

NRR-PMDAPEm Resource

From: Orenak, Michael
Sent: Tuesday, March 11, 2014 3:18 PM
To: BICE, DAVID B (ANO) (DBICE@entergy.com)
Subject: Unit 2 NFPA 805 additional RAIs
Attachments: ANO2 NFPA 805 FollowUp Draft RAIs MF0404 3-11-14.docx

Dave,

The NRC staff has additional follow up questions to your January 6, 2014 (ADAMS Accession No. ML14006A315) response to the staff's September 11, 2013 Request for Additional Information (RAI) (ADAMS Accession No. ML13235A005). Please see the attached draft RAIs. We request that you review these draft RAIs and provide comments or inform us if you would like a teleconference to discuss by next Tuesday, March 18th.

Please let me know if you have any questions.

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REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST TO ADOPT
NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805
PERFORMANCE-BASED STANDARD FOR FIRE PROTECTION FOR LIGHT WATER
REACTOR GENERATING PLANTS
ARKANSAS NUCLEAR ONE UNIT 2
(TAC NO. MF0404)

Fire Modeling (FM) Request for Additional Information (RAI) 01.01

In a letter dated January 6, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14006A315), the licensee responded to FM RAI 01.b and explained that the main control room (MCR) abandonment times for propagating panel fires were re-calculated assuming fire spread to adjacent panels in 10 minutes. However, a review of the revised calculations revealed that a propagation time of 12 minutes was assumed instead of 10 minutes.

Provide a quantitative assessment of the effect of correcting this error (i.e., of using a propagation time of 10 minutes instead of 12 minutes) on the MCR abandonment times, the probability for abandonment, and plant risk (core damage frequency (CDF), delta (Δ) CDF, large early release frequency (LERF) and Δ LERF).

FM RAI 01.02

In a letter dated January 6, 2014 (ADAMS Accession No. ML14006A315), the licensee responded to FM RAI 01.c and stated that they recalculated the MCR abandonment times for transient fires. However, the revised MCR abandonment time calculations consider two sets of heat release rate (HRR) curves, a set with a time to peak HRR of 2 minutes (for loose trash) and another set with a time to peak of 8 minutes (for trash in a container). The latter is presented as a “sensitivity case.”

Explain what growth time was used in the revised abandonment time calculations for transient fires in the MCR. If a growth time of 8 minutes was used for all or part of the revised calculations, provide a technical justification for this choice. Finally, explain what is meant by “sensitivity case.”

FM RAI 01.03

In a letter dated January 6, 2014 (ADAMS Accession No. ML14006A315), the licensee responded to FM RAI 01.f and 01.g and stated that new zone of influence (ZOI) and hot gas layer (HGL) tables were developed that are applicable to ignition source-cable tray configurations. The ZOI and HGL were calculated for a number of ignition sources without any intervening combustibles, and in combination with various cable tray configurations. The ZOI

dimensions and HGL temperatures are tabulated as a function of time, compartment volumes, vent sizes, and for different fire locations (open, wall, and corner) and ambient temperatures.

Provide the following information:

- a. Technical justification for the assumption that the lowest cable tray in a stack located above an ignition source ignites first when multiple trays within the stack of trays are potentially located within the fire plume or flame, (e.g., direct flame impingement on multiple trays).
- b. An explanation that provides to what extent the new ZOI and HGL tables replace the Generic Fire Modeling Treatments (GFMTs) ZOI and HGL tables and whether the latter are still used for fires involving secondary combustibles.
- c. A description of whether the new ZOI and HGL tables were used for the ignition sources without intervening combustibles and if so, how.
- d. An explanation of how the effect of ambient temperature is accounted for in the ZOI and HGL determination.

FM RAI 07

National Fire Protection Association Standard 805 (NFPA 805), "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, Section 2.4.3.3, on acceptability states: "The PSA approach, methods, and data shall be acceptable to the AHJ." The staff has noted the utilization of a number of accepted tools and methods in the analyses for transition such as the Consolidated Model of Fire Growth and Smoke Transport (CFAST) and Fire Dynamic Tools (FDTs)

- a. Identify any fire modeling tools and methods that have been used in the development of the NFPA 805 LAR that are not already documented in the license amendment request (LAR) and where their use or application is documented. Examples might include a methodology (empirical correlations and algebraic models) used to convert damage times for targets in Appendix H of NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities" to percent damage as a function of heat flux and time or Supplements to the GFMTs - Empirical Correlations and Algebraic Models.
- b. For any tool or method identified in "a." above, provide the Verification and Validation (V&V) basis if not already explicitly provided in the LAR (for example in LAR Attachment J).

FM RAI 08

In a letter dated January 6, 2014 (ADAMS Accession No. ML14006A315), the licensee responded to FM RAI 01.k and explained that during additional walkdowns, non-cable intervening combustibles were identified that were not considered in the fire modeling analyses and that an implementation item was added to LAR Attachment S, Table S-2 to ensure that these combustibles will be appropriately controlled to support transition to NFPA 805.

Since non-cable intervening combustibles, (e.g., fixed or in situ), are generally not subject to controls, the licensee's approach is not adequate. Provide a quantitative assessment of the impact on plant risk (CDF, Δ CDF, LERF and Δ LERF) of the fire scenarios that involve the non-cable intervening combustibles that were identified in the walkdowns.

FM RAI 09

Explain how high energy arcing fault (HEAF) initiated fires were addressed in the HGL calculations and Multi-Compartment Analysis (MCA) and provide technical justification for the approach that was used to calculate HGL development timing. More specifically, confirm whether the guidance provided in NUREG/CR-6850, page 11-19, fourth bullet regarding the fire growth, and the guidance provided on page M-13, sixth bullet regarding delay to cable tray ignition was followed. Also, considering the energetic nature of the HEAF events, provide justification for the HRR used in the HGL calculations for electrical cabinet fires following a HEAF.

Fire Protection Engineering (FPE) RAI 11.01

In a letter dated November 7, 2013, (ADAMS Accession No. ML13312A877) the licensee responded to FPE RAI 11 and stated that the fire brigade leader and fire brigade members are required to maintain non-licensed operator (NLO) qualifications. This qualification requires completion of plant systems training as part of a qualification program designed to give the NLO an understanding of the integrated nature and design of plant systems and structures.

NFPA 805 Section 3.4.1(c) states "the brigade leader and at least two brigade members shall have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance criteria". In Regulatory Guide (RG) 1.189, "Fire Protection for Nuclear Power Plants," Revision 2, the staff has acknowledged the following example for the fire brigade leader as sufficient: "The brigade leader should be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant systems."

Describe the training provided to the fire brigade leader that addresses their ability to assess the effects of fire and fire suppressants on nuclear safety performance criteria.