

Event Report Guidelines 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii)

Draft Report for Comment

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Event Report Guidelines 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii)

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ABSTRACT

NUREG-1022, Revision 3, “Event Reporting Guidelines: 10 CFR 50.72 and 50.73,” issued in January 2013, contains guidelines that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for use in meeting the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.72, “Immediate notification requirements for operating nuclear power reactors,” and 10 CFR 50.73, “Licensee event report system.” This supplement clarifies the guidance in section 3.2.4, “Degraded or Unanalyzed Condition,” of NUREG-1022, Revision 3, which contains general guidance for event reporting under 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii).

The regulations in 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii) require reports for any event or condition that results in either of the following:

- the condition of the nuclear power plant, including its principal safety barriers, being seriously degraded
- the nuclear power plant being in an unanalyzed condition that significantly degrades plant safety

In developing Supplement 2 to NUREG-1022, Revision 3, the NRC evaluated data on submitted and retracted event notifications and held a public meeting on August 9, 2023, to discuss this section 3.2.4 of NUREG-1022 with stakeholders. Supplement 2 provides updated guidance for nuclear power reactor licensees and can be used for evaluating and reporting degraded and unanalyzed conditions as described in 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii). The specific guidance included in this supplement supersedes the guidance found in section 3.2.4 of NUREG-1022, Revision 3.

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1. INTRODUCTION

This document provides guidance on the reporting requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.72, “Immediate notification requirements for operating nuclear power reactors,” and 10 CFR 50.73, “Licensee event report system,” specific to the criteria in 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii) for degraded and unanalyzed conditions.

1.1 Background

In August 2018, the Nuclear Energy Institute submitted a petition to amend 10 CFR 50.72. In 2021, the commissioners of the U.S. Nuclear Regulatory Commission (NRC) directed the NRC staff to pursue rulemaking to evaluate the immediate notification requirements for nonemergency events in 10 CFR 50.72(b) (ML21209A947). As part of this rulemaking effort, the NRC determined that clarifications to the guidance in section 3.2.4, “Degraded or Unanalyzed Condition,” of NUREG-1022, Revision 3, “Event Reporting Guidelines: 10 CFR 50.72 and 50.73,” issued in January 2013, could address part of the concerns identified in the petition. To expedite this process, the NRC developed Supplement 2 to NUREG-1022, Revision 3, to address stakeholder concerns outside of the rulemaking process.

1.2 Revised Reporting Guidelines

The purpose of Supplement 2 to NUREG-1022, Revision 3, is to incorporate clarifications and updates to the existing guidance in section 3.2.4. This supplement supersedes section 3.2.4 of NUREG-1022, Revision 3.

2. SPECIFIC REPORTING GUIDELINES

Section 3.2.4 of NUREG-1022, Revision 3, relates to a degraded or unanalyzed condition, as defined in the regulations as follows:

10 CFR 50.72(b)(3)(ii)	10 CFR 50.73(a)(2)(ii)
<p>“Any event or condition that results in:</p> <p style="margin-left: 20px;">(A) The condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or</p> <p style="margin-left: 20px;">(B) The nuclear power plant being in an unanalyzed condition that significantly degrades plant safety.”</p>	<p>“Any event or condition that resulted in:</p> <p style="margin-left: 20px;">(A) The condition of the nuclear power plant, including its principal safety barriers, being seriously degraded; or</p> <p style="margin-left: 20px;">(B) The nuclear power plant being in an unanalyzed condition that significantly degraded plant safety.”</p>

A licensee event report (LER) is required under 10 CFR 50.73(a)(2)(ii) for a seriously degraded principal safety barrier or an unanalyzed condition that significantly degrades plant safety. If such an event or condition is not reported under 10 CFR 50.72(a), (b)(1), or (b)(2), then the licensee must report the event or condition through an event notification under 10 CFR 50.72(b)(3). Sections 50.72(a)(1)(ii) and 50.73(a)(1) require event notifications and LERs, respectively, if a degraded or unanalyzed condition occurs within 3 years of the date of discovery of the condition, even if the event is not ongoing at the time of discovery.

Licensees reporting under 10 CFR 50.72 and 10 CFR 50.73 for events involving design basis functions that are also associated with Risk-Informed Safety Class (RISC)–1 or RISC–2 structures, systems, and components (SSCs) for licensees that receive NRC authority to use 10 CFR 50.69, “Risk-informed categorization and treatment of structures, systems and components for nuclear power reactors,” are also required to report under 10 CFR 50.69(g) for events involving RISC–1 or RISC–2 SSCs that perform functions credited for beyond design basis mitigation. Reporting events involving RISC–1 or RISC–2 that perform credited beyond design basis functions is distinct from, and in addition to, events involving credited design basis functions for RISC–1 or RISC–2 SSCs. The criteria in 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii) do not apply to RISC–3 or RISC–4 SSCs for licensees that are authorized to use 10 CFR 50.69.

2.1 Time of Discovery

Conditions may arise under which it is not immediately apparent that a degraded or unanalyzed condition that requires reporting under this criterion exists. When these conditions are identified, further evaluation may be necessary to determine whether the condition resulted in a seriously degraded principal safety barrier or unanalyzed condition that significantly degraded plant safety. Attempts to determine whether such a condition exists, starting from the time of occurrence of the condition for the purposes of reporting, may lead to more notifications and subsequent retractions for these reports than other reporting criteria, placing an unwarranted burden on the licensee and the NRC.

To provide clarity on event notifications under 10 CFR 50.72(b)(3)(ii) and LERs required under 10 CFR 50.73(a)(2)(ii), the term “discovery” is defined as either of the following:

- the moment when a degraded or unanalyzed condition occurs, such as those discussed in the examples below, or is found to have occurred
- if the existence of a seriously degraded principal safety barrier or unanalyzed condition that significantly degraded plant safety cannot be readily determined when it occurs or when it is found to have occurred, and additional evaluation is needed, then the moment when that evaluation supports the existence of such a condition

For event notifications under 10 CFR 50.72(b)(3)(ii) and LERs under 10 CFR 50.73(a)(2)(ii), it is possible that an initial analysis of a previously unanalyzed condition could demonstrate reasonable expectation of operability or functionality for all impacted equipment or safety systems. Further analysis could result in the discovery of a degraded or unanalyzed condition. In these situations, for purposes of reportability, the time of discovery would be the moment when the revised analysis concluded a degraded or unanalyzed condition existed, regardless of the timing or outcome of any prior evaluation. Such evaluations should be performed commensurate with the potential safety significance of the underlying issue, given the information available absent the evaluation.

2.2 Examples

A: A Nuclear Power Plant, Including Its Primary Safety Barriers, Being Severely Degraded

This criterion pertains to issues like material problems (e.g., metallurgical or chemical) that result in an abnormal degradation of or stress on the primary safety barriers, such as the fuel cladding, reactor coolant system pressure boundary, or containment. Abnormal degradation may necessitate corrective action to restore the barrier's functionality, as described in some of the examples below, while abnormal stress on a barrier might arise from an unplanned transient, as seen in example (4) below. The following are five examples of reportable events and conditions:

1. fuel cladding failures that exceed expected values, unique or widespread cladding failures, or failures caused by unexpected factors
2. welding or material indications in the primary coolant system that do not meet the acceptance standards defined in American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," Table IWB-3410-1, "Acceptance Standards" and the respective Tables in IWB-3500, "Acceptance Standards"
3. degradation of steam generator tubes that is deemed serious if the tubes fail to meet the performance criteria outlined in the plant-specific technical specifications (TS) for steam generator tube integrity
4. low-temperature overpressure transients violating pressure-temperature limits derived from Appendix G, "Fracture Toughness Requirements," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" (e.g., TS pressure-temperature curves)
5. loss of containment function or integrity, including containment leak rate tests in which the total containment as-found, minimum-pathway leak rate exceeds limits in the facility's TS

With regard to example (3), when one or more steam generator tubes meet the tube repair criteria and have not been plugged or repaired in accordance with the steam generator program, they are not considered to be severely degraded as long as structural integrity and the accident-induced leakage performance criteria in the plant-specific TSs are met.

B: Unanalyzed Condition Significantly Affecting Plant Safety

In the preambles to the 1983 final rules amending 10 CFR 50.72 and establishing 10 CFR 50.73, the Commission stated the following regarding 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii):

The Commission recognizes that the licensee may use engineering judgment and experience to determine whether an unanalyzed condition existed. It is not intended that this paragraph apply to minor variations in individual parameters, or to problems concerning single pieces of equipment. For example, at any time, one or more safety-related components may be out of service due to testing, maintenance, or a fault that has not yet been repaired. Any trivial single failure or minor error in performing surveillance tests could produce a situation in which two or more often unrelated, safety-grade components are out-of-service. Technically, this is an unanalyzed condition. However, these events should be reported only if they involve functionally related components or if they significantly compromise plant safety.¹

The following are examples of reportable unanalyzed events and conditions that could significantly compromise plant safety:

1. The accumulation of voids that could impede the adequate removal of heat from the reactor core, especially under natural circulation conditions. The significance of this case is generally tied to the inability to perform a required safety function. However, the accumulation of voids previously deemed not safety significant through analysis does not need to be reported.
2. Voiding in instrument lines leading to erroneous indications that could mislead operators about the actual plant condition.
3. The discovery that a system required to meet the single-failure criterion would have failed to meet its safety function.
4. Fire barriers are found to be missing, resulting in insufficient separation for redundant safe-shutdown trains. Conversely, if a fire wrap is missing from one safe-shutdown train but another is available in a different fire area, providing the required separation for safe-shutdown trains, the event need not be reported.
5. Multiple functionally related safety-related components out of service that could prevent the fulfillment of a safety function.

¹ 48 FR 39039, 39042 (August 29, 1983), and 48 FR 33850, 33856 (July 26, 1983).

2.2.1 Additional Examples

(1) Failures of Reactor Fuel Rod Cladding Discovered during Fuel Assembly Testing

Radiological data for a specific pressurized-water reactor indicated that numerous fuel rods had experienced failures during the initial months of operation. Projections ranged from 6 to 12 failed rods. The end-of-cycle reactor coolant system iodine-131 activity averaged 0.025 microcuries per milliliter. After the end-of-cycle shutdown, iodine-131 levels spiked to 11.45 microcuries per milliliter. The cause was a significant number of failed fuel rods. Inspections revealed that out of the total 157 fuel assemblies, 136 contained failed fuel (approximately 300 fuel rods had through-wall penetrations), well beyond the expected number of failures. The defects were typically the size of a pinhole. Fuel cladding failures resulted from long-term fretting caused by debris that became lodged between the lower fuel assembly nozzle and the first spacer grid. This penetration of the stainless-steel fuel cladding was due to machining debris from thermal shield support system repairs during the previous refueling outage.

The event was reportable because cladding failures exceeded anticipated values and were unique or widespread.

(2) Degradation of the Reactor Coolant System Pressure Boundary Due to Corrosion of a Control Rod Drive Mechanism Flange

During a hot shutdown, six control rod drive mechanism (CRDM) reactor vessel nozzle flanges were identified as leaking. Subsequently, one of the flanges was found to be eroded and pitted. While removing the nut ring from beneath the flange, the licensee discovered that approximately 50 percent of one of the nut ring halves had corroded away, with two of the four bolt holes in the corroded nut ring half degraded to the point of no bolt-thread engagement. An inspection of the flanges and spiral-wound gaskets removed from between the flanges revealed that the leaks resulted from the gradual deterioration of the gaskets due to aging. A replacement CRDM was installed, and the gaskets on all six CRDMs were replaced with graphite-type gaskets of a new design.

The event was reportable because there was a material defect in the primary coolant system and degradation of the reactor coolant system pressure boundary that was not acceptable under ASME Boiler and Pressure Vessel Code, Section XI.

(3) Reactor Fuel Rod Cladding Degradation Detected during Fuel Sipping Operations

With the plant in cold shutdown, fuel sipping operations appeared to indicate that a significant portion of cycle-2 fuel, type "LYP," had failed, with 4 confirmed and 12 potential fuel leakers identified. The potential fuel leakers had only undergone sipping once before an emergency notification system notification was made. The licensee sought assistance from the fuel vendor to evaluate this issue. An event notification would not be required at this time because further analysis was needed to determine whether a degraded or unanalyzed condition existed, and therefore time of discovery would be delayed based on the second definition for time of discovery at the beginning of section 2.1. Additional sipping operations and subsequent evaluation by the licensee's reactor engineering department, with vendor assistance, concluded that no additional fuel failures had occurred. The abnormal readings associated with the potential fuel leakers were attributed to fission products trapped in the crud layer.

The event was not reportable because further analysis showed that the fuel cladding was not severely degraded.

(4) Additional Clarification for Events Not Required to Be Reported

Licensees are not required to report an event pursuant to this criterion if the event results from a shared dependency among trains or channels that is a natural or expected consequence of the approved plant design, or normal and expected wear or degradation.

3. CONCLUSION

Section 3.2.4 of NUREG-1022, Revision 3, contains general guidance for event reporting under 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii). The existing guidance in NUREG-1022, Revision 3, section 3.2.4 is superseded by this supplement.

Although an event or condition might not require a licensee report under 10 CFR 50.72 or 10 CFR 50.73, other regulatory requirements may necessitate a report.

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11. ABSTRACT (200 words or less)

NUREG-1022, Revision 3, "Event Reporting Guidelines: 10 CFR 50.72 and 50.73," issued in January 2013, contains guidelines that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for use in meeting the requirements of Title 10 of the Code of Federal Regulations (10 CFR) 50.72, "Immediate notification requirements for operating nuclear power reactors," and 10 CFR 50.73, "Licensee event report system." This supplement clarifies the guidance in section 3.2.4, "Degraded or Unanalyzed Condition," of NUREG 1022, Revision 3, which contains general guidance for event reporting under 10 CFR 50.72(b)(3)(ii) and 10 CFR 50.73(a)(2)(ii).

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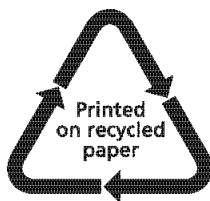
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