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IEEE Recommended Practice for the Investigation of Events at Nuclear Facilities

IEEE Power and Energy Society

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Nuclear Power Engineering Committee

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IEEE Std 1707™-2015

IEEE Recommended Practice for the Investigation of Events at Nuclear Facilities

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Nuclear Power Engineering Committee
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Abstract: Common terminology and recommended practices for initiating and conducting event investigations, analyzing data, producing results, and identifying corrective actions associated with facility personnel, processes, equipment, and systems at nuclear facilities are provided in this document. The scope of event investigation activities addressed includes, but is not limited to, root cause analysis, which is an in depth investigation process used to identify primary causes of an event based on the systematic and consistent use of analysis tools. This recommended practice can be used for the investigation of all events and allows the use of a graduated approach to the depth of the investigation based upon the event significance.

Keywords: event investigation, IEEE 1707™, nuclear, root cause

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Introduction

This introduction is not part of IEEE Std 1707™-2015, IEEE Recommended Practice for the Investigation of Events at Nuclear Facilities.

IEEE Subcommittee 5 on Human Factors, Control Facilities and Human Reliability (SC5), a unit of the IEEE Nuclear Power Engineering Committee (NPEC), has developed and maintained human factors engineering standards for nuclear facilities since the early 1980s. SC5 has structured its standards in a hierarchical fashion. The top-level SC5 guidance document is IEEE Std 1023™, IEEE Recommended Practice for the Application of Human Factors Engineering to Systems, Equipment, and Facilities of Nuclear Power Generating Stations and Other Nuclear Facilities. IEEE Std 1023 promotes the systematic integration of human performance considerations in the life cycle of commercial nuclear power stations and other nuclear facilities. IEEE Std 1023 is supported by additional standards written to address specific technical needs. IEEE Std 1707 is an additional standard that provides a recommended practice to establish the characteristics of an acceptable approach to event investigations. Such investigations can serve as part of the basis for operating experience reviews needed to support IEEE Std 1023. The need for a Corrective Action Program at nuclear facilities is discussed in regulations (e.g., 10 CFR Part 50, Appendix B, criterion XVI). The investigation process in IEEE Std 1707 provides one framework for implementing such programs. In addition, this process aligns with the event investigation section of the voluntary guidance of OSHA Safety and Health Program Management Guidelines (Federal Register 54:3904-3916), which supports 29 CFR 1910 requirements.

This recommended practice provides the nuclear industry a common approach for planning, conducting, and reporting event investigations. It includes definitions and elements for corrective action plans. Staff and management at nuclear facilities who complete event investigations and those evaluating event investigation reports can use the document to fulfill their respective roles. Event investigation reports serve a key role for sharing event information within the facility conducting the investigation, as well as among similar facilities and by the organizations charged with evaluating the event investigations. It is important that reports include sufficient information in a manner that allows for a common understanding of event causation. This recommended practice focuses not only on specific causes, but on the entire organizational infrastructure's role in events. The investigation reports also can be used to focus on needed improvements in personnel, processes, and system and equipment performance.

This recommended practice identifies seven elements of an acceptable event investigation including the following:

a) Establishing roles and responsibilities (see 4.1)

b) Planning (see 4.2)

c) Information gathering and analysis (see 4.3)

d) Cause determination (see 4.4)

e) Corrective action plan (see 4.5)

f) Investigation report (see 4.6)

g) Records (see 4.7)

This document is intended to be used by personnel at nuclear power plants, nuclear fuel processing plants, research and test reactors, and at nuclear materials production reactors to implement an acceptable event investigation process and by regulators whose job it is to assure that a robust event reporting system is being applied.

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IEEE Recommended Practice for the Investigation of Events at Nuclear Facilities

1. Overview

1.1 Scope

This document provides common terminology and recommended practices for initiating and conducting event investigations, analyzing data, producing results, and identifying corrective actions associated with facility personnel, processes, equipment, and systems at nuclear facilities.

1.2 Overview of event investigation process

The event investigation process provides a systematic and complete framework for investigating events and their causes consistently. The threshold for a root cause investigation should be based on the level of risk, which is a function of the probability of recurrence (assuming no corrective actions) and consequence of the event (actual and potential). For example, a high consequence event with a high probability of recurrence is a high risk event requiring a root cause analysis.

Figure 1 provides a graphical view of the steps of an event investigation and refers to the applicable clauses of this document where the topic is discussed as follows:

— Planning (4.2): The important aspects of this step are early actions (remedial actions, preservation of evidence), investigation team formation, and charter development.

— Information gathering and analysis (4.3): Success in determining the cause(s) of an event requires obtaining factual information that supports analysis to conclusively explain what occurred and why it occurred. This includes extent of condition and operating experience reviews, as well as use of data analysis to support cause determination.