

NSIR_DPR_Admin Resource

From: YOUNG, David <dly@nei.org>
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To: Johnson, Don
Subject: [External_Sender] EP FAQ on Emergency Classification of Hazardous Conditions Caused by Equipment Failures

Proposed EP FAQ on Emergency Classification of Hazardous Conditions Caused by Equipment Failures

Background – The emergency classification schemes endorsed for licensee use by the NRC staff have Initiating Conditions that require the declaration of an emergency if certain “hazards” affect plant safety systems or equipment. The ICs specifically addressed by this EP FAQ are HA2 in NUMARC/NESP-007, and NEI 99-01 revisions 4 and 5, and CA6 and SA9 in NEI 99-01 revision 6. As used in this EP FAQ, a “hazard” is an outward manifestation of an equipment failure leading to component damage. The hazards of interest are fire and explosion, including those that may occur as a result of electrical arcing. In addition, this EP FAQ guidance may be used to assess the damage caused by electrical arcing if no fire or explosion event is apparent.

Question – Does a hazard caused by an equipment failure warrant an emergency declaration if the only safety system train affected by the hazard is the one upon which the equipment failure occurred?

Answer – No. If the hazard did not cause any damage to another safety system, or another train of the affected safety system, then no emergency declaration is warranted. If a hazard resulting from an equipment failure causes damage to another safety system, or another train of the affected safety system (i.e., a system or train that was not the source of the initiating equipment failure), then an emergency declaration is required in accordance with the licensee’s emergency classification scheme. Within the context of Emergency Action Levels (EALs), damage typically means that the Control Room receives either indications of degraded system performance or reports of VISIBLE DAMAGE (a term defined in endorsed EAL development guidance) to system components.

An equipment failure may have a cascading effect leading to hazards that cause damage to multiple individual components and subcomponents, all associated with one safety system train. For example, consider an electrical breaker failure that leads to a small fire in both the breaker and an associated pump motor. This failure damages components (i.e., the breaker and the pump) as well as subcomponents (e.g., the pump motor stator, windings, flywheel, bearings and electrical connections). The damage to individual components and sub-components on the affected safety system should therefore be assessed collectively at the system train-level, i.e., regardless of their number or location, if all the damaged components are on one safety system train, and no other safety system or system train has been affected, then no emergency declaration is required.

The emergency director must declare the appropriate emergency classification level within 15 minutes of the initiating event indications (e.g., a fire alarm or report of explosion). If damage to a safety system other than the one upon which the equipment failure occurred, or to another train of the affected safety system, is indicated or observed during this period, then that information must be considered in the emergency classification assessment. If damage is determined to have occurred after that time (e.g., personnel could not initially enter an area as a safety precaution), then the emergency classification may be escalated or reported in accordance with NUREG-1022, as appropriate.

This answer reflects the fact that an equipment failure, absent collateral damage to another safety system train or system, is adequately addressed by Technical Specifications; the fire protection, industrial safety and corrective action programs; and work management and maintenance requirements.

The following examples are provided to illustrate the above points.

Example 1

An electrical equipment failure causes an observed small fire in a safety-related Motor Control Center (MCC) cubicle. The fire is extinguished by on-site personnel prior to the end of the 15-minute emergency classification period. As a result of the fire, the power supply for a safety-related pump is damaged which, in turn, renders that train of the safety-related system inoperable. The Control Room receives no indications of degraded performance on any system or system train other than that associated with the failed power supply, and plant personnel report no **VISIBLE DAMAGE** outside the affected MCC cubicle.

This event is an equipment failure that did not cause damage to another safety system or system train and so no emergency declaration is warranted.

Example 2

An electrical equipment failure occurs in a safety-related pump motor resulting in an arc and trip. Personnel in the area report a bright flash and loud noise that came from the direction of the pump. Operators enter the area to assess the event and report that portions of the motor housing are melted and blackened (i.e., clear **VISIBLE DAMAGE** to the motor housing). They also report that no other components in the area have been affected. The Control Room receives no indications of degraded performance on any system or system train other than that associated with the failed pump.

This event is an equipment failure that did not cause damage to another safety system or system train and so no emergency declaration is warranted.

Example 3

An electrical equipment failure occurs in a safety-related MCC causing a feeder breaker to explode (a blast-type explosion associated with a high-voltage arc-flash). There was a short-lived fire that self-extinguished. The Control Room receives "trouble" indications for both the system component powered by the feeder breaker as well as a component of another system powered from one of the adjacent cubicles. The system associated with the other adjacent cubicle was not in service. Plant personnel arrive at the scene and report that the door of a cubicle is open and damaged, debris is scattered in front of the MCC, and the sides of the affected cubicle panel are bowed outward causing relocation of electrical components in the adjacent MCC cubicles. There are smoke/carbon traces visible on electrical component in the adjacent cubicles.

This event is an equipment failure that did cause damage to another system. The Control Room received indications of degraded performance for multiple systems and plant personnel reported **VISIBLE DAMAGE** to multiple components associated with other systems; from these indications and reports, the Control Room can conclude that an equipment failure resulted in a hazard that caused damage to another system. An emergency declaration is required in accordance with the licensee's emergency classification scheme.

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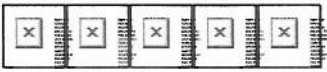
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