

NRR-PMDAPEm Resource

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Sent: Wednesday, August 10, 2016 3:05 PM
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Subject: Davis-Besse NFPA 805 LAR - DRAFT RAI
Attachments: MF7190 DB NFPA 805 RAI AFBP.docx

Phil,

Attached is the draft request for additional information (RAI) from the NRR Fire Protection Branch regarding the Davis-Besse NFPA 805 application. A separate draft RAI from the NRR PRA Licensing Branch will be provided later. The NRC staff will use this draft RAI during its upcoming onsite audit. The final RAI will be issued after the audit and the questions may be revised based upon the audit findings.

The staff would like to have a clarification call regarding the draft RAI in advance of the audit. Please let me know your availability to support a call later this month.

Thanks,

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Docket 50-346

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REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST TO ADOPT
NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805
FIRSTENERGY NUCLEAR OPERATING COMPANY
DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1
DOCKET NO. 50-346

By application dated December 16, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15350A314), as supplemented by letters dated February 2, March 7, and July 28, 2016 (ADAMS Accession Nos. ML16033A085, ML16067A195, and ML16210A422, respectively), First Energy Nuclear Operating Company (the licensee), submitted a license amendment request (LAR) for Davis-Besse Nuclear Power Station, Unit No. 1 (DBNPS). The proposed amendment would change the current fire protection program (FPP) at DBNPS to one based on the National Fire Protection Association Standard 805 (NFPA 805), "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," 2001 Edition, as incorporated into Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.48(c).

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittals and has determined that the additional information below is required to complete the review.

Fire Modeling (FM) Request for Additional Information (RAI) 01

NFPA 805, Section 2.4.3.3, requires that the probabilistic risk assessment (PRA) approach, methods, and data shall be acceptable to the NRC. LAR Section 4.5.1.2, "Fire PRA," states: "Fire modeling was performed as part of the Fire PRA development (NFPA 805, Section 4.2.4.2)." LAR Attachment J, "Fire Modeling V&V [Verification and Validation]," discusses the acceptability of the fire models used. Address the following questions regarding the information in LAR Attachment J, Table J-2, "Technical Basis for Fire Modeling Approaches and Methodologies."

- a. On page J-17, the LAR states that to calculate the burning area, the entire width of the cable tray was assumed to ignite and that the length of the tray assumed to initially ignite was determined by the length of the tray exposed to the fire. It is unclear from this statement how the licensee determined the initially ignited cable tray length.

Explain how the initially ignited cable tray length was determined in the calculations of fire propagation in stacks of horizontal cable trays. Provide technical justification for the approach that was used.

- b. On page J-17, the LAR states:

NUREG/CR-6850, Appendix R^[1] provides cable tray properties and guidance on determining the HRRPUA [heat release rate per unit area] and spread rate for both thermoset and thermoplastic cable trays. For most areas, DBNPS fire modeling analyses use the NUREG/CR-6850 spread rates and the most conservative NUREG/CR-6850 Table R-1 bench scale HRRPUAs (adjusted using the Lee correlation, shown in the table below) for each cable type in the fire growth analysis for cable trays. For some risk-significant fire scenarios, subsequent fire modeling refinements utilize the refined HRRPUAs recommended by NUREG/CR-7010^[2].

This statement implies that for Kerite FR cable the licensee used the generic flame spread rate for thermoset cable recommended in NUREG/CR-6850. Flames generally spread at a faster rate over the surface of an electrical cable that has a lower ignition temperature compared to a similar cable with a higher ignition temperature. Since the ignition temperature for Kerite FR cable is lower than the ignition temperature for thermoset cable, it appears that using the generic flame spread rate for thermoset cable may be nonconservative.

The table of HRRPUA values mentioned above was not provided. The licensee further states that in some cases refined HRRPUAs from NUREG/CR-7010 were used, but it is not clear what these HRRPUA values are and what the criteria were for using these values in lieu of the NUREG/CR-6850 values. Finally, it is not clear what value the licensee used for the HRRPUA of Kerite FR cable. There are no test data for Kerite FR cable in NUREG/CR-6850, but the HRRPUA was measured for Kerite HTK cable in the CHRISTIFIRE program². The Kerite HTK cable is identified in NUREG/CR-7010, Vol. 1 as #367, and it is reported in Table 9-1 of the NUREG that a HRRPUA of 210 kilowatt per square meter was measured in the radiant panel tests for this cable. It is reasonable to assume that the HRRPUA of Kerite FR is higher than that of Kerite HTK.

Provide the technical justification for the flame spread rate for Kerite FR cable that was used in the cable tray fire propagation calculations. Provide a description and technical justification for the HRRPUAs for all cables that were used in the cable tray fire propagation calculations, and explain the criteria for selecting the NUREG/CR-7010 values over the HRRPUAs recommended in NUREG/CR-6850.

- c. On page J-18, the LAR states that if fire propagation to non-cable secondary combustibles was possible, they were included in the ignition source fire growth analysis.

Explain how the time to ignition and subsequent fire propagation and heat release rate of non-cable secondary combustibles was determined.

¹ NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities," Volume 2: Detailed Methodology, dated September 2005 (ADAMS Accession No. ML15167A411).

² NUREG/CR-7010, "Cable Heat Release, Ignition, and Spread in Tray Installations during Fire (CHRISTIFIRE)," Volume 1: Horizontal Trays, published July 2012 (ADAMS Accession No. ML12213A056)

- d. On page J-19, the LAR describes the process for placing transient fires in each compartment in the fire PRA. However, the licensee did not describe how it determined the area and elevation of transient fires.

Describe and provide technical justification for the fire area and elevation that were assumed in the transient fire scenarios postulated in the fire PRA.

FM RAI 02

LAR Section 4.5.1 states: "In accordance with the guidance in RG 1.205^[3], a Fire PRA model was developed for DBNPS in compliance with the requirements of Part 4 'Requirements for Fires At Power PRA,' of the American Society of Mechanical Engineers (ASME) and American Nuclear Society (ANS) combined PRA Standard, ASME/ANS RA-Sa-2009, 'Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications,' . . ."

Part 4 of ASME/ANS RA-Sa-2009 requires damage thresholds be established to support the fire PRA. Thermal impacts must be considered in determining the potential for thermal damage of structures, systems, and components and appropriate temperature and critical heat flux criteria must be used in the analysis.

Describe the treatment of sensitive electronics throughout the plant where they are in the lower parts of a room when there is a hot gas layer in the upper part of a room. Provide technical justification for such treatment if it is assumed that the electronics do not fail.

Fire Protection Engineering (FPE) RAI 01

The licensee has proposed a license condition which would require implementation of the plant modifications listed in Table S-1, "Plant Modifications Committed," in LAR Attachment S. In addition, the LAR states that the items listed in Table S-2, "Implementation Items," will be completed prior to implementation of the NFPA 805 fire protection program. The NRC staff identified several inconsistencies between information in other sections of the LAR and Attachment S. Revise Tables S-1 and S-2, as appropriate, or justify the following inconsistencies:

- a. Table S-2 does not include the following open items identified in Table B-1: DB-0779, DB-1900, DB-0540, DB-1912, DB-1838, and DB-2041.
- b. Table S-2, Implementation Item DB-1825, references Attachment Z, which does not exist.
- c. Table B-3 states that modification DB-2033 will be tracked for implementation under LAR Attachment S. This modification is not listed in Attachment S.

³ NRC Regulatory Guide (RG) 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light Water Nuclear Power Plants," Revision 1, dated December 2009 (ADAMS Accession No. ML092730314).

- d. LAR Section 4.7.1 states that the fire protection design basis document and supporting documentation will be created as part of the transition to NFPA 805. This action is not listed as an implementation item in Table S-2.
- e. LAR Section 4.7.2 discusses the configuration control process as it applies to the requirements in NFPA 805. Changes to the configuration control process are not listed as an implementation item in Table S-2.
- f. In LAR Attachment L, Approval Request 1, the licensee stated in the discussion of defense-in-depth echelon 1, that procedure changes ensure future cable installations above suspended ceilings will be listed for plenum use or enclosed per NFPA 805, Section 3.3.5.1. The approval request and Table S-2 do not identify these procedure changes as an implementation item.
- g. Clarify if modification Item DB-1983 in LAR Attachment S, Table S-1 is the modification associated with the disposition of variance from deterministic requirement (VFDR) DB-2012.

FPE RAI 02

NFPA 805, Section 3.4.1(c), requires that the fire brigade leader and at least two brigade members have sufficient training and knowledge of nuclear safety systems in order to understand the effects of fire and fire suppressants on nuclear safety performance criteria (NSPC). Section 1.6.4.1, "Qualifications," of NRC RG 1.189, "Fire Protection for Nuclear Power Plants," Revision 2, September 2009 (ADAMS Accession No. ML092580550), states:

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.

In LAR Attachment A (p. 67), the licensee stated that the fire brigade members are qualified through a training program that is maintained by the training organization. The licensee further stated that qualification requirements detailed in its plant procedures include knowledge of plant systems, layout, and general operation, as well as firefighting skills and attack strategy.

Provide additional detail regarding the training that is provided to the fire brigade leader and members that addresses their ability to assess the effects of fire and fire suppressants on the NSPC.

FPE RAI 03

In LAR Section 4.6.2, "Overview of Post-Transition NFPA 805 Monitoring Program," Phase 3, the licensee stated that the Electric Power Research Institute (EPRI) Technical Report (TR) 1006756, "Fire Protection Surveillance Optimization and Maintenance Guide for Fire Protection Systems and Features" will be used as input for establishing reliability targets, action levels, and monitoring frequency for fire protection systems and features. The methodology in EPRI TR 1006756 is a performance-based approach to determining acceptable surveillance frequencies for fire protection systems and features that are different than the surveillance frequencies described in the appropriate NFPA code or standard. This performance-based methodology is an alternative method to meeting the NFPA code or standard for the applicable

NFPA 805 Chapter 3 requirements for the fire protection system and features. If the licensee intends to use the report as originally intended to determine or adjust fire protection surveillance frequencies then, in accordance with the requirements of 10 CFR 50.48(c)(2)(vii), the licensee needs NRC approval of this alternative method.

Confirm that EPRI TR 1006756 will only be used as input for establishing reliability targets, action levels, and monitoring frequency for fire protection systems and features. Otherwise, revise the LAR to include this methodology as an approval request.

FPE RAI 04

NFPA 805, Section 3.3.5.3, requires that electric cable construction comply with a flame propagation test acceptable to the authority having jurisdiction. In LAR Attachment A1, "Table B-1 Transition of Fundamental Fire Protection Program and Design Elements Worksheet," the licensee stated (p. 41) that it complies with NFPA 805, Section 3.3.5.3, by previous approval and referenced the NRC safety evaluation dated May 30, 1991 (ADAMS Accession No. ML033490026). The licensee described that the fire test used to qualify electric cable initially installed at the plant did not conform with the methodology required by the Institute for Electrical and Electronics Engineers (IEEE) Standard No. 383, "IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices and Connections for Nuclear Power Generation Stations," rather an alternative was used.

- a. In the NRC safety evaluation, the staff accepted the deviation based on the levels of fire protection (e.g., fire detection, fire suppression, and fire barriers) provided for safe shutdown systems and hazardous areas as described in Revision 1 of the licensee's fire area optimization report and in Revision 12 of the licensee's fire hazards analysis report. Confirm that the fire protection systems and features credited in the NRC's previous approval of the cable tests are included in LAR Table 4-3, "Summary of NFPA 805 Compliance Basis and Required Fire Protection Systems and Features." Otherwise, identify fire protection systems and features credited in the previously approved licensing action.
- b. In LAR Attachment A1 (p. 41), the licensee stated that there are limited amounts of thermoplastic cables and they account for less than 10 percent of the cables in trays. The licensee requested approval of a performance-based method in LAR Attachment L, Approval Request 2, for the installed thermoplastic cables. In its basis for maintaining the safety margin and defense-in-depth, the licensee stated that flame spread to adjacent cable trays in high density safety-related areas is reduced by the use of solid-bottom trays with a layer of ceramic fiber on top. The licensee further stated that the detailed fire models as well as the PRA identified and accounted for thermoplastic cable impacts. Identify the fire areas where this passive feature is credited in the fire risk evaluation to meet the NSPC.

FPE RAI 05

Section 2.3.2 of RG 1.205 provides guidance on using previously-approved alternatives to meet NFPA 805 requirements. The guidance indicates that licensees can use existing exemptions or deviations to demonstrate compliance with NFPA 805 provided the licensee acceptably addresses the continued validity of any exemption or deviation in effect at the time of the NFPA 805 licensee amendment application. In LAR Attachments A1 and A2, the licensee used

previous NRC-approval as the basis for complying with certain NFPA 805 Chapter 3 design elements. However, the LAR did not specify if the previous NRC approval remains valid for NFPA 805 Sections 3.3.5.1, 3.3.5.3, and 3.8.1.

Confirm that the basis for the previous NRC approval remains valid for NFPA 805 Sections 3.3.5.1, 3.3.5.3, and 3.8.1, and for any other NFPA 805 sections where the LAR does not clearly specify the previous NRC approval remains valid.

FPE RAI 06

NFPA 805, Section 3.5.5, requires that each fire pump and its driver and controls be separated from the remaining fire pumps and from the rest of the plant by rated fire barriers. In connection to this requirement, LAR Attachment L, Approval Request 4, requests approval for the remote start circuit separation configuration of the remote control circuits to each fire pump. The following information is needed for the NRC staff to review this approval request:

- a. Approval Request 4 only discusses the fire effects on control cables associated with the fire pumps, and does not discuss the routing or consequences of damage to the power cable to the electric pump. In addition, the licensee indicated that a loss of offsite power to the electric fire pump could occur due to a fire in fire compartments FF-01 and DD-01, but did not discuss the fire effects of a loss of offsite power coincident with the loss of remote and local control of the diesel fire pump.

Describe how at least one fire pump will remain available to supply the fire suppression systems, hydrants, and hose stations in the fire areas where the control cable for the diesel fire pump is affected by a fire, coincident with the loss of power to the electric fire pump.

- b. Approval Request 4 states that in fire compartments BG-01 and DD-01 cables are routed independently in solid bottom trays with a layer of ceramic fiber on top. Clarify if these passive fire protection features are credited to limit fire damage to both redundant fire pumps in fire compartments BG-01 and DD-01 to ensure that at least one fire pump will remain available to provide the required flow to credited fire suppression systems, yard hydrants, and hose stations.
- c. In its discussion of impact on the NSPC, the licensee stated:

A fire in Fire Compartment BG-01, DD-01, or FF-01 that renders the starting circuits for both fire pumps inoperable would not affect the ability to supply the required fire water during a fire since the fire pumps are not relied upon for nuclear safety functions. In the event of damage to both fire pumps' starting circuits, it would not affect the ability to perform an emergency start of the pump. The plant is also provided with an alternate means of manual suppression via fire extinguishers to contain the fire while the electric fire pump is being manually locally started.

In LAR Table 4-3, the licensee identified the automatic suppression systems in fire area DD-01 and BG-01 to be required to meet the NSPC.

Discuss how the delay in fire pump availability due to a manual local start will affect the results of the nuclear safety capability assessment (NSCA) for fire compartments DD-01 and BG-01. Describe how the fire protection defense-in-depth will be maintained if the fire pump availability is delayed to the sprinkler systems, hydrants, and hose stations.

FPE RAI 07

NFPA 805, Section 3.11.2, requires that fire barriers required by Chapter 4 include a specific fire resistance rating and be designed and installed to meet the specific fire resistance rating using assemblies qualified by fire tests. In LAR Attachment A2, for various compartments and rooms (e.g., fire compartment V-01 room 405, fire compartment DG-01 room 402), the licensee stated that it will comply with previous approval for structural steel that could not be adequately fire proofed. The licensee stated that overhead sprinklers have been provided rather than applying the fireproof coating. In LAR Table 4-3, the licensee identified fire protection systems and features that are credited to meet the NSPC required by NFPA 805 Chapter 4. The automatic sprinkler system in several rooms (e.g., rooms 402 and 405) were not identified as a system required for the previously approved licensing action. Clarify whether the sprinkler system in Rooms 402, 405, and other rooms identified in the previous approval are required systems credited to meet the NSPC.

FPE RAI 08

NFPA 805, Section 3.3.7.2, requires outdoor high-pressure flammable gas storage containers be located so that the long axis is not pointed at buildings. In LAR Attachment A1 (p. 46), the licensee stated that the hydrogen and propane storage tanks are oriented with the long axis toward buildings. The licensee stated that it complies with NFPA 805, Section 3.3.7.2, using an existing engineering equivalency evaluation. The licensee stated that outdoor flammable gas storage orientation was evaluated for compliance with NFPA 50A-1973, "Standard for Gaseous Hydrogen Systems at Consumer Sites," and NFPA 58-2004, "Liquid Petroleum Gas Code," and concluded that the orientation of the tanks is acceptable. However, NFPA 805, Section 3.3.7.2, is not associated with compliance with other codes.

The information provided in the LAR is not sufficient to support the licensee's statement that it complies with this section by use of an existing engineering equivalency evaluation. The NRC staff reviewed the evaluation as part of its audit of licensee documents (see ADAMS Accession No. ML16075A111), and it appears that the evaluation included use of an unapproved risk-informed, performance-based method.

- a. Provide a summary of the methods used in the evaluation, including any risk-informed, performance-based methods. For each risk-informed, performance-based method, explain why NRC approval is not needed or revise the application to request NRC approval in accordance with 10 CFR 50.48(c)(2)(vii).
- b. Verify that the outdoor high-pressure flammable gas storage configurations meet the distance requirements in the code of record. Demonstrate that structures, systems, and components important to nuclear safety will not be adversely impacted by a failure of the outdoor high-pressure flammable gas storage containers.

FPE RAI 09

NFPA 805, Section 3.3.7.1, requires that storage of flammable gas be located outdoors, or in separate detached buildings, so that a fire or explosion will not adversely impact systems, equipment, or components important to nuclear safety. This section also requires NFPA 50A be followed for hydrogen storage. In LAR Attachment A1 (p. 45), the licensee stated it complies in that flammable gas storage is “located outdoors, or in separate detached buildings.” The licensee also stated that it complies by previous NRC approval and included an excerpt from the NRC safety evaluation dated May 30, 1991.

The LAR does not clearly distinguish between the parts of NFPA 805, Section 3.3.7.1, DBNPS complies with and the parts it complies with by previous NRC approval. The LAR also does not sufficiently describe the specific NFPA code conformance analysis.

Clearly specify the parts of NFPA 805, Section 3.3.7.1, which DBNPS complies with and which parts it complies with by previous NRC approval. Describe the applicability of the previous NRC approval to compliance with NFPA 805, Section 3.3.7.1, that clearly connects the approval with the criteria in this element. If previous NRC approval is necessary to demonstrate compliance, confirm that the bases for approval remain valid. In addition, clarify whether the flammable gas storage is located outdoors or is in one or more separate attached buildings.

Safe Shutdown Analysis (SSA) RAI 01

NFPA 805, Section 4.2.1, requires that the effects of fire suppression activities on the ability to achieve the NSPC be evaluated. In LAR Attachment C (p. 308), the licensee stated that for fire compartment OS (Outside Areas) impacts to equipment due to activation of the automatic suppression located in OS-02, Rooms 001 and 002, are beyond the scope of the detailed fire model analysis and are to be treated as an uncertainty. Clarify the basis for the statement and describe if the fire suppression activities in these rooms will adversely affect the ability to achieve the NSPC.

SSA RAI 02

As described in NFPA 805, Chapter 1, the standard applies to plants during all phases of plant operations, including shutdown. In LAR Section 4.3.2, the licensee summarized the results of the evaluation process for non-power operations (NPO). Provide the following information pertaining to NPO discussions provided in the results discussion in LAR Section 4.3 and LAR Attachment D.

- a. LAR Section 4.3.2 states that for those components which had not been previously analyzed in support of the at-power analysis or whose functional requirements may have been different for the NPO analysis, cable selection was performed in accordance with the project procedures. Provide a general description of components that are different for the NPO analysis.
- b. LAR Attachment D states the licensee followed the guidance of FAQ 07-0040, “Non-Power Operations Clarifications,” dated August 11, 2008 (ADAMS Accession No. ML082200528). In LAR Attachment D, the licensee stated that 46 fire compartments were found to have pinch points resulting in the potential loss of one or more key safety function success paths. Clarify if any key safety function is completely lost for a fire in any of the fire compartments.

- c. During NPO modes, spurious actuation of valves can have a significant impact on the ability to maintain a key safety function. Provide a description of any actions (e.g., pre-fire rack-out, actuation of pinning valves, and isolation of air supplies) being 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.
- d. The description of the NPO review in the LAR does not identify locations where key safety functions are achieved via recovery actions (RAs) or for which instrumentation not already included in the at-power analysis is needed to support RAs required to maintain safe and stable conditions. Identify those RAs and instrumentation relied upon in the NPO, and describe how RA feasibility is evaluated. Include in the description whether these variables have been or will be factored into operator procedures supporting these actions.

SSA RAI 03

In LAR Section 4.2.1.1, the licensee indicated that the method used to perform the NSCA either meets the NRC-endorsed guidance in Chapter 3 of Nuclear Energy Institute (NEI) 00-01, "Guidance for Post Fire Safe Shutdown Circuit Analysis," Revision 2 (ADAMS Accession No. ML091770265), or meets the intent of the endorsed guidance with adequate justification. NEI 00-01, Section 3.5.1.1, states that for ungrounded direct-current circuits, multiple shorts-to-ground are to be evaluated for their impact and a single hot short from the same power source is assumed to occur unless it can be demonstrated that the occurrence of a same source short is not possible in the affected fire area. In LAR Attachment B, "Table B-2 Nuclear Safety Capability Assessment, Methodology Review," the licensee stated that it aligns with the intent of the NEI 00-01 guidance. However, in its discussion relative to multiple high impedance faults, the licensee stated that existing circuit analyses relied on ungrounded direct-current circuits of the proper polarity not faulting in some cases. Provide the technical basis for the assumption that ungrounded direct-current circuits of the proper polarity will not fault and discuss how this methodology meets the intent of the guidance in NEI 00-01 with respect to circuit failures for ungrounded direct-current circuits.

SSA RAI 04

In LAR Section 4.2.1.1, the licensee indicated that the method used to perform the NSCA either meets the NRC-endorsed guidance in Chapter 3 of NEI 00-01, Revision 2, or meets the intent of the endorsed guidance with adequate justification. NEI 00-01, Section 3.5.1.2, describes the spurious operation criteria to address the effect of multiple spurious operation. In LAR Attachment B, the licensee stated that it is "Not in Alignment, but no Adverse Consequences," with the NEI 00-01 guidance. However, in the alignment basis, the licensee stated that emergent industry issues related to multiple spurious operations are being addressed during the transition to NFPA 805, and that the issues were reviewed and analyzed per the guidance provided in NEI 00-01 and NEI 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)," Revision 2, (ADAMS Accession No. ML081130188). In LAR Attachment F, the licensee stated it conducted the review of multiple spurious operations in accordance with NEI 04-02, Revision 1, and RG 1.205, Revision 0, as supplemented by FAQ 07-0038, "Lessons Learned on Multiple Spurious Operations" (ADAMS Accession No. ML110140242).

It is not clear what methodology is not in alignment with the methods endorsed by the NRC staff in guidance documents NEI 00-01, NEI 04-02, and FAQ 07-0038. Describe the specific methodology that is not in alignment with NEI 00-01 and provide justification for not meeting the NEI guidance.

SSA RAI 05

NFPA 805, Section 4.1, requires that once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design and qualification shall meet the applicable requirement of Chapter 3. In LAR Table 4-3, the licensee identified that 1-hour fire rated electrical raceway fire barrier systems (ERFBS) are credited in fire compartment A-08 to protect cables that are required to achieve and maintain the NSPC. In LAR Table 4-3, under the heading "Other" the licensee also identified that 1-hour fire rated ERFBS and cable tray systems that are protected on three sides by metal covers and on top by ceramic fiber (e.g., Kaowool) are credited to protect selected cables for risk reduction.

Clarify the basis for differentiating these "other" types of fire barrier features from the fire barriers credited as an ERFBS, and clarify whether these "other" types of fire barriers systems will meet NFPA 805, Section 3.11.5, or the appropriate Chapter 3 requirement. If these "other" types of fire barrier systems will not meet NFPA 805, Section 3.11.5, describe and justify how the risk reduction credit will be determined.

SSA RAI 06

NFPA 805, Section 4.3.2 allows the use of RAs to demonstrate availability of a success path for the NSPC, and feasibility of the RA can be demonstrated by applying the feasibility criteria and guidance in Frequently Asked Question (FAQ) 07-0030, "Establishing Recovery Actions," (see ADAMS Accession Nos. ML103090602 and ML110070485). One of the criteria in FAQ 07-0030 is to perform periodic drills that simulate the conditions to the extent practical. In LAR Attachment G, "Recovery Actions Transition," the licensee stated that it will update the fire brigade drills after completion of the procedures and training, and identified this as an Implementation Item DB-1941 in LAR Attachment S, Table S-2. The activities performed by the fire brigade are generally focused on fire fighting and suppression of a fire in the plant, so it is unclear how an update to the fire brigade drills is associated with RAs credited to meet the NSPC. Discuss the specific changes to be made to the fire brigade drills and confirm that the fire brigade members are not credited to perform any RAs required to meet the NSPC.

SSA RAI 07

The nuclear safety goal described in NFPA 805, Section 1.3.1, requires that reasonable assurance be provided such that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition. In LAR Section 4.2.1.2, the licensee described the methods used to maintain safe and stable hot standby conditions. The licensee stated that inventory makeup to the reactor coolant system (RCS) will be required to account for nominal RCS leakage and RCS shrinkage due to cooldown, as well as reactor coolant pump (RCP) seal injection. In LAR Attachment G, the licensee identified a number of RAs associated with VFDRs that involve a loss of RCP seal cooling via the RCP seal injection flow path (e.g., VFDRs DB-1029, DB-1381, DB-1383). The licensee stated that within 8 hours, the RA will involve either manually aligning seal injection flow to all the RCP seals, manually align component cooling water to the RCP thermal barrier or

cooling down the RCS to place the plant between 280 °F and 350 °F. The first two options re-establish RCP seal cooling to prevent a loss-of-coolant accident through the seal.

Provide justification that maintaining the RCS temperature between 280 °F and 350 °F is equivalent to maintaining RCP seal cooling sufficient to prevent RCP seal failure. Clarify if the operator activities to cool down the plant to an RCS temperature between 280 °F and 350 °F are required to maintain safe and stable conditions. Describe the specific RAs required to be performed, if any, to achieve and maintain this condition.

SSA RAI 08

NFPA 805, Section 4.2.4, requires that when the use of RAs has resulted in the use of a performance-based approach, the additional risk presented by their use is to be evaluated. In LAR Attachment G (p. G-51), the licensee identified an RA required for risk reduction in fire compartment G-02, which is associated with tripping the auxiliary feed pump 1 and its solenoid control valve, and indicated that this RA is associated with VFDR DB-1184. However, this VFDR is not identified in the NSCA summary for fire compartment G-02 in LAR Attachment C.

Clarify whether VFDR DB-1184 is applicable to fire compartment G-02. If so, confirm that the RA identified for fire compartment G-02 is required, and that the additional risk presented by its use was evaluated in this fire compartment.

SSA RAI 09

NFPA 805, Section 4.2.4, requires that when the use of RAs results in the use of a performance-based approach, the additional risk presented by their use be evaluated. In LAR Attachment C, the licensee identified RAs as required to meet the risk, safety margin, and defense-in-depth acceptance criteria in the resolution of VFDR DB-1923 in fire compartment II-01 and VFDRs DB-1227 and DB-1268 in fire compartment V-01. However, the licensee did not identify the RAs in LAR Attachment G. Provide any additions to LAR Attachment G, as appropriate, and address the following:

- a. Clarify whether the RAs are required for risk or defense-in-depth to resolve VFDRs DB-1923, DB-1227, and DB-1268. If so, verify that the RA is feasible, and verify that the additional risk of their use has been included in the fire area risk reported in LAR Attachment W.
- b. Confirm that there are no other VFDRs in the NSCA that credit RAs to meet the NSPC which are not identified in LAR Attachment G. Identify any discrepancies, clarify whether the RA is required to meet the NSPC, and verify that the RA is feasible.

SSA RAI 10

NFPA 805, Section 4.2.1, requires that one success path necessary to achieve and maintain the NSPC be maintained free of fire damage by a single fire. In LAR Attachment C, for all fire compartments, the licensee listed VFDR DB-2012, which involves fire damage to makeup pumps that could affect achieving the NSPC associated with RCS inventory and pressure control. An RA is identified for all fire compartments in LAR Attachment G for VFDR DB-2012, but LAR Attachment C does not identify an RA as required in the disposition of the VFDR. Clarify the disposition of VFDR DB-2012, including the need for an RA.

SSA RAI 11

NFPA 805, Section 4.1, requires that once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design and qualification shall meet the applicable requirements of Chapter 3. In LAR Table 4-3, the licensee identified that “other” fire protection features are credited in a licensing action, and identified Licensing Action 8, “Manhole MH3001 Cable Separation,” in LAR Attachment C as required to meet the NSPC. However, LAR Attachment K does not identify any fire protection system or feature required for the basis of the previous approval of Licensing Action 8.

Clarify whether fire protection systems and features are required in Licensing Action 8 to meet the NFPA 805 Chapter 4 requirements, and verify that it meets the applicable NFPA 805 Chapter 3 requirement.