial, interim, final): _____

5. Proposed Event Categorization (e.g. 1a, 2b, 3c): _____

6. Generation Tripped Off-line

MW Total _____

List Units Tripped _____

7. Frequency

Just prior to disturbance (Hz) _____

Immediately following disturbance
(Hz MAX) _____

Immediately following disturbance
(Hz MIN) _____

8. List Transmission facilities tripped and locked out
(Specify voltage level of each facility listed and extent of equipment damage, if any)

9. Demand Interrupted (MW)

Firm _____

Interruptible _____

10. Number of affected customers

Firm _____

Interruptible _____

11. Restoration Time from Time of Event

Transmission _____

Generation _____

Demand _____

12. Sequence of events _____

13. Identify contributing causes of the event to the extent known

14. Identify any protection system misoperations to the extent known

15. Narrative

16. If a one-line diagram is included please provide an explanation.

17. Identify the significance and duration of any monitoring and control event, such as loss of BPS visibility, loss of data links, etc.

Appendix B: Event Analysis Report Template

The EAR template is provided as a guideline for preparing an EAR. The level of detail will vary depending on the category and details of a specific event. The EAR template contains notices concerning Confidential/CEII Protected information. If a particular event involves CEII protected information, leave the notice on the report. Otherwise, remove it.

Event Analysis Report Template

1. Report Cover Sheet

- a. Report Title, Event ID Tracking Number
- b. Date of Report
- c. Preparer's Name

2. Table of Contents

3. Executive Summary

- a. Introduction
- b. Purpose
- c. Scope
- d. Background

4. Event Overview

Provide a description of the important facts leading up to the event, occurring during the event, and when the event is over and returned to normal operations. This includes all pre-event conditions.

5. Detailed Sequence of Events

Provide an accurate sequence of events. This timeline is a building block for all other aspects of the analysis, and is a starting point for the root cause analysis. It is the basis for developing computer models to simulate system conditions and evaluate steady state and stability conditions in the period leading to the event. The sequence of events is the foundation of facts upon which all other aspects of the analysis can proceed.

6. Cause Analysis

Cause analysis methodology and the tools used guides the overall analysis process by providing a systematic approach to evaluating root causes, causal factors and contributing factors leading to the event. Cause analysis enables the analysis process to develop a factual record leading to logical and defensible conclusions in the final EA report regarding the causes of the event.

7. Detailed System Analysis

- a. System conditions prior to event
- b. Generation outage summary

- c. Transmission outage summary
- d. Effects on customers/public
- e. Event Response
- f. Restoration observations

8. Findings, Conclusions, and Recommendations

- a. Reference to published Lessons Learned, if any

9. Appendices

- a. One Line Diagrams
- b. Graphic representations
- c. Team Members
- d. Other Relevant Data

Appendix C: Target Timeframes for Completion of Brief Reports, Event Analysis Reports and Lessons Learned²

Event Category	Brief Report	Event Analysis Report	Lessons Learned	Close Event Analysis
1	Draft within five business days, sent to applicable Regional Entity for review. Final report within 10 days.	Not required	Within 30 business days (if applicable)	10 business days following receipt of Brief Report
2	Draft within five business days, sent to applicable Regional Entity for review. Final report within 10 days.	(If requested) Within 30 business days of the event	Within 30 business days	30 business days following receipt of EAR
3	Draft within five business days, sent to applicable Regional Entity for review. Final report within 10 days.	Within 60 business days of the event	Within 60 business days	30 business days following receipt of EAR
4	Draft within five business days, sent to applicable Regional Entity for review. Final report within 10 days.	Within 180 business days of the event	Within 180 business days	60 business days following receipt of EAR
5	Draft within five business days, sent to applicable Regional Entity for review. Final report within 10 days.	Within 180 business days of the event	Within 180 business days	60 business days following receipt of EAR

² All timeframes are subject to extension to accommodate special circumstances with agreement of the applicable Regional Entity. If the timeline for the completion of the EAR exceeds 30 days from the date of the event, draft reports need to be provided to the Regional Entity every 30 days.

Appendix D: Lessons Learned Template

Instructions for completing a Lessons Learned report:

- **Title:** The “Title” should be short and specify the theme of the lesson learned so its reader can easily identify the subject.
- **Primary Interest Groups** – The “Primary Interest Groups” heading is to identify those NERC registered entities that could possibly benefit from the information contained in the lessons learned report. NERC registered entities are defined per the “NERC Reliability Functional Model Function Definitions and Responsible Entities” document, which can be found on the NERC website. (Example: Transmission Owner, Generator Owner, Load Serving Entity, etc.)
- **Problem Statement** – The “Problem Statement” heading is to provide a short descriptive narrative of the problem that occurred. Usually this can be defined in one sentence, but the purpose of the problem statement is to explain the problem so that the reader is able to easily determine if the problem is of interest without having to go further into the report.
- **Details** – The “Details” heading is to provide a concise narrative of what happened in the event, the end result of the event, the findings of the analysis of the event, corrective actions taken, and any other pertinent information that will provide the reader information that could be used to apply the lessons learned. One-line diagrams or other diagrams and representations that will help the reader understand the event should be included.
- **Corrective Actions** – Defines what was learned from the analysis of the event. The lessons learned should be a list of changes the entity incorporated to ensure that the event would not happen again. Some examples of items identified are changes in procedures and processes, maintenance changes, changes in training programs, equipment replacement, equipment testing changes, etc.
- **Lessons Learned** – Knowledge and experience – positive or negative – derived from actual incidents or events as well observations and historical studies of operations, training and exercises.

Lessons Learned Template

Lesson Learned Title

Primary Interest Groups

Problem Statement

Details

Corrective Actions

Lesson Learned

Appendix E: Categorization of Events

Operating reliability events are those events that are deemed to have significantly impacted the reliable operation of interconnected systems. The events are prioritized into one of five categories, based on the events' varying levels of significance and their impacts on the interconnected system. The event categories are intended to allow the registered entity and Regional Entity to quickly and unambiguously identify the event thresholds. **The highest category that characterizes an event shall be used.** An event may be assigned to a higher or lower category based on the significance of the event. The registered entity is expected to work with the applicable Regional Entity to determine initial categorization of events.

The categories listed in this appendix do not cover all possible events related to CIP, EMS loss of functionality, or loss of BPS "visibility." If such events occur, their analyses are discussed with the affected registered entity, appropriate Regional Entity and NERC to determine if the use of the event analysis process is warranted.

Category 1: An event that results in one or more of the following:

- a. An unexpected outage, contrary to design, of three or more BPS elements caused by a common disturbance. For example:
 - i. The loss of a combination of NERC-defined elements or facilities.
 - ii. The loss of an entire generation station of three or more generators (aggregate generation of 500 MW to 1,999 MW); combined cycle units are represented as one unit.
- b. Intended and controlled system separation by the proper operation of a Special Protection System Scheme (SPS) or Remedial Action Scheme (RAS) in Alberta from the Western Interconnection, New Brunswick or Florida from the Eastern Interconnection.
- c. Failure or misoperation of BPS SPS/RAS.
- d. System-wide voltage reduction of 3% or more that lasts more than 15 continuous minutes due to a BPS emergency.
- e. Unintended BPS system separation that results in an island of 100 MW to 999 MW. Excludes BPS radial connection, and non-BPS (distribution) level islanding.
- f. Unplanned evacuation from a control center facility with BPS SCADA functionality for 30 minutes or more.
- g. In ERCOT, the loss of generation of 1,000 MW - 1,399 MW.

Category 2: An event that results in one or more of the following:

- a. Complete loss of all BPS control center voice communication systems for 30 minutes or more.
- b. Complete loss of SCADA, control or monitoring functionality for 30 minutes or more.

- c. Voltage excursions equal to or greater than 10% lasting more than 15 continuous minutes due to a BPS emergency.
- d. Loss of off-site power (LOOP) to a nuclear generating station per the Nuclear Plant Interface Requirement.
- e. Unintended system separation that results in an island of 1,000 MW to 4,999 MW.
- f. Unintended loss of 300 MW or more of firm load for more than 15 minutes.
- g. Interconnection Reliability Operating Limit (IROL) Violation or SOL Violation (WECC only) for time greater than T_v .

Category 3: An event that results in one or more of the following:

- a. The loss of load or generation of 2,000 MW or more in the Eastern Interconnection or Western Interconnection or Québec Interconnection, or 1,400 MW or more in the ERCOT Interconnection.
- b. Unintended system separation that results in an island of 5,000 MW to 10,000 MW.
- c. Unintended system separation (without load loss) that results in an island of Florida from the Eastern Interconnection.

Category 4: An event that results in one or more of the following:

- a. The loss of load or generation from 5,001 MW to 9,999 MW
- b. Unintended system separation that results in an island of more than 10,000 MW (with the exception of Florida as described in Category 3c).

Category 5: An event that results in one or more of the following:

- a. The loss of load of 10,000 MW or more.
- b. The loss of generation of 10,000 MW or more.

Appendix F: Planning Meeting Scope Template

The planning meeting scope template provides guidance for conducting an event analysis planning meeting. The meeting participants (for example, NERC, the Regional Entities and the registered entities involved in the event) will determine the event category. If EA process timelines and expectations for that particular event category need to be changed, then there should be clear understanding of any divergence from the EA process by all participants. This is particularly important for large events that involve multiple entities, multiple regions, or both.

The Planning Meeting Scope Template can be applied to All Events. For more complicated events (Category 4 and 5) see **Appendix G: Contributory Factor Assessment**.

Planning Meeting Scope Template

Description	Discussion	Comments
Summary of Event or Incident	Describe what happened	Retrieve information from preliminary/initial reports, OE 417, EOP 004, RCIS, email, telephone calls, etc.
Attendees	List names and titles of participants	
Event Analysis Project Steps to Address	<ol style="list-style-type: none"> 1. Does the incident or event fit NERC’s Event Categories? 2. Discuss Data Hold Retention Notice requirements. 3. What type of analytical work needs to be done? 4. Who should be on the team (identify points of contact)? 5. What is the schedule for completing work (e.g. studies, draft reports, final reports, etc.)? 6. Document the scope or create a record that summarizes who, what, and when. 7. Discuss scope of work with 	

Description	Discussion	Comments
	NERC. 8. Make adjustments to scope, deliverables and schedule (if appropriate).	

Appendix G: Contributory Factor Assessment

The Contributory Factor Assessment template assists registered entities in making a determination of what to include in an EAR. For example, the team can determine if the “contributing factor” contributed to the event or hindered restoration efforts. The Regional Entities and NERC will collaborate on the request for information from the affected registered entities.

Contributory Factor Assessment Template

Contributing Factor	Explanation of Contributing Factor	Contributing Factor in Causing The Event, Increasing Its Severity, Or Hindering Restoration? (Yes or No)	Explanation
1. Power System Facilities	The existence of sufficient physical facilities to provide a reliable BPS.		
2. Relaying Systems	Detection of bulk power supply parameters that are outside normal operating limits and activation of protective devices to prevent or limit damage to the system. (UFLS/UVLS)		
3. System Monitoring, Operating Control And Communication Facilities	Ability of dispatch and control facilities to monitor and control operation of the bulk power supply system. Adequacy of communication facilities to provide information within and between entities.		
4. Operating Personnel Performance	Ability of system personnel to communicate appropriately and react properly to unanticipated circumstances that require prompt decisive action.		
5. Operational Planning	Study of near-term operating conditions. Application of results to system operation.		

Contributing Factor	Explanation of Contributing Factor	Contributing Factor in Causing The Event, Increasing Its Severity, Or Hindering Restoration? (Yes or No)	Explanation
6. System Reserve and Generation Response	Ability of generation or load reduction equipment to maintain or restore system frequency and tie-line flows to acceptable levels following a system disturbance.		
7. Preventive Maintenance	A program of routine inspections and tests to detect and correct potential equipment failures.		
8. Load Relief	The intentional disconnection of customer load in a planned and systematic manner or restoration of the balance between available power supply and demand.		
9. Restoration	Orderly and effective procedures to quickly re-establish customer service and restore the bulk power supply system to a reliable condition.		
10. Special Protection Systems (or Remedial Action Schemes)	An automatic protection system designed to detect abnormal or predetermined system conditions, and take corrective actions other than and/or in addition to the isolation of faulted components to maintain system reliability.		
11. System Planning	Comprehensive planning work using appropriate planning criteria to provide a reliable bulk power supply system.		

Contributing Factor	Explanation of Contributing Factor	Contributing Factor in Causing The Event, Increasing Its Severity, Or Hindering Restoration? (Yes or No)	Explanation
12. Reliability Coordinator action	Directives, actions, or procedures of the Reliability Coordinator(s).		
13. Cyber Security	Ability of personnel to react properly to unanticipated circumstances that require prompt decisive action.		
14. Other	Any other factor not listed above which was significant in causing the disturbance, making the disturbance more severe or adversely affecting restoration.		

Appendix H: Summary of Roles, Responsibilities and Expectations for Event Reporting and Analysis

Appendix H provides a summary of roles, responsibilities, and expectations for event reporting and analysis.

Summary of Roles, Responsibilities, and Expectations for Event Reporting and Analysis

Category 1 Events			
Entity	Brief Report	Event Analysis Report (EAR)	Lessons Learned
Registered Entity	<p>Provide initial event report to Regional Entity and NERC in accordance with requirements specified in applicable NERC standards.</p> <p>Ensure content of report is consistent with Brief Report Template included in Appendix A.</p> <p>Provide Brief Report in five business days or less.</p>	Not required (unless requested by Regional Entity or NERC)	Provide draft of suggested lessons learned to Regional Entity within 30 business days of event occurrence.
Regional Entity (RE)	<p>Request additional event information from registered entity as determined by Regional Entity or in collaboration with NERC.</p> <p>Send Brief Report to NERC within 10 business days of the event.</p>	Not required (unless requested by Regional Entity or NERC)	<p>Review draft lessons learned from registered entity. Request additional information as deemed necessary.</p> <p>Work with registered entity and NERC to prepare final lesson learned for review by selected technical groups.</p>
NERC	Coordinate with Regional Entity to determine if additional	Not required (unless requested by Regional Entity or NERC)	Work with registered entity and Regional Entity to

	event information is needed.		prepare final lessons learned for review by selected technical groups. Disseminate final lesson learned to industry.
Category 2 and 3 Events			
Entity	Brief Report	Event Analysis Report (EAR)	Lessons Learned
Registered Entity	<p>Provide initial event report to Regional Entity and NERC in accordance with requirements specified in applicable NERC standards.</p> <p>Ensure content of report is consistent with Brief Report Template included in Appendix A.</p> <p>Provide Brief Report in five business days or less.</p>	<p>Hold data relevant to the event for 120 days unless notified by the Regional Entity.</p> <p>Provide EAR to Regional Entity within 30 business days for Category 2 event or 60 business days for Category 3 events. (For a Category 2 event – not required unless requested by Regional Entity or NERC)</p> <p>Registered Entity and Regional Entity should collaborate on the expectations for the report and any extensions to the due dates.</p>	<p>Provide draft of suggested lessons learned to Regional Entity within 30 business days of event occurrence.</p>
Regional Entity (RE)	<p>Send Data Hold Retention Notice for Category 3 event to registered entity.</p>	<p>Request EAR if not initiated by registered entity. Specify deadline. (For a Category 2 event – not required unless requested by Regional Entity or NERC)</p> <p>Follow progress of event analysis and report preparation with Entity.</p> <p>Review EAR for sufficiency and request additional analysis or information as</p>	<p>Review draft lessons learned from registered entity. Request additional information as deemed necessary.</p> <p>Work with registered entity and NERC to prepare final lesson learned for review by selected technical groups.</p>

		deemed necessary. Specify deadline and inform NERC. Notify registered entity that event analysis is closed unless NERC has additional questions.	
NERC	Coordinate with Regional Entity to determine if additional event information is needed.	Review final version of EAR, and provide comments to Regional Entity Before Regional Entity closes event analysis.	Work with registered entity and Regional Entity to prepare final lessons learned for review by selected technical groups. Disseminate final lesson learned to industry.
Category 4 and 5 Events			
Entity	Brief Report	Event Analysis Report (EAR)	Lessons Learned
Registered Entity	Provide initial event report to Regional Entity and NERC in accordance with requirements specified in applicable NERC standards. Ensure content of report is consistent with Brief Report Template included in Appendix A . Provide Brief Report in five business days or less.	Hold data relevant to the event for 180 days unless notified by the Regional Entity or NERC. Participate in event analysis as directed by Regional Entity and NERC.	Provide draft of suggested lessons learned to Regional Entity within 180 business days of event.
Regional Entity (RE)	Request additional event information from registered entity as determined by Regional Entity or requested by NERC. Send Data Hold	Planning Meeting of affected registered entities, Regional Entities involved, and NERC within five business days of occurrence of event to discuss approach for conduct of event analysis and agreement on	Review draft lessons learned from registered entity. Request additional information as deemed necessary.

	<p>Retention Notice to entity.</p> <p>Send Brief Report to NERC within 10 business days of the event.</p>	<p>composition and lead for event analysis team.</p> <p>Collaborate with NERC on request for information from affected registered entities.</p> <p>Coordinate event analysis for multi-entity events within Regional Entity. (Category 4)</p> <p>Participate in multi-regional event analysis led by NERC. (Category 5)</p> <p>Follow progress of event analysis and report preparation.</p> <p>Notify registered entity that event analysis is closed with agreement of NERC for Category 4 events.</p>	<p>Work with registered entity and NERC to prepare final lessons learned for review by selected technical groups.</p>
<p>NERC</p>	<p>Request Regional Entity to provide additional event report information from registered entity, as needed.</p>	<p>Planning Meeting of affected registered entities, Regional Entities involved, and NERC within five business days of occurrence of event to discuss approach for conduct of event analysis and agreement on composition and lead for event analysis team.</p> <p>Collaborate with Regional Entity(s) involved on request for information from affected registered entities.</p> <p>Participate in multi-entity events within Regional Entity, led by Regional Entity. (Category 4)</p>	<p>Work with registered entities and Regional Entity(s) to prepare final lessons learned for review by selected technical groups. Disseminate final lessons learned to industry.</p>

		<p>Lead multi-regional event analyses when determined by NERC president. (Category 4 or 5)</p> <p>Notify registered entity that event analysis is closed for Category 5 events, with agreement of the applicable Regional Entities</p>	
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Appendix I: Data Retention Hold Notice

As registered entities begin to analyze events, they must retain all data and information relative to the event. Regional Entities will formally send a Data Retention Hold Notice for events in Category 3 or higher.

Data holds will have an end date that corresponds with the closing of the event or a timeframe identified in the request from the Regional Entity for the data hold. The form used for notification is included in this appendix as a reference.

Appendix I – Data Retention Hold Notice

CONFIDENTIAL — NON-PUBLIC

DATA RETENTION HOLD NOTICE

Subject: []

Notice Date: [DATE]

Date of Event: [DATE]

The **[Name of Issuer]** is reviewing the circumstances surrounding the **[Description of Event]** (Event).

Therefore, this letter serves as *official notice* to **[Registered Entity Name]** to preserve and retain and not discard or destroy any and all data or documentation pertaining to the Event.

- Documentation includes, but is not limited to: operator logs, recorded voice communications, e-mail and written correspondence, work orders, inspection records, patrol records, and any other documents, fault recorder records, data or other information that may be directly or indirectly related to the Event, including “Electronic Data.” In addition, documentation includes, but is not limited to e-mails and other forms of communication, including Electronic Data, from entity personnel, including management, that may be directly or indirectly related or relevant to the Event.
- Documentation includes, but is not limited to: Energy Management System (EMS) data with regards to system load, frequency, online and offline generation energy/capacity, reserve capacity, forecasted load, capacity study results, interchange schedules, Market Analyst Interface, SCADA, and any other documents, data or other information that may be directly or indirectly related to the Event.

- “Electronic Data” shall include, but not be limited to: all planning power system models, operational planning system models, text files (including word processing documents), spreadsheets, e-mail files and information concerning e-mail (including logs of e-mail history and usage, header information and “deleted” files), internet history files and preferences, graphical image format (GIF) files, databases, calendar and scheduling information, computer system activity logs, and all file fragments and backup files containing Electronic Data.

[Registered Entity Name] is required, upon request, to produce any requested data pursuant to Title 18 of the Code of Federal Regulations (CFR)³ Part 39.

This Notice will be in effect for 120 calendar days from the date of issuance, unless extended by **[Issuer]**.

Please confirm by e-mail, within 24 hours of receipt, that you have received this message.

If you have any questions regarding this Notice and related requirements please contact me at any time using my contact information below.

Respectfully submitted,

[Insert Signature]

[Insert Name]

[Insert Title and Contact Information]

³ 18 CFR Part 39, Section 39.2 requires: (d) Each user, owner or operator of the Bulk-Power System within the United States (other than Alaska and Hawaii) shall provide the Commission, the Electric Reliability Organization and the applicable Regional Entity such information as is necessary to implement section 215 of the Federal Power Act as determined by the Commission and set out in the Rules of the Electric Reliability Organization and each applicable Regional Entity. The Electric Reliability Organization and each Regional Entity shall provide the Commission such information as is necessary to implement section 215 of the Federal Power Act.

Revision History

Rev.	Date	Reviewers	Revision Description
1	December 2011	Event Analysis Working Group (EAWG), NERC Management, Operating and Planning Committees.	Document endorsed by Operating and Planning Committees January 2012. Document endorsed by NERC Board of Trustees February 2012.