

## Emergency Preparedness Program Frequently Asked Question (EPFAQ)

**EPFAQ Number:** 2019-04 / Question 2

Note – This is a revision of question 2 that addresses NRC staff comments from the public meeting conducted on 5/21/20.

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**Organization:** NEI

**Relevant Guidance:** This question concerns NEI 99-01, *Development of Emergency Action Levels for Non-Passive Reactors*, Revision 6

**Applicable Section(s):**

- Containment Potential Loss threshold 2.A, “Primary containment flooding required.”

**Date Accepted for Review:**

**Status:**

**QUESTION OR COMMENT:**

Background

In Table 9-F-2, “BWR EAL Fission Product Barrier Table,” Containment Barrier Potential Loss threshold 2.A, states, “Primary containment flooding required.” This threshold, appearing in NEI 99-01 Revision 6, dated November 2012, was based on guidance in EPG/SAG Revision 2. The threshold was subsequently updated by EPFAQ 2015-004 to reflect changes incorporated into EPG/SAG Revision 3; the revised threshold is, “SAG entry is required.”

In Revision 2, primary containment flooding was required when core cooling was determined to be inadequate. The flooding action raises the water level in the primary containment, thereby reducing the available volume for noncondensable gases and leading to a rise in containment pressure. This rise in pressure will require venting of the primary containment, which is a threshold for a Loss of Containment (see Containment Loss threshold 3.B). Thus, “Primary Containment Flooding is Required” was included as a Containment Potential Loss threshold because the action is a precursor to containment venting and the release of radioactive material (i.e., a Loss of Containment). These conditions also served as transition criteria for exiting the EOPs and entering the SAGs.

In EPG/SAG Revision 3, the condition “primary containment flooding is required” was reached only after SAG entry and the decision to flood the primary containment had been thoroughly evaluated against a set of technical criteria. To address the variability in the timing of containment flooding, as permitted by Revision 3 strategy change, the containment barrier

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potential loss threshold was changed by EPFAQ 2015-004 such that it remained functionally equivalent to the threshold wording reflecting the Revision 2 strategy. The Containment barrier was considered potentially lost when adequate core cooling could no longer be assured and core damage was imminent. Within the context of EOPs, this point is best defined when operators are directed to enter a SAG (i.e., the threshold of “SAG entry is required”).

In EPG/SAG Revision 4, the containment flooding strategy was re-evaluated and modified to consider new insights related to quenching and cooling of fuel debris in the primary containment. The flooding strategy was modified to permit the use of FLEX equipment to supply an initial flow of water with a preferred injection point into the vessel and then reduce it to just enough to stabilize the debris and remove decay heat. This strategy preserves the availability of the hardened wetwell vent, provides for longer-term use of the suppression pool to scrub radionuclides (which reduces the offsite consequences from a release), and extends the time available to put an alternative method of containment heat removal in place (which alleviates the need for venting). Thus, flooding of the containment is a less preferred option early in a severe accident progression and, in some sequences, may not be directed.

With the incorporation of the “SAG entry is required” threshold described in EPFAQ 2015-004, the entry into a SAG results in meeting the thresholds for a Fuel Clad Barrier Loss and a Containment Barrier Potential Loss. Given that the RCS Barrier would also be assessed as lost by other thresholds, a General Emergency declaration would be required at the time a SAG is entered. This declaration would be premature since primary containment flooding (and subsequent containment venting) may not be directed after entry into the SAG (per EPG/SAG Revision 4). In other words, the SAG entry by itself is not indicative of a potential loss of containment (e.g., events could lead to a recovery of RPV injection sources to resubmerge the core before the onset of significant fuel damage). For this reason, the Containment Potential Loss threshold 2.A approved in EPFAQ 2015-004, “SAG entry is required,” is no longer optimum.

To address the SAG strategy change discussed above, a new threshold was developed that is both tied to an operationally significant decision within the SAGs and a precursor to a potential loss of containment. The goal was to maintain consistency between a site’s SAGs and emergency classification scheme, which facilitates more timely and accurate classification assessments. The new threshold is, “It cannot be determined that core debris will be retained in the RPV.” This determination is made from the evaluation of criteria identified in the SAGs and the supporting Technical Support Guidelines. If it cannot be determined that core debris will be retained in the RPV, then subsequent events could lead to a potential challenge to primary containment integrity. This decision would occur prior to RPV failure and the release of core debris into the primary containment.

The new threshold will promote an accurate and timely General Emergency declaration, and preclude an unwarranted evacuation of the public.

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Based on the discussion above, can Containment Barrier Potential Loss threshold 2.A be revised to read, “It cannot be determined that core debris will be retained in the RPV.”

### PROPOSED SOLUTION:

Yes. Containment Barrier Potential Loss threshold 2.A may be revised to read, “It cannot be determined that core debris will be retained in the RPV.”

NOTE: The related change discussed in EPFAQ 2015-004 regarding the recommended use “SAG entry is required” for Fuel Clad Loss threshold 2.A is not affected by this EPFAQ.

During development of this EPFAQ, a conforming and non-intent change was identified. Since containment venting could be directed as part of a SAG strategy, as described above, and in the interest of clarity, emergency classification scheme developers should also make the following changes (shown in underlined text). These changes make explicit reference to SAGs in decision-making related to containment venting. SAGs were always intended to be read into the term “EOPs” (as in “EOP network”) but this change makes that intent explicit and clear.

1. Revise Containment Barrier Loss Threshold 3.B to read, “Intentional primary containment venting per EOPs/SAGs”
2. Revise the associated Basis section to read:

“EOPs or SAGs may direct primary containment isolation valve logic(s) to be intentionally bypassed, even if offsite radioactivity release rate limits will be exceeded. Under these conditions with a valid primary containment isolation signal, the containment should also be considered lost if primary containment venting is actually performed. Intentional venting of primary containment for primary containment pressure or combustible gas control in the EOPs, or for any reason in the SAGs, to the secondary containment and/or the environment is a Loss of the Containment. Venting for primary containment pressure control when not in an accident situation (e.g., to control pressure below the drywell high pressure scram setpoint while in the EOPs) does not meet the threshold condition.”

### Difference/Deviation Determination

As indicated in the “Relevant Guidance” entry, EPFAQ 2019-04-02 may be considered only by sites that have implemented NEI 99-01, Revision 6. The response above promotes alignment between BWR emergency operating procedures and emergency classification schemes; therefore, implementation of the guidance in this EPFAQ will improve the accuracy and timeliness of emergency classifications. Moreover, the responses will result in EAL

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interpretations that are consistent with the meaning and intent of NRC-approved EAL bases such that the classification of the addressed events/conditions would not be different from that approved by the NRC in a site-specific application. For this reason, it is reasonable to conclude that incorporation of the guidance from this EPFAQ into an NRC-approved site-specific scheme would be considered a “difference” in accordance with Regulatory Issue Summary (RIS) 2003-18, Supplement 2, Use of Nuclear Energy Institute (NEI) 99-01, “Methodology for Development of Emergency Action Levels,” Revision 4, dated January 2003.

### **NRC RESPONSE:**

### **RECOMMENDED FUTURE ACTION(S):**

- ☐ INFORMATION ONLY, MAINTAIN EPFAQ
- ☒ UPDATE GUIDANCE DURING NEXT REVISION