

November 28, 2017

MEMORANDUM TO: APLB File

FROM: Jay E. Robinson, Acting Chief /RA/
PRA Licensing Branch B
Division of Risk Assessment
Office of Nuclear Reactor Regulation

SUBJECT: CLOSE-OUT OF NATIONAL FIRE PROTECTION ASSOCIATION
FREQUENTLY ASKED 07-0040, REGARDING NON-POWER
OPERATIONS CLARIFICATIONS

Revision 5 to Frequently Asked Question (FAQ) 07-0040 was proposed by the licensee of the Callaway Plant through the Nuclear Energy Institute (NEI) NFPA 805 Task Force, to clarify the guidance for the treatment of spent fuel pool (SFP) cooling during non-power operating conditions in NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program under Title 10 of the *Code of Federal Regulations* 50.48(c)," Revision 2 (NEI 04-02) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081130188).

Revision 5 to FAQ 07-0040 was created to address a conflict between the definition of safe and stable provided in National Fire Protection Association (NFPA) Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, and a licensee's existing licensing basis with respect to spent fuel pool cooling. NFPA 805, Section 1.6.56, Safe and Stable Conditions, includes the requirement that for all configurations other than fuel in the vessel, head on and tensioned, "...safe and stable conditions are defined as maintaining $K_{eff} < 0.99$ and fuel coolant temperature below boiling," which is in conflict with the licensing basis for many operating reactors that currently allow the spent fuel pool to boil.

A new section was added to FAQ 07-0040 titled "Spent Fuel" that discusses the NFPA 805 definition of safe and stable, as well as a discussion of the risk of scenarios involving loss of SFP cooling. Section 3 of FAQ 07-0040 states that:

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“...the SFP is designed to place the nuclear fuel in a coolable, subcritical geometry. The larger SFP water volumes extend the response times to a fire event resulting in a loss of SFP cooling. In addition to the length of time required to boil the water in the SFP, there is substantial volume of water that would need to be boiled off to lower the level down to the top of active fuel. This results in a substantial time period available to the operators to provide makeup to the pool. Probabilistic Risk Assessments of SFP events are not typically performed as loss of SFP cooling is a slowly developing event with long periods of time for response and diverse response strategies. The slowly developing nature of SFP events in conjunction with the relatively short durations of high SFP heat loading (e.g., fully offloaded, hot core), results in a low risk of fuel damage as well as a large or early release of radiological material.”

Revision 5 of FAQ 07-0040 states that some commercial nuclear power plants have been previously approved by the U.S. Nuclear Regulatory Commission (NRC) to have licensing bases allowing boiling of the spent fuel pool. This is an acceptable alternative to the requirements in NFPA 805 since the standard specifically allows previously approved alternatives to take precedence over the requirements in the standard. In these cases, the NRC staff has already reviewed the specific design, licensing and operational aspects of that specific plant's licensing basis and made a satisfactory safety conclusion allowing the SFP to boil.

As a result of the low risk of SFP events, FAQ 07-0040 Revision 5 states that all SFP configurations are not considered risk significant and are not treated as a Higher Risk Evolution (HRE). Based on the low risk justification discussed in the FAQ, and the previous specific NRC staff approval of boiling the SFP at applicable plants, the NRC staff agrees that loss of SFP cooling does not need to be considered a HRE.

Revision 5 of FAQ 07-0040 also includes additional documentation that should be included in the NFPA 805 License Amendment Request (LAR). In previous NFPA 805 transition reviews by the NRC staff, several Requests for Additional Information (RAIs) were sent to licensees related to non-power operations (NPO) as summarized below:

- a. Document the plant HRE's which will be evaluated.
- b. Provide a list of the components (including power supplies) added, that were not included in the at-power analysis and a list of those at-power components that have a different functional requirement for NPO for the HRE evaluation.
- c. Provide a list of key safety function (KSF) pinch points by fire area that were identified in the NPO fire area reviews including a summary level identification of unavailable paths in each fire area and any accompanying actions required to mitigate the loss of the KSF.
- d. Provide a description of any actions that are credited to minimize the impact of fire induced spurious actuations on power operated valves (e.g., air-operated valves and motor-operated valves) during NPO either as pre-fire plant configuration or as required during the fire response recovery.
- e. Describe any recovery actions and instrumentation that are credited to achieve KSFs during NPO and describe how these recovery actions will be evaluated for feasibility and factored into operating procedures.

- f. Provide an overview of the SFP (fuel configuration, SFP cooling design, the typical time to boil values, and the plant procedures used and mitigation strategy for loss of SFP cooling and inventory.) If a licensee has an NRC previously approved SFP licensing basis that is different from the NFPA 805 safe and stable definition (such as the allowance for SFP boiling) it should be discussed.

Requiring licensees to provide this information in the NFPA 805 transition LAR will provide the staff with the necessary information to perform an efficient review and come to the required safety conclusion.

The staff has evaluated the FAQ 07-0040, Revision 5 proposal with respect to regulatory compliance and technical adequacy and concludes that it is consistent with the regulation and NFPA 805, as well as the guidance provided in Regulatory Guide (RG) 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," Revision 1, (ADAMS Accession No. ML092730314), and therefore, the staff finds the proposed changes acceptable. The NRC staff further concludes that that nothing in this FAQ would prevent continued endorsement of NEI 04-02 and that in accordance with Regulatory Issue Summary 2007-19 "Process for Communicating Clarifications of Staff Positions Provided in Regulatory Guide 1.205 Concerning Issues Identified During the Pilot Application of National Fire Protection Association Standard 805," (ADAMS Accession No. ML071590227), the guidance in this FAQ is acceptable for use by licensees in transition. The final endorsement of this FAQ will be addressed by the next revision to RG 1.205.

References:

For details regarding this FAQ, please see the following:

1. FAQ 07-0040, Revision 5 dated May 20, 2016, ADAMS Accession No.: ML16193A464
2. NRC Staff response to FAQ 07-0040, Revision 5, ADAMS Accession No.: ML16216A451
3. FAQ 07-0040, Revision 5a, dated May 20, 2016, ADAMS Accession No: ML16312A021
4. NRC Staff response to FAQ 07-0040, Revision 5, presented at the May 15, 2017 FAQ meeting, ADAMS Accession No: ML17166A267
5. FAQ 07-0040, Revision 5, dated May 20, 2016, ADAMS Accession No: ML17331B109

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FREQUENTLY ASKED 07-0040, REVISION 5 ON NON-POWER
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