UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 11, 2013

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 – REQUEST FOR ADDITIONAL INFORMATION REGARDING ADOPTION OF NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NFPA-805 (TAC NO. MF0404)

Dear Sir or Madam:

By letter dated December 17, 2012 (Agencywide Documents Access and Management System Accession No. ML12353A041), Entergy Operations, Inc. (the licensee), submitted a license amendment request (LAR) to transition its fire protection licensing basis at the Arkansas Nuclear One, Unit 2 (ANO-2), from paragraph 50.48(b) of Title 10 of the *Code of Federal Regulations* (10 CFR) to 10 CFR 50.48(c), "National Fire Protection Association Standard NFPA-805" (NFPA-805).

The U.S. Nuclear Regulatory Commission staff reviewed the application and conducted an NFPA-805 LAR Fire Audit at the plant site during the week of July 15, 2013, and determined that additional information is needed to complete the review of the LAR. A draft request for additional information (RAI) was provided to ANO-2 at the audit. In addition, on August 22, 2013, there was a clarification call with ANO-2 regarding the NFPA-805 LAR Audit RAIs, where the response times proposed by the licensee were also discussed.

Enclosed is the RAI for your consideration and response. The response times that were agreed upon are in the table below.

RAI	Response Time
FPE RAIs 01 through 11 SSA RAIs 02, 03, 04, 06 through 09 PROG RAIs 01 through 05 FM RAI 02, 03, RAD RAIS 01 and 02 PRA RAIs 01 (all except d and g), 02, 03, 04, 06, 07, 09, 11, 12, 13, 18, 19	60 Days
SSA RAIs 01 and 05 FM RAI 05 PRA RAIs 01d, 01gii, 05, 08, 10, 15	90 Days
FM RAI 01, 04, 06 PRA RAIs 01gi, 03 (results), 06 (results), 10 (results), 14, 16, 17	120 Days

Please note that review efforts on this task (TAC No. MF0404) are continuing, and additional RAIs may be needed.

If you have any questions, please contact me at (301) 415-1480 or by e-mail at kaly.kalyanam@nrc.gov.

Sincerely,

N. Kalyanam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST TO ADOPT NFPA-805

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

Fire Protection Engineering (FPE)

FPE RAI 01

The compliance basis in license amendment request (LAR) dated December 17, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12353A041) Attachment A, Table B-1, Element 3.3.1.2(5) refers to an Implementation Item S2-4 in LAR Attachment S that states that procedure EN-DC-161, "Control of Combustibles," will be revised to include the following:

> In accordance with NFPA 30, applicable NFPA Standards are considered to be equivalent to those NFPA Standards identified in the current license basis (CLB) for procedures and systems in the fire protection program that are transitioning to NFPA-805.

National Fire Protection Association (NFPA) 30, "Flammable and Combustible Liquids Code," does not address the current license basis for any plant. Please clarify the above statement.

FPE RAI 02

LAR Attachment K includes two exemptions from Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix R, that are requested to be transitioned. The evaluation for transition of these previously approved licensing actions does not clearly state that the basis for the exemptions and previous approval remain valid per the guidance in Section 2.3.1 of Regulatory Guide (RG) 1.205, "Risk-Informed, Performance-Based Fire Protection for Existing Light-Water Nuclear Power Plants," and Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Fire Protection Program Under 10 CFR 50.48(c)." Describe the validity of using these previously approved exemptions to meet NFPA-805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants, 2001 Edition." Please include a discussion of any changes or modifications that have been made to the plant that impact the basis for the exemptions.

FPE RAI 03

In LAR Attachment L, Nuclear Regulation Commission (NRC) approval is requested for Arkansas Nuclear One, Unit 2 (ANO-2) applications of epoxy floor coatings that may not meet NFPA-805, Section 3.3.3, "Interior Finishes." The basis for the request states the coatings meet

NFPA 101, "Life Safety Code," Class A or American Society for Testing and Materials (ASTM) E84, "Standard Test Method for Surface Burning Characteristics of Building Materials," flame spread criteria with the exception of Douchem 9400. The LAR contains no further discussion of the properties of Douchem 9400. Please provide the classification or flame spread rating for Douchem 9400, and a justification for its use at ANO-2.

FPE RAI 04

In LAR Attachment L, the following statement (or similar) is provided for Chapter 3 Elements, 3.3.3, 3.3.5.1, 3.3.5.2, and 3.3.12(1), with regard to meeting safety margin:

> These precautions and limitations on the use of these materials have been defined by the limitations of the analytical methods used in the development of the fire probabilistic risk assessment (PRA). Therefore, the inherent safety margin and conservatisms in these methods remain unchanged."

These statements are general. Please clarify how safety margin is maintained within the context of each of the subject approval requests.

FPE RAI 05

In LAR Attachment L, NRC approval is requested for oil mist resulting from normal operation of the reactor coolant pump oil collection system. The majority of the supporting discussion is associated with the previous NRC approval of the oil collection system as addressed by the existing exemptions being transitioned (see LAR Attachment K). Please provide additional technical justification addressing the following items:

a. Characterization of the misting in terms of oil quantity and location of deposition.
b. Discussion of the fire hazard associated with the oil misting and deposition locations, including proximity to equipment necessary to meet nuclear safety performance criteria.
c. What actions, if any, are taken to clean oil mist deposits from equipment surfaces (e.g., during maintenance outages)?

FPE RAI 06

In LAR Attachment L, NRC approval is requested for deviations from NFPA-805, Section 3.5.3 regarding fire pump compliance with NFPA 20, "Standard for the Installation of Stationary Pumps for Fire Protection." The "Basis for Request" and "Conclusion" cite historic testing and experience as reason to accept the identified deviations from the code requirements. Please provide additional summary discussion of the historic testing and operating experience, as well as the current routine testing and maintenance that support the conclusions and basis for approval.

FPE RAI 07

In LAR Attachment L, NRC approval is requested for non-fire protection use of the fire protection water supply system. The approval request describes the use of a temporary fire

pump to supply cooling water during unit outages when the auxiliary cooling water (ACW) system is out of service. The approval request states the fire water supply system has excess capacity to supply the demands of the system to the greatest hose reel demand. Please provide additional technical justification addressing the following items:

a. Describe the configuration of the temporary fire pump, including all connections when supplying the ACW system.
b. Describe the normal fire pump configuration, alignment, and operation with the temporary pump in-service.
c. Per NFPA-805, Section 3.5.1(b), the fire water supply must be capable of providing 500 gallons per minute for manual hose streams plus the largest demand of any sprinkler or water spray system. Describe the capability to meet the NFPA-805 required demand in addition to the temporary cooling system demand.

FPE RAI 08

LAR Table 4-3 indicates that no detection or suppression is required in Fire Area K. LAR Attachment C, Fire Area K, indicates that no suppression or detection is installed, but also indicates detection is required for existing engineering equivalency evaluations. Please resolve the discrepancy.

FPE RAI 09

Incipient detection is being installed in Fire Area B-4 (LAR Attachment S, Modification S1-10). Please provide more details regarding system design features, NFPA code(s) of record, installation, acceptance testing, set-point control, alarm response procedures and training, and routine inspection, testing, and maintenance that will be implemented to credit the new incipient detection system.

FPE RAI 10

In LAR Attachment C, Fire Area G, the discussion on fire suppression effects on nuclear safety performance criteria states automatic suppression in this fire area is limited to the cable spreading room. This Fire Area includes two cable spreading rooms (CSRs). In addition, based on review of the fire risk evaluation (FRE), fire hazards analysis, and plant drawings, it appears that fire zone 2136-I and 2137-I also have water-based suppression systems. Please provide a justification for not including these systems in the suppression effects discussion in Attachment C for this fire area.

FPE RAI 11

NFPA-805, Section 3.4.1(c) specifically requires the fire brigade leader and two members to have sufficient training and knowledge of nuclear safety systems to understand the effects of fire and fire suppressants on nuclear safety performance criteria. In 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 and at least two brigade members should have sufficient training in or knowledge of plant systems to understand the effects of fire and fire suppressants on safe-shutdown capability. 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."

LAR Attachment A, Table B-1, Section 3.4.1(c) indicates compliance with this requirement. The compliance basis does not specifically address the training and knowledge given these members of the fire brigade.

Please describe how the requirements of NFPA-805 Section 3.4.1(c) are met with regard to training and knowledge for the brigade leader and at least two of the brigade members.

For some period of time, the fire protection licensing basis for ANO-2 will be NFPA-805 and the licensing basis for ANO-1 will be Appendix R. During this time, the fire brigade will continue to be composed of personnel from each unit. Please describe how the different licensing bases will be addressed in the training and knowledge of fire brigade members that respond to both ANO-1 and ANO-2.

Safe Shutdown Analysis (SSA)

SSA RAI 01

LAR Attachment B references the following documents relative to demonstrating alignment with NFPA-805, Section 2.4.2, Nuclear Safety Capability Assessment (NSCA):

a. CALC-85-E-0087-01, Safe Shutdown Capability Assessment (SSCA)
b. CALC-85-E-0087-23, Safe Shutdown Equipment List (SSEL) Methodology
c. CALC-85-E-0087-24, Safe Shutdown Cable Analysis
d. CALC-85-E-0086-02, Manual Action Feasibility Methodology and Common Results

These calculations address current Appendix R compliance but contain little or no reference relative to compliance with NFPA-805. Provide additional discussion of how these documents support meeting NFPA-805, Section 2.4.2, what changes are necessary for transition, and the status of NFPA-805 nuclear safety capability analyses if different from the results presented in these documents.

SSA RAI 02

LAR Section 4.2.1.1 states the NSCA methodology was evaluated against the guidance of NEI 00-01, "Guidance for Post-Fire Safe Shutdown Circuit Analysis," Revision 1 and a gap analysis was performed to NEI 00-01, Revision 2. LAR Attachment B, Element 3.5.1.1 states in the alignment basis that for ungrounded direct current (DC) circuits, proper polarity shorts causing spurious operation were only considered credible for high-low pressure interface components. Describe how ANO-2 meets the criteria in NEI 00-01, Revision 2, Section 3.5.1.1 for evaluating proper-polarity DC faults on non-high low pressure interface components.

SSA RAI 03

The Alignment Basis for LAR Attachment B, Element 3.5.1.5 [C, Likelihood of Undesired Consequences] (page B-92) states a multi-spurious operation (MSO) expert panel was assembled to determine the scenarios that could significantly impair the ability to achieve and maintain hot standby. The reference document for this element is the licensee's manual action feasibility analysis and does not address the expert panel MSO analysis. Please provide the appropriate reference that supports the alignment basis statement.

SSA RAI 04

In LAR Attachment C:

a) Fire Area G, the disposition for the variance from deterministic requirement (VFDR) G-03 identifies a recovery action (RA) for 2CV-1066-1 to isolate SG-B blowdown. This RA is not identified in the Attachment C summary for this fire area or in Attachment G.

Please provide a revised Attachment C Summary for Fire Area G, and a revised Attachment G that includes the RA for component 2CV-1006-1.

b) Fire Area EEU, the summary lists four components under "Credited Recovery Actions."

- 2CV-1026-2 EFW discharge valve
- 2CV-1076-2 EFW discharge valve
- 2EFW-5A EFW manual cross-tie valve
- 2EFW-5B EFW manual cross-tie valve

These components are also included in LAR Attachment G, as associated with VFDR EEU-01. However, the disposition for VFDR EEU-01 in LAR Attachment C does not include these RAs.

Fire Area GG, the summary lists 2CV-0789-1 under "Credited Recovery Actions." This component is also included in LAR Attachment G, as associated with VFDR GG-02. However, the disposition for VFDR GG-02 in LAR Attachment C does not include this RA.

Fire Area JJ, the summary lists 2CV-5649-1 and 2CV-5650-2 under "Credited Recovery Actions." These components are also included in LAR Attachment G, as associated with VFDR JJ-02. However, the disposition for VFDR JJ-02 in LAR Attachment C does not include discussion of these components.

Fire Area MM, the Summary lists several components under "Credited Recovery Actions."

- 2A-113 offsite power breaker
- 2A-213 offsite power breaker
- 2CV-1025-1 EFW discharge valve
- 2CV-1036-2 EFW discharge valve
- 2CV-1075-1 EFW discharge valve
- 2CV-1038-2 EFW discharge valve

These components are also included in LAR Attachment G, as associated with VFDR MM-01. However, the disposition for VFDR MM-01 in LAR Attachment C does not include discussion of these components.

Fire Area SS, the Summary lists 2EFW-802 under "Credited Recovery Actions." This component is also included in LAR Attachment G, as associated with VFDR SS-01. However, the disposition for VFDR SS-01 in LAR Attachment C does not include discussion of this component.

Fire Area TT, the Summary lists 2A-309 under "Credited Recovery Actions." This component is also included in LAR Attachment G, as associated with VFDR TT-01. However, the disposition for VFDR TT-01 in LAR Attachment C does not include discussion of this component.

Provide a revised Attachment C that includes the RAs in the disposition of VFDR-EEU-01; VFDR-GG-02; VFDR-JJ-02; VFDR-MM-01; VFDR-SS-01; and VFDR TT-01.

SSA RAI 05

NFPA-805, Section 1.1, states, "This standard specifies the minimum fire protection requirements for existing light water nuclear power plants during all phases of plant operation, including shutdown, degraded conditions, and decommissioning." Please provide the following pertaining to non-power operations (NPO) discussions provided in Section 4.3 and Attachment D of the LAR:

a) Provide additional description of the six shutdown conditions used in the outage management process to define risk of operations.
b) Section 4.3.2 and Attachment D of the LAR states that for those components which had not previously been analyzed in support of the at-power analysis, the equipment was evaluated and added to the Plant Data Management System (PDMS). The LAR stated that all new circuit analyses were performed in accordance with existing methodologies established at ANO consistent with the guidance in NEI 00-01. Provide a list of the additional components and a list of those at-power components that have a different functional requirement for NPO. Describe the difference between the at-power safe shutdown function and the NPO function. Include with this list a general description by system indicating why components would be selected for NPO and not be included in the at-power analysis.
c) LAR Attachment D states the licensee followed the guidance of frequently asked questions (FAQ) 07-0040, "Non-Power Operations Clarifications" (ADAMS Accession No. ML082200528). Provide a list of key safety functions (KSF) pinch points by fire area that were identified in the NPO fire area reviews using FAQ 07-0040 guidance including a summary level identification of unavailable paths in each fire area. Describe how these locations will be identified to the plant staff for implementation.
d) During NPO modes, spurious actuation of valves can have a significant impact on the ability to maintain decay heat removal and inventory control. Provide a description of any actions 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 (e.g., pre-fire rack-out, actuation of pinning valves, and isolation of air supplies).

e) During normal outage evolutions certain NPO credited equipment will have to be removed from service. Describe the types of compensatory actions that will be used during such equipment down-time.

f) The description of the NPO review for the LAR does not identify locations where KSFs are achieved via 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 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 06

LAR Attachment F states the licensee followed the guidance of FAQ 07-0038, "Lessons Learned on Multiple Spurious Operations," and describes the multiple spurious operations (MSO) expert panel as being conducted in 2005, and a later review the generic pressurized water reactors MSO list from NEI 00-01, Revision 2. The FAQ guidance suggests the use of the licensee's safe shutdown analysis, probabilistic risk assessment (PRA) insights, and operating experience as sources for identifying and evaluating MSOs. Describe the use of plant-specific fire PRA or NSCA analyses that were performed since the original expert panel in 2005, as well as plant operating experience, in identifying any additional MSOs or insights to existing MSOs. If these subsequent plant specific analyses have not been reviewed, please provide a basis for their exclusion.

SSA RAI 07

LAR Section 4.2.1.3 and Attachment G describe that recovery action feasibility was assessed per the methods and criteria of FAQ 07-0030, "Establishing Recovery Actions." LAR Attachment B, Element 3.4.1.4 states the process defined in FAQ 07-0030 was used to determine recovery actions. Attachment G, under "Results of Step 4," references the Fire Risk Evaluations (FREs) and CALC-85-E-0086-02, "Manual Action Feasibility and Common Results," for the feasibility assessment against the criteria of the FAQ.

The calculation referenced for the feasibility analysis addresses manual action feasibility for compliance with Appendix R and although the feasibility criteria described in the calculation appear consistent with the FAQ, the calculation does not address or reference the FAQ. Please provide the following:

a. Confirm the recovery actions necessary to meet NFPA-805 were assessed to the FAQ 07-0030 methods and the 11 feasibility criteria or provide a comparison of the feasibility criteria in CALC-85-E-0086-02 to that of the FAQ.
b. CALC-85-E-0086-02 addresses Appendix R manual actions. Confirm that the calculation addresses all the recovery actions listed in LAR Attachment G.
c. Describe the actions necessary to transition the referenced manual action analysis to one that meets NFPA-805 and Regulatory Guide 1.205.

SSA RAI 08

LAR Attachment L contains an approval request related to NFPA-805 Section 3.5.16 for non-fire protection use of the fire protection water supply system. The approval request describes the use of a temporary fire pump to supply cooling water during unit outages when the ACW system is out of service. If fire water to the ACW system must be secured in the event of a fire, what is the impact of losing this cooling capability on achieving key safety functions and meeting the nuclear safety performance criteria?

SSA RAI 09

Attachment S, Modification S1-10 describes incipient detection to be installed in Fire Area B-4. Please describe if this proposed detection system is credited to initiate any operator actions for safe shutdown.

Programmatic RAI 01

Based on the NRC staff's review of the LAR and during the subsequent audit, it was determined that the licensee did not adequately describe the post-transition NFPA-805 fire protection program licensing basis.

Please describe the specific documents (e.g., analysis, designs, and engineering reviews) that will comprise the post transition NFPA-805 fire protection program (FPP) licensing basis. In addition, describe whether these documents prepared to support the NFPA-805 FPP will be managed as controlled documents under the licensee's document control process.

Programmatic RAI 02

Based on the NRC Staff's review of the LAR and associated documentation, it was determined that the LAR did not provide the information needed for the NRC staff to evaluate what changes will be made to the FPP to incorporate NFPA-805 requirements.

Please describe the changes that are planned to the FPP as part of the NFPA-805 transition process specifically associated with training and identification of the positions where any such training necessary would be to support the fire protection program changes.

Programmatic RAI 03

NFPA-805, Section 2.7.3.4, "Qualification of Users", states that cognizant personnel who use and apply engineering analysis and numerical models (e.g., fire modeling techniques) shall be competent in that field and experienced in the application of these methods as they relate to nuclear power plants, nuclear power plant fire protection, and power plant operations.

Please describe how the training program will be revised to support the NFPA-805 change evaluation process, including positions that will be trained and how the training will be implemented (e.g., classroom, computer-based, reading program).

Programmatic RAI 04

LAR Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA-805," does not indicate whether future NFPA-805 analyses will be conducted in accordance with the requirements of NFPA-805, Section 2.7.3. Please describe whether future NFPA-805 analysis will be conducted in accordance with NFPA-805, Section 2.7.3.

Programmatic RAI 05

LAR Attachment S, Table S-1, "Plant Modifications Comrnitted" listed the proposed modifications S1-12; S1-13; S1-14; S1-16. With respect to compensatory measures currently in place, please provide a statement regarding whether or not compensatory measures have been implemented in accordance with the plant's fire protection program for the listed modifications.

Fire Modeling RAI 01

NFPA-805 Section 2.4.3.3, states, "The PSA [probabilistic safety assessment] approach, methods, and data shall be acceptable to the AHJ [authority having jurisdiction] ...." The NRC staff noted that fire modeling comprised the following:

- The Consolidated Fire Growth and Smoke Transport (CFAST) model was used to calculate control room (CR) abandonment times and to evaluate development and timing of hot gas layer conditions in selected fire zones.

- Heskestad's plume temperature correlation was used to determine Severity Factors.

- The Generic Fire Modeling Treatments (GFMT) approach was used to determine the zone of influence (ZOI) in all fire areas throughout plant.

- FLASH-CAT for calculating fire propagation in stacks of horizontal cable trays.

- HEATING 7.3 was used in the assessment of the fire resistance of conduit embedded in concrete to justify exclusion of such conduit from fire zones.

LAR Section 4.5.1.2, "Fire PRA" states that fire modeling was performed as part of the Fire PRA development (NFPA-805 Section 4.2.4.2). Reference is made to LAR Attachment J, "Fire Modeling V&V [verification and validation]," for a discussion of the acceptability of the fire models that were used.

Specifically regarding the acceptability of CFAST for the CR abandonment time study:

a) Please provide the basis for the assumption that the fire brigade is expected to arrive within 15 minutes. In addition, describe the uncertainty associated with this assumption, discuss possible adverse effects of not meeting this assumption on the results of the fire PRA and explain how possible adverse effects will be mitigated.

b) Provide technical justification for the assumption that fire spreads to adjacent cabinets in 15 minutes, and not in 10 minutes as recommended in Appendix S of NUREG/CR-6850, "Fire PRA Methodology for Nuclear Power Facilities," for the case when cables in the adjacent cabinet are in direct contact with the separating wall.

c) LAR Table H-1, "NEI 04-02 FAQs Utilized in LAR Submittal," credits FAQ 08-0052, "Transient Fires Growth Rates and Control Room Non-Suppression" (ADAMS Accession No. ML092120501, closure memo). Provide justification for using transient fire growth rates that differ from those specified in FAQ-08-0052, and discuss the effect of these deviations on the risk results (i.e., core damage frequency (CDF), large early release frequency (LERF), ΔCDF and ΔLERF).

d) Provide technical justification for applying the hot gas layer smoke concentration and temperature modifications in the analysis that resulted in the CR abandonment times used in the Fire PRA.

Specifically regarding the acceptability of the Generic Fire Modeling Treatments approach:

e) Please explain how the modification to the critical heat flux for a target that is immersed in a thermal plume was used in the zone-of-influence (ZOI) determination.

f) Provide technical justification to demonstrate that the GFMTs approach as used to determine the ZOI of fires that involve multiple burning items (e.g., an ignition source and an intervening combustible such as a cable tray) is conservative and bounding.

g) Describe how the flame spread and fire propagation in cable trays and the corresponding heat release rate (HRR) of cables was determined, and provide technical justification for the methodology that was used. Explain how the flame spread, fire propagation and HRR estimates affect the ZOI determination and hot gas layer temperature calculations.

h) Describe how transient combustibles in an actual plant setting are characterized in terms of the three fuel package groupings in Supplement 3, "Transient Ignition Source Strength" of the GFMT. Identify areas, if any, where the NUREG/CR-6850 transient combustible HRR characterization (probability distribution and test data) may not encompass typical plant configurations. Finally, explain how any administrative action will be used to control the type of transient combustibles in a fire area.

Specifically regarding the evaluation of development and timing of hot gas layer conditions:

i) Please explain why the heat release rate per unit area and flame spread rate values for thermoplastic cables were used in the FLASH-CAT cable tray fire propagation calculations.

j) Explain why the modification to the smoke concentration in the CR abandonment time analysis was not applied in the CFAST calculations of smoke detector response timing in Fire Zone 2098-C.

Regarding the acceptability of the PSA approach, methods, and data in general:

k) Please address how it was assured that non-cable intervening combustibles were not missed in areas of the plant. Provide information on how intervening combustibles were identified and accounted for in the fire modeling analyses and the FREs.

l) Explain why wall and corner effects were only considered for transient ignition sources, and not for fixed ignition sources.

m) It appears from Table 4-3 in the LAR that there are 59 fire zones where some credit is taken in the Fire PRA for detection or suppression. Explain the process for determining which targets are damaged before suppression occurs.

n) LAR Table 4-3 indicates that selected fire zones have "partial" detection or suppression. Explain what "partial" means in this context, and whether partial coverage was credited.

Fire Modeling RAI 02

American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) Standard RA-S-2008, "Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessments for Nuclear Power Plant Applications," Part 4, requires damage thresholds be established to support the fire PRA. Thermal impact(s) must be considered in determining the potential for thermal damage of systems, structures, and components. Appropriate temperature and critical heat flux criteria must be used in the analysis. During the audit, the damage criteria used for cables, sensitive electronics and component failures due to smoke damage was discussed.

NFPA-805, Section 2.5, requires damage thresholds be established to support the performance-based approach. Thermal impact(s) must be considered in determining the potential for thermal damage of structures, systems, or components. Appropriate temperature and critical heat flux criteria must be used in the analysis.

Section 6.1 of the Fire Scenario Report states that, "Since the cables used at ANO-2 are IEEE [Institute of Electrical and Electronics Engineers]-383 qualified cables, the damage threshold for these cables specified in NUREG/CR 6850 is used in this evaluation (Safe Shutdown Cable Jacket Insulation Types at ANO [8] documents the basis for cable qualification at ANO)."

During the audit, the licensee stated that, "NUREG/CR-6850 recommends failure criteria for solid-state control components of 3 kW/m^2 (versus 11 kW/m^2 for IEEE-383 qualified cables and 6 kW/m^2 for non-IEEE-383 qualified cables) be used for screening purposes. However, given that the enclosure would provide protection to the sensitive internal contents from external fire effects, it is reasonable to apply the same zone of influence established for cable damage. Credit for the enclosure is judged to provide sufficient margin to allow use of the cable damage criteria for sensitive electronics."

Please provide technical justification for using cable damage thresholds for temperature sensitive equipment located inside cabinets.

Fire Modeling RAI 03

NFPA-805, Section 2.7.3.2, "Verification and Validation," states: "Each calculational model or numerical method used shall be verified and validated through comparison to test results or comparison to other acceptable models."

LAR Section 4.5.1.2, "Fire PRA" states that fire modeling was performed as part of the fire PRA development (NFPA-805 Section 4.2.4.2). Reference is made to LAR Attachment J, "Fire Modeling V&V," for a discussion of the V&V of the fire models that were used.

Furthermore, LAR Section 4.7.3 "Compliance with Quality Requirements in Section 2.7.3 of NFPA-805" states "Calculational models and numerical methods used in support of compliance with 10 CFR 50.48(c) were verified and validated as required by Section 2.7.3.2 of NFPA-805."

Regarding the V&V of fire models:

a) It is stated on page J-2 of LAR Attachment J that "CFAST does not use a fire diameter, therefore, it is possible to specify a fire that falls within the range of Froude numbers considered in the NUREG-1824 validation documentation."
Please provide confirmation that this is true for all the CFAST model calculations or justify why CFAST is appropriate for use with Froude numbers outside the validated range.

b) It is stated on page J-3 of LAR Attachment J that "[The] flame length ratio is normally met, but in the case of the largest fire sizes postulated, the flame height may reach or exceed the ceiling height. Because sprinkler actuation and thermal radiation to targets are not computed with the CFAST model, this parameter is not an applicable metric."

   Please provide a technical justification for using CFAST to model fires with flames that impinge on the ceiling.

Fire Modeling RAI 04

NFPA-805, Section 2.7.3.3, "Limitations of Use," states: "Acceptable engineering methods and numerical models shall only be used for applications to the extent these methods have been subject to verification and validation. These engineering methods shall only be applied within the scope, limitations, and assumptions prescribed for that method."

LAR Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA-805," states that "Engineering methods and numerical models used in support of compliance with 10 CFR 50.48(c) are used and were used appropriately as required by Section 2.7.3.3 of NFPA-805."

Regarding the limitations of use:

Please identify uses, if any, of the GFMTs (including the supplements), and CFAST outside the limits of applicability of the method and justify how the use of these fire modeling approaches were appropriate.

Fire Modeling RAI 05

NFPA-805, Section 2.7.3.4, "Qualification of Users," states: "Cognizant personnel who use and apply engineering analysis and numerical models (e.g., fire modeling techniques) shall be competent in that field and experienced in the application of these methods as they relate to nuclear power plants, nuclear power plant 'fire protection, and power plant operations."

Section 4.5.1.2, "Fire PRA" of the LAR states that fire modeling was performed as part of the fire PRA development (NFPA-805 Section 4.2.4.2). This requires that qualified fire modeling and PRA personnel work together. Furthermore, Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA-805," of the LAR states:

> Cognizant personnel who use and apply engineering analysis and numerical methods in support of compliance with 10 CFR 50.48(c) are competent and experienced as required by Section 2.7.3.4 of NFPA-805.
>
> During the transition to 10 CFR 50.48(c), work was performed in accordance with the quality requirements of Section 2.7.3 of NFPA-805. Personnel who used and applied engineering analysis and numerical methods (e.g., fire modeling) in support of compliance with 10 CFR 50.48(c) are competent and experienced as required by NFPA-805 Section 2.7.3.4.
>
> Post-transition, for personnel performing fire modeling or fire PRA development and evaluation, Entergy will develop and maintain qualification requirements for individuals assigned various tasks. Position Specific Guides will be developed to identify and document required training and mentoring to ensure individuals are appropriately qualified per the requirements of NFPA-805, Section 2.7.3.4, to perform assigned work (see Attachment S).

Regarding qualifications of users of engineering analyses and numerical models, please:

a) Describe what constitutes the appropriate qualifications for the staff and consulting engineers to use and apply the methods and fire modeling tools included in the engineering analyses and numerical models.

b) Describe the process for ensuring the adequacy of the appropriate qualifications of the engineers and personnel performing the fire analyses and modeling activities.

c) Describe the communication process between the fire modeling analysts and PRA personnel to exchange the necessary information, and any measures taken to assure fire modeling was performed adequately and will continue to be performed adequately during post-transition.

d) Describe the communication process between the consulting engineers and Entergy personnel to exchange the necessary information and any measures taken to assure the fire modeling was performed adequately and will continue to be performed adequately during post-transition.

Fire Modeling RAI 06

NFPA-805, Section 2.7.3.5, "Uncertainty Analysis," states: "An uncertainty analysis shall be performed to provide reasonable assurance that the performance criteria have been met."

Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA-805," of the LAR states that "Uncertainty analyses were performed as required by Section 2.7.3.5 of NFPA-805 and the results were considered in the context of the application. This is of particular interest in fire modeling and fire PRA development."

Regarding the uncertainty analysis for fire modeling, please:

a) Describe how the uncertainty associated with the fire model input parameters was accounted for in the fire modeling analyses.

b) Describe how the "model" and "completeness" uncertainty was accounted for in the fire modeling analyses.

Radioactive Release RAI 01

For areas where containment/confinement is relied upon:

a. Liquid

1) Describe whether the qualitative/quantitative assessment addresses capacities of sumps, tanks, transfer pumps, etc.
2) Describe whether operator actions are specified (e.g., to direct effluent flow/overflow with temporary measures (drain covers, etc.)).
3) Describe any plant features that may divert the effluent flow that were not taken into account (e.g., Aux. Bld. roll-up doors).
4) Describe whether any of the sumps being relied upon, have auto pump out features (an automatic discharge/release at a certain sump level).

b. Gaseous

1) Describe whether the qualitative/quantitative assessment addresses filtering and monitoring of confined gaseous (smoke) effluent.
2) Describe whether operator actions are specified (e.g., "manual" ventilating fire areas to other ventilated areas).
3) Describe whether there are any that can bypass the planned filtered/monitored ventilation pathway that have not been accounted for.

Radioactive Release RAI 02

For areas where containment/confinement is not available describe whether a quantitative assessment was performed and if so, whether the assessment credited operator actions.

a. If operator actions are credited, describe whether they are specifically addressed in the fire pre-plans and in fire brigade training materials.

Probabilistic Risk Assessment (PRA)

PRA RAI 01 - Fire PRA Facts and Observations (F&Os)

Section 2.4.3.3 of NFPA-805 states that the probabilistic safety assessment (PSA is also referred to as PRA) approach, methods, and data shall be acceptable to the authority having jurisdiction, which is the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. RG 1.200, "An Approach For Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," describes a peer review process utilizing an associated ASME/ANS standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established for evaluations that could influence the regulatory decision. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os.

Please clarify the following dispositions to fire F&Os and Supporting Requirement (SR) assessment identified in Attachment V of the license amendment request that have the potential to impact the fire PRA results and do not appear to be fully resolved:

a) CF-B1-01 (Finding, Not Met at CC-I/II/III)

This F&O disposition explains that the altered events table in Attachment F of the Fire Scenarios Report (PRA-A2-05-003) has been revised to correct discrepancies such as incorrect references to EC13540, "ANO-2 Cable Routing Exclusions to Support Fire PRA for NFPA-805." Review of the current FRANC tables by the NRC Staff identified the following additional apparent discrepancies.

i. The "FRANC Altered Events" table defines basic event PMV2CV052N to be "MOV 2CV-1052 FAILS TO OPEN," but states in the "Notes" column that "only 1 cable in the control room can result in spurious opening of the valve" and therefore a modification to prevent spurious opening is proposed. Please clarify what PMV2CV052N failure mode was modeled in the fire PRA and explain the inconsistency in the referenced failure mode.

ii. The "FRANC Altered Events" table "Note" column for basic event PMV201052R (MOV 2CV-1052 Transfers Open) and PMV201002R (MOV 2CV-1002 Transfers Open) references the "Note" for event PMV2CV052N (MOV 2CV-1052 Fails to Open), but these two events are not included in Attachment K List of

Modifications. Clarify that protection of Conductor 1F of Cable R2 will protect for both failure modes of MOV 2CV-1052 and for MOV 2CV-1002.

Please summarize the review that was performed that provides confidence that additional discrepancies do not exist.

b) CS-B1 (Suggestion, CC-I) CS-C4-01 (Finding, Not Met at CC-I/II/III)

Section 4.1 of the Component and Cable Selection report (PRA-A2-05-005) states that mapping of the PRA Basic Events is provided in Appendix A "BE Mapping/Dispositions." This appendix describes the FREVENT (Safe Shutdown List Component ID) field as providing the TAG (equipment ID) mapping to the BE, populated when the basic event is used to disable the mapped equipment. The appendix states for Disposition Codes Y3, N1, N2, or N3 this field is not used (N/A); however numerous Y3 dispositions do have the FREVENT Field. In light of these apparent discrepancies, please explain how the Disposition Codes are used to identify basic events that will be failed following each fire.

c) FSS-A4-01 (Finding, Met at Cat-I/II/III):

Entries in Attachment A-2 of the Fire Scenario report (PRA-A2-05-003) indicate that a large number of targets were added or revised in response to this F&O. Examples from comments in the "Notes" include: "targets added during drawing review" (e.g., page 365), "Corrected entry from comparing Walkdown Data with XX2 Table on Plant Data" (e.g., page 368), "Target not identified in walkdowns, but in PDMS XX2. Target added to high congested scenarios conservatively to increase confidence level" (e.g., pages 369 to 2208), "Revised invalid ID# to match PDMS" (e.g., pages 2219 to 2222), "Added to conservatively account for PDMS match of target A4001 during database review" (e.g., page 2223), and many others. In light of the large number of changes made to the target list, please explain why the updated list of targets can now be characterized as complete. Include description of the mechanisms (e.g., walkdowns, drawing reviews and database review) that were used to achieve a final set of targets.

d) FSS-B1-02 (Finding, Met at Cat-I/II/III):

Appendix A of the Fire PRA summary report (PRA-A2-05-004) presents separate risk estimates for specific fire scenarios occurring in the Unit 1 and 2 Main Control Rooms (MCRs). Fire Area G appears to be defined as including the control rooms of both units (i.e., Fire Zones 2199-G and 129-F). Table W-2 of the LAR presents the risk estimates (i.e., CDF, LERF, ΔCDF, and ΔLERF) for Fire Area G, which presumably includes the contribution from the Unit 1 MCR. Aside from this, it is not clear to what extent fire in one control room impacts the opposite unit's control room and whether this has been fully addressed in the fire PRA. An exception to this is that the cited reference (ANO2-FP-09-00013) presents a sensitivity study of failure of the glass partition between the MCRs on abandonment time and concludes there is little impact. Please explain:

i. How the impact of heat and smoke from fire in the Unit 1 MCR was addressed in the fire PRA for the Unit 2 MCR.

ii. How the potential for fire propagation from the Unit 1 to Unit 2 MCR was addressed. Include description of the extent to which the two MCRs are connected.

iii. How the heating, ventilation, and air conditioning (HVAC) for the two MCRs are connected and how HVAC operation was considered in the fire PRA for the MCR.

iv. How fire frequency was assigned to Fire Zones 2199-G and 129-F.

e) FSS-B2-01 (Finding, Met at Cat-I/II/III):

The disposition to this F&O states that detailed analysis was performed to calculate conditional core damage probability (CCDP) for MCR abandonment. Table 4-1 of the Fire PRA Summary report (PRA-A2-05-004) presents a CCDP of 6.97E-2 for MCR abandonment scenario listed as "2199-G/A." It is noted that this is a lower value than the screening value of 0.1 in use at the time of the Fire PRA peer review. The Fire Area G Fire Risk Evaluation identifies four credited Recovery Actions (RAs) that appear to be the actions credited for MCR abandonment (i.e., RHF2LTDWNP, RHF2RCPSLP, QHF2P75BFP, and QHF2SGLCXP). Other RAs for Fire Area G, where the MCR is located, are identified in Attachment G of the LAR but credited for Defense in Depth only. The Fire PRA New Human Failure Events report (PRA-A2-05-002) provides detailed Human Error Probability (HEP) analysis for each of the four credited RAs. Please explain how the CCDP for MCR abandonment and alternate shutdown was calculated. Include in this explanation:

i. Identification of all the actions required to accomplish alternate shutdown including actions credited before leaving the MCR; explanation of why RAs listed for Fire Area G that appear to be abandonment actions following a fire in the MCR are not needed or credited; and justification that actions credited for MCR abandonment are sufficient to reach safe shutdown.

ii. Identification of events and conditions that prompt the decision to transfer command-and-control from the MCR to the alternate shutdown locations, and discussion of whether and how loss-of-control due to fires in the MCR or Cable Spreading Room (CSR) were modeled.

iii. Confirmation that feasibility of operator actions supporting alternate shutdown was assessed.

iv. Justification for assuming continuous communication and coordination of actions and operator performance, including consideration of the fact that there is no primary control station.

v. Description of the treatment of potential dependencies between individual actions, including discussion of operator actions that can impact actions of other operators.

f) FSS-D8-01 (Finding from Table V-2, Not Met at CC-I/II/III):

The disposition of this F&O explains that the transient fire heat release modeled for the CSR was reduced to 69 kilowatts (kW) from 317 kW (i.e., the recommended 98th percentile transient fire from Table G-1 of the NUREG/CR 6850). Identify any other areas where the heat release rate was reduced to 69 kW from 317 kW. For fire areas where the HRR was reduced provide justification. Please include:

i. Description of the specific administrative controls that will be added to the Control of Combustible procedure (EN-DC-161), and how those controls will address the locations and types of existing and potential transient combustible material in the CSR.

ii. The results of reviewing of records related to violations of transient combustible controls and other key factors that support this reduced fire size.

g) FSS-E2-01 (Finding, Not Met at CC-I/II/III):

The disposition to this F&O refers to a method submitted to the Electric Power Research Institute (EPRI) Fire PRA Methods Panel regarding the conditional probability of fire propagation from electrical cabinets that was rejected in a letter from NRC staff (letter from Joseph Giitter of NRC to Biff Bradley of NEI dated June 21, 2012 , see ADAMS Accession No. ML12171A583). Section V.2.2 of the LAR cites a sensitivity study performed to remove credit for the electrical panel factors associated with this approach and incorporated the results of new fire modeling. In light of this, please provide:

i. The results of the sensitivity study cited in Section V.2.2 of the LAR, on fire CDF, LERF, ΔCDF, and ΔLERF.

ii. Description of the additional modeling done to remove credit for electrical panel factors. Include discussion of how fire propagation from open versus closed cabinets was performed in the sensitivity study.

h) HRA-A2-01 (Finding, Not Met at CC-I/II/III)

This F&O cites ANO-2 fire PRA staff as saying that as part of NFPA transition the fire-related procedures will "be changed to make them more symptom-based and remove many of the steps currently in the procedures." It is not clear whether this intention to update the fire procedures is included as part of the Implementation Items listed in Table S-2 of the LAR. Please clarify that update of the fire-related procedures is an Implementation Item listed in Table S-2, and that the PRA will be revised to reflect the new procedures when they are completed per Implementation Item S2-9.

i) IGN-A7-01 (Finding, Met at CC-I/II/III):

The Fire Scenario report (PRA-A2-05-003) states (page 8756) that the floor area of Turbine Bay is 79,406 square feet. Based on this, it appears that only a very small portion (1.5%) of Turbine Bay (TB) fire frequency is assigned to transient fire scenarios

as the ignition source area is assumed to be 100 sq. ft. and there are only 12 transient scenarios. Section 8.3 of the Fire Scenario report explains that in response to the F&O a revision using the actual floor area of the zone of influence was used leading to an increase in the floor area used in calculating the ignition frequency. However, it is not clear this approach significantly changed the fraction of TB fire frequency assigned to a transient fire scenario. Please explain how the transient frequency was distributed for the TB floor area and justify excluding any areas of the TB from consideration.

j) PRM-C1-01 (Finding, Not Met at CC-I/II/III):

This F&O finds that fire PRA documentation parallel to internal events PRA documentation does not exist (e.g., initiating event, accident sequence, success criteria, system, and data notebooks). The F&O disposition contends that fire PRA models, to a large degree, are the internal events PRA models and that the differences between the models used in the fire PRA versus the internal events PRA are identified in the Component and Cable Selection report (e.g., in Appendices D, E, F, and H). Section 4.5.2 of this report states that no initiating events, accident sequences, success criteria or data analysis methods were required to incorporate fire induced failures into the internal events model. It is not clear that the fire PRA reports provides a complete basis and accounting for fire PRA modeling. Please identify where information about such modeling discussion appears in the current fire PRA documentation.

k) UNC-A1-01 (Finding, Met at CC-I/II/III):

As indicated by the F&O disposition, the Fire PRA Uncertainty/Sensitivity Analysis report (PRA-A2-05-006) presents the results of propagation of parametric data uncertainty for basic events in the plant response model, human failure events (HFEs), non-suppression probabilities, and circuit failure mode probabilities, while Appendix D of the Fire PRA Summary report (PRA-A2-05-004) qualitatively characterizes the sensitivity of the fire PRA results to sixteen sources of uncertainty. Please:

i. Clarify the extent to which propagation of parametric uncertainty includes state-of-knowledge-correlations (SOKC) between event probabilities including fire event related parameters (e.g., spurious operation probabilities).

ii. Confirm that the CDF, LERF, ΔCDF, and ΔLERF values reported in Attachment W of the LAR are based on calculated mean values from propagation of parametric data uncertainty and SOKC.

PRA RAI 02 - Use of Assumed Cable Routing

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions

regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02.

The documented methods accept the use of simplifications such that the routing of all cables can be avoided but the specifics of the simplification is not described. Section 4.1 of the Component and Cable Selection report (PRA-A2-05-005) identifies a disposition code for components in the fire PRA. One such designation is "Y3" which is assigned to equipment assumed failed because there is no cable routing data. Section 4.1 of the Component and Cable Selection report explains that when cable routing is not known "assumptions are made based on general layout of the plant and required dependencies". Please explain how "assumed cable routing" is determined and justify the adequacy of these assumptions for use in the fire PRA. Include in this explanation an indication of the fraction or number of cables for which routing is assumed.

PRA RAI 03 – Use of Incipient Detection in the Control Element Drive Mechanism

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02.

Modeling of incipient detection is summarized in FAQ 08-0046, "Guidance for Modeling Non-Suppression Probability When an Incipient Fire Detection System is Installed to Monitor Electrical Cabinets." (ADAMS Accession No. ML093220426). Attachment S of the LAR identifies an Implementation Item (i.e., S1-10) that will install an incipient detection system in the control element drive mechanism (CEDM) room cabinets in Fire Area B-4 which is credited in the fire PRA. Attachment S of the LAR states that this modification reduces the risk of fire induced circuit and equipment failures that could result in loss of CEDM room panels. Explain how incipient detection is credited in the fire PRA. Please explain whether the incipient detection is used only to limit damage to targets outside the cabinet and not used to limit damage inside the cabinet where the detection would be installed. If incipient detection was used to limit damage inside the cabinets where detection would be installed, as opposed to limit damage to targets outside the cabinet, provide the impact on CDF, LERF, ΔCDF, and ΔLERF of removing this credit.

PRA RAI 04 – PRA Treatment of Dependencies between Units 1 and 2

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. Section 2.4.4.1 of NFPA-805 further states that the change in public health risk arising from transition from the current fire protection program to an NFPA-805 based program, and all future plant changes to the program, shall be acceptable to the AHJ, which is the NRC. RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," provides quantitative guidelines on CDF, LERF, and identifies acceptable changes to these frequencies that result from

proposed changes to the plant's licensing basis and describes a general framework to determine the acceptability of risk-informed changes. The NRC staff review of the information in the LAR has identified the following information that is required to fully characterize the risk estimates.

a) Note 1 for Table W-2 of the LAR indicates that ANO-1 specific fire areas' contribution to ANO-2 CDF/LERF were assessed and values of 6.06E-7/yr and 1.87E-8/yr respectively are provided. Please clarify how these two ANO-1 values are calculated.

b) Note 1 further indicates ANO-1 MCR and CSR are included in Fire Area G results, presumably because this fire area includes equipment from both ANO-1 and ANO-2. Is Fire Area G the only fire area that includes both ANO-1 and ANO-2 equipment? If not, please clarify the guidelines for identifying and evaluating fire areas that include equipment from both ANO-1 and ANO-2. Please discuss the extent to which the units share systems that are credited in the ANO-2 PRA.

PRA RAI 05 – Inconsistencies and Anomalies in Tables W-1 and 2 of the LAR

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. Section 2.4.4.1 of NFPA-805 further states that the change in public health risk arising from transition from the current fire protection program to an NFPA-805 based program, and all future plant changes to the program, shall be acceptable to the NRC. RG 1.174 provides quantitative guidelines on CDF, LERF, and identifies acceptable changes to these frequencies that result from proposed changes to the plant's licensing basis and describes a general framework to determine the acceptability of risk-informed changes. The NRC staff review of the information in the LAR has identified the following information that is required to fully characterize the risk estimates.

There are a few apparent inconsistencies and anomalies in Tables W-1 and W-2 of the LAR supplement that provide the risk results, as summarized below.

a) Table W-1 provides the IF (initiating event frequency), CCDP, and CDF for the dominant scenarios. In a number of cases the CDF presented is not the product of the IF and CCDP (i.e., 2098-L/A, 2199-G-B/A, 2154-E-TN10/A, 2154-E-TN8/A, 2154-E-TN9/A, 2154-E-TN11). Please explain these apparent inconsistencies.

b) For Fire Area B-4 (CEDM equipment room) Table W-2 presents a fire CDF of 3.26E-06/yr and a ΔCDF of 2.60E-7/yr, but a fire LERF of 2.60E-7/yr and a ΔLERF of -5.17E-8/yr. This is the only Fire Area for which the CDF is a positive value and LERF is a negative value. Please explain this apparent anomaly.

c) For Fire Area 2MH03E (concrete manhole east) Table W-2 presents a low fire CDF of 9.99E-08/yr and low LERF of 2.65E-9/yr, but a large negative ΔCDF of - 5.66E-6/yr and large negative ΔLERF of -1.89E-7/yr. The CDF, LERF, ΔCDF, and ΔLERF values for the other reported concrete manholes are very low. Please explain why fire risk evaluation values for Fire Area 2MH03E result in large negative CDF and LERF values.

PRA RAI 06 - Use of Unreviewed Analysis Methods (UAMs)

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105, the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

a) Section V2 of the LAR identifies several methods for which sensitivity studies were performed. Section V.3 reports that "more fully comply with the approved methods" (i.e. UAMs were removed). Other than the UAMs cited in Section V.2 of the LAR identify any other deviations from NUREG/CR-6850 or other acceptable methods (e.g., FAQs or interim guidance documents such as the June 21, 2012, letter from Joseph Giitter "Recent Fire PRA Methods Review Panel Decisions and EPRI 1022993, 'Evaluation of Peak Heat Release Rates in Electrical Cabinets Fires'" - see ADAMS Accession No. ML12171A583); please provide analyses that remove the credit obtained from these methods, and new integrated risk estimates from these analyses.

b) Section V.2 identifies several deviations from NUREG/CR-6850 and summarizes several sensitivity studies that have been performed to measure the impact of using these methods instead of the methods in NUREG/CR-6850. During the audit, ANO indicated that the PRA has been changed after the submittal (e.g., some NUREG/CR-6850 methods have been incorporated into the PRA replacing the original methods). Please identify all changes that have been made to the PRA since the submittal and indicate whether the changes have been fully incorporated in the PRA (i.e., if the PRA models and supporting documentation have been updated and, if methods are upgrades, whether the recommended focused scope peer review has been completed).

PRA RAI 07– Transient Fire Placement at Pinch Points

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

Per NUREG/CR-6850 Section 11.5.1.6, transient fires should at a minimum be placed in locations within the plant physical analysis units (PAUs) where CCDPs are highest for that PAU, i.e., at "pinch points". Pinch points include locations of redundant trains or the vicinity of other potentially risk-relevant equipment. Transient fires should be placed at all appropriate locations in a PAU where they can threaten pinch points. Hot work should be assumed to occur in locations where hot work is a possibility, even if improbable, keeping in mind the same philosophy. Please describe how transient and hot work fires are distributed within the PAUs at your plant. In particular, identify the criteria for your plant used to determine where an ignition source is placed within the PAUs.

PRA RAI 08 - MCR Fire Modeling

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

The Fire Scenario report (PRA-A2-05-003) appears to indicate that propagation of fires between adjacent cabinets in the Main Control Room was not evaluated. Section, 2.1, Assumption #4, of that report states that "for electrical fire inside the control room, the fire is expected to be contained within the panel" and "f[F]or large, controllable fires, the frequency is captured in the control room abandonment scenario." Assumption #5 states that half the panels were assumed to involve a single cable bundle and half multiple bundles. Please:

a) Explain the extent to which propagation of fires between adjacent cabinets in the MCR was evaluated and provide justification for this level of treatment.

b) Include in the explanation, a discussion of the physical separation between Main Control Board and back panels, and indicate whether they consist of single or double walls.

c) Justify the assumption that half the fire frequency is assigned to multiple bindle fires, and half is assigned to single bundle fires.

PRA RAI 9 – Use of Multipliers on Internal Event HEPs to Determine Fire HEPs

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to

RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

Section 4.2 of the Human Reliability Analysis (HRA) Notebook (PRA-A2-05-007) describes an approach in which multipliers are applied to HEPs that have been previously determined for the internal events PRA to calculate the increased probability of fire related HEPs. Please describe the proposed methodology. Please include discussion of how this approach is consistent with, or conservative with respect to related guidance provided in NUREG 1921, "EPRI/NRC-RES Fire Human Reliability Analysis Guidelines."

PRA RAI 10 – Minimum Value for the Joint Probability of Multiple HFEs

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

Section 3.0, Assumption #1, of the Fire PRA Human Reliability Analysis report (PRA-A2-05-007) appears to indicate that the minimum value used for the joint probability of multiple HFEs is effectively 1E-6. Section 6.2 of NUREG 1921 states that this "value [should] not be below ~1E-05 since it is typically hard to defend that other dependent failure modes that are not usually treated (e.g., random events such as even a heart attack)." Please clarify what minimum value was used for the joint probability of multiple human failure events that occur in a single cutset in the fire PRA. If 1E-6 was used, please justify this value. Alternatively, determine the impact on CDF, LERF, ΔCDF, and ΔLERF using a minimum of 1E-5.

PRA RAI 11 – Fire-Induced Instrument Failure

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

Fire-induced instrument failure should be addressed in the HRA per NUREG/CR-6850 and NUREG-1921. Please describe how fire-induced instrument failure (e.g., including no readings, off-scale readings, and incorrect/misleading readings) is addressed in the fire HRA.

PRA RAI 12 – Fire PRA Modeling of HVAC

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff require additional justification to allow the NRC Staff to complete its review of the proposed method.

Attachment C of the LAR identifies a number of systems for which HVAC is needed to meet its performance goal. Please describe the HVAC modeling performed to support the fire PRA and whether HVAC cable tracing and fire modeling were performed to support this modeling. Explain whether additional operator actions are needed for crediting HVAC.

PRA RAI 13 – Smoke Damage

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff or acceptable methods that appear to have been applied differently than described require additional justification to allow the NRC Staff to complete its review of the proposed method.

Section 6.2 of the Fire Scenario report (PRA-A2-05-003) states that only an abandonment scenario would produce smoke exposure conditions in the MCR sufficient to have negative impact on electronics not already directly affected by fire damage; high voltage components reside in enclosures that limit smoke density and that smoke removal capacity exists in areas of concern such as the switchgear rooms; and that fire within an enclosure was assumed to cause loss of function of all equipment in the enclosure, and therefore smoke effects would be bounded. Please explain how the effect of smoke on equipment was evaluated by using the guidance provided in Appendix T of NUREG/CR-6850.

PRA RAI 14 – Sensitive Electronics

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology

for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. In letter dated July 12, 2006, to NEI (ADAMS Accession No. ML061660105), the NRC established the ongoing FAQ process where official agency positions regarding acceptable methods can be documented until they can be included in revisions to RG 1.205 or NEI 04-02. Methods that have not been determined to be acceptable by the NRC Staff or acceptable methods that appear to have been applied differently than described require additional justification to allow the NRC Staff to complete its review of the proposed method. Section 6.2 of the Fire Scenario report (PRA-A2-05-003) discusses three steps for deciding the damage threshold for electrical cabinets based on the location of the electronics related to the ignition source. Describe how sensitive electronics components are identified treated. If the impact of fire on sensitive electronics whose failure could have an impact on fire risk was not performed, provide an estimate of the impact on CDF and LERF, and ΔCDF and ΔLERF of considering fire-induced failure of electronics using recommended criteria from NUREG/CR-6850.

PRA RAI 15- Calculation of VFDR ΔCDF and ΔLERF

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. Section 2.4.4.1 of NFPA-805 further states that the change in public health risk arising from transition from the current fire protection program to an NFPA-805 based program, and all future plant changes to the program, shall be acceptable to the NRC. RG 1.174 provides quantitative guidelines on CDF, LERF, and identifies acceptable changes to these frequencies that result from proposed changes to the plant's licensing basis and describes a general framework to determine the acceptability of risk-informed changes. The NRC staff review of the information in the LAR has identified the following information that is required to fully characterize the risk estimates.

Section W.2.1 of the LAR provides description of how the ΔCDF and ΔLERF for the VFDRs and how the additional risk of recovery actions for each of the fire areas were determined including a special discussion of how the MCR was assessed. The described approach is based on setting VFDR related components in the fire PRA to their random failure probability, as in the compliant case, or to "failed by the fire," as in the post transition case. However, exceptions are acknowledged of VFDRs not modeled in the fire PRA (e.g., HVAC systems) because their failure has no impact on the safety function modeled in the fire PRA. Please clarify the following:

a) Please clarify how the compliant and variant plants were modeled to determine the ΔCDF and ΔLERF for the control room abandonment scenario.

b) For exceptions described above and in Section W.2.1 explain how a system that is identified as contributing to Nuclear Safety Performance Criteria by virtue of being identified in a VFDR can have "no impact on the safety function."

c) Are there any systems not modeled in the PRA for simplicity or convenience and because not including them is conservative? Would including any of these unmodeled systems have an impact on the change in fire risk estimates?

PRA RAI 16 – Large Reduction Credit for Modifications

Section 3.2.5 of RG 1.205 states that risk decreases may be combined with risk increases for the purposes of evaluating combined changes in accordance with Regulatory Positions 2.1.1 and 2.1.2 of RG 1.174. Accordingly, both individual and cumulative risk effects should be evaluated in detail.

a) Given that the submitted application represents a change that combines risk increases with risk decreases, please provide the total increase and total decrease in the ΔCDF and ΔLERF.
b) Attachment W of the LAR summarizes the risk significant scenarios in the variant case. Please summarize the risk significant scenarios for fire areas II, SS, and G in the compliant case.

PRA RAI 17 - Implementation Item Impact on Risk Estimates

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. Section 2.4.4.1 of NFPA-805 further states that the change in public health risk arising from transition from the current fire protection program to an NFPA-805 based program, and all future plant changes to the program, shall be acceptable to the NRC. RG 1.174 provides quantitative guidelines on CDF, LERF, and identifies acceptable changes to these frequencies that result from proposed changes to the plant's licensing basis and describes a general framework to determine the acceptability of risk-informed changes. The NRC staff review of the information in the LAR has identified the following information that is required to fully characterize the risk estimates.

Attachment S of the LAR identifies numerous proposed plant modifications. Some of the proposed modifications are fairly complex. Installing backup DC control power to the switchgear (S1-3) might, for example, require routing of cables that could, in turn be failed by some of the fires which the new equipment is being credited to help mitigate. Please provide the following:

a) Identify the proposed modifications that do not correct any VFDRs (i.e., that are installed solely to reduce risk).

b) Summarize how the design of the new features has been provided to the PRA analysts for use in modeling the risk impact (e.g., as brief descriptions or completed design package).

c) Summarize the new models that have been developed (e.g., what basic events, fault trees, event trees, and failure data).

d) Describe how the effect of all new cables has been evaluated (e.g., have areas that credit for the new equipment is being taken been identified as areas where required cables may not be routed).

PRA RAI 18 - Model Changes and Focused Scope Reviews after the Full Peer Review

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. RG 1.200 describes a peer review process utilizing an associated ASME/ANS standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established.

Section V.1 of the LAR states that two focused scope peer reviews have been performed after the June 2009 full scope peer review, the first in October 2011 and a second in November 2012. A focused scope peer review only reviews a PRA against some of the elements and supporting requirements in the ASME/ANS PRA Standard. The scope of these two peer reviews is not provided. Please summarize the elements or supporting requirements reviewed during these reviews.

PRA RAI 19 - Internal Events PRA F&Os

Section 2.4.3.3 of NFPA-805 states that the PRA approach, methods, and data shall be acceptable to the NRC. RG 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a fire PRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the staff for adopting a fire protection program consistent with NFPA-805. RG 1.200 describes a peer review process utilizing an associated ASME/ANS standard (currently ASME/ANS-RA-Sa-2009) as one acceptable approach for determining the technical adequacy of the PRA once acceptable consensus approaches or models have been established. The primary results of a peer review are the F&Os recorded by the peer review and the subsequent resolution of these F&Os.

Please clarify the following dispositions to fire F&Os and SR assessment identified in Attachment U of the LAR that have the potential to impact the fire PRA results and do appear to be fully resolved:

a) AS-A4-01 and AS-A10-01 (Finding, Not Met at CC-I/II/III):

   The full text of F&O AS-A4-01 from the internal events PRA peer review (LTR-RAM-II-08-020) says "Even though some operator actions required to achieve the identified success criteria are mentioned in portions of the initiating event analyses, these operator actions are not consistently identified and documented. Please identify all operator actions needed to achieve the success criteria for each of the key safety functions defined for modeled initiating events." Also, F&O AS-A10-01 states that operator actions are not specified in either the accident sequence descriptions or event trees. Please describe the review performed to check for treatment of operators actions required for success of accident sequences in the internal events PRA.

b) AS-A5-01 (Finding, Not Met at CC-I/II/III):

Please describe what steps were taken to develop accident sequences consistent with system design, emergency operating procedures (EOPs), and other plant response procedures. Please justify that the extent of the described effort is adequate to support the fire PRA application.

c) AS-B1-01 (Finding, Not Met at CC-I/II/III):

Please describe what steps were taken to ensure that accident sequences developed for "special initiators" appropriately reflect the impact of these initiators on mitigating systems. Please justify that the extent of the described effort is adequate to support the fire PRA.

d) AS-B2-01 (Finding, Not Met at CC-I/II/III):

Please describe what steps were taken to ensure that accident sequences adequately address dependencies in the internal events PRA. In particular, please describe how dependency between HFEs in the same cutset is evaluated. Include in this description, identification of dependencies considered (e.g., same crew, common cognition, resources, timing, and stress level), and how minimum joint HEP floors were established.

e) AS-B3-01 (Finding, Not Met at CC-I/II/III):

Please identify the assumptions made about the impact of phenomenological conditions created by accident progression on systems modeled in the accident sequences in the internal events PRA.

f) AS-B6-01 (Finding, Not Met at CC-I/II/III):

Please describe in general how time phrased dependencies are modeled in the internal events PRA. Please include in the description how changing environmental conditions, such as room heating, are considered. Justify that the extent of the described effort is adequate to support the fire PRA.

g) AS-C2-01 (Finding, Not Met at CC-I/II/III):

Please describe what improvements will be made to the Accident Sequence notebook to document the process used to develop accident sequences and treat dependencies. Include in this description how the inputs, methods, and results mentioned in SR AS-C2 were considered.

h) SY-A4-01 (Finding, Not Met at CC-I):

Capability Category II of SR SY-A4 requires performing walkdowns and interviews with knowledgeable plant personnel (e.g., engineering, plant operations, etc.) to confirm that the systems analysis correctly reflects the as-built, as-operated plant. Please describe

what efforts were made during the systems analysis to correctly reflect the as-built, as-operated plant. Include in this description identification of any walkdowns and interviews performed specifically in support of the internal events PRA and otherwise, the extent of those efforts, and identification of what kinds of staff performed them. Please justify that the extent of the described effort is adequate to support the fire PRA.

i) SY-B8-01 (Finding, Not Met at CC-I/II/III):

Please describe analysis performed in support of the PRA of spatial and environmental hazards that have the potential to impact multiple systems or redundant components in the same systems. Please justify that the extent of the described effort is adequate to support the fire PRA.

j) HR-C2-01 (Finding, Not Met at CC-I):

Please describe the review of plant-specific and generic operating experience, including licensee event reports, to check for pre-initiators performed in support of the internal events PRA. Please justify that the extent of the described effort is adequate to support the fire PRA.

k) HR-D3-01 (Finding, Not Met at CC-I):

Please describe how procedures supporting human error probability assessment in the internal events PRA were reviewed and whether the review included evaluation of procedure quality (e.g., format, logical structure, ease of use, clarity, and comprehensiveness) or evaluation of administrative controls impacting the procedure (e.g., review, configuration, training, and management controls). If review of procedural quality was not performed then justify the quality of procedures used for detailed HEP assessment.

l) HR-D6-01 (Finding, Not Met at CC-I/II/III):

Please specify the version of the HRA Toolbox Excel Spreadsheets used and describe how the conversion of median to mean values was performed. Clarify whether the HRA Toolbox Excel Spreadsheets were used for all HEP determinations or were used in combination with other software or approaches. If other approaches were also used, please describe those approaches.

m) HR-G6-01 (Finding, Not Met at CC-I/II/III):

Please describe the consistency review performed to check the reasonableness of final HEPs in the internal events PRA given the scenario context, plant history, procedures, operational practices, and experience, and indicate whether all or just a fraction of the HEPs were reviewed. Please justify that the extent of the described effort is adequate to support the fire PRA.

n) DA-C10-01 (Finding, Not Met at CC-I):

Please explain how surveillance test data was collected and incorporated in the internal events PRA appropriate to applicable component failure modes. If surveillance test data was not incorporated into the PRA, at a level appropriate to the failure modes then complete this work or evaluate the impact of not completing this work on the fire PRA results.

o) DA-C12-01 (Finding, Not Met at CC-I):

Please describe how the out-of-service time (i.e., unavailable time) data for maintenance of equipment components, trains, and systems was determined for the PRA and the extent to which plant operators and maintenance engineers were involved in the data collection or evaluation process.

p) IF-C2-01 through IF-E8-01 (Findings, many Not Met at CC-I/II/III):

For all internal flooding related entries presented in Attachment U of the LAR the dispositions state that internal flooding does not impact fire risk. It is noted that medium loss of coolant accident (LOCA) and seal LOCAs are referred to in Tables V-1 and W-1. In general, spurious actuations have the potential to cause internal flooding or spray. Please clarify whether any fire events can lead to internal flooding or spray. If flooding or spray can occur as a result of a fire event, then justify why these internal flooding F&Os cannot impact fire CDF, LERF, ΔCDF, or ΔLERF.

q) QU-D3-01 (Suggestion, Met at CC-I):

Please provide a comparison of results with similar plants for the internal events PRA risk profile and results. Include in this assessment comparison by accident sequence frequencies, and identify any significant differences and the reasons for those differences.

r) LE-D3-01 (Finding, Not Met at CC-I):

Describe how possible failures of piping segments and pump seals after the last isolation valve were modeled in the internal events PRA. Please explain how this modeling supports the evaluation of fire PRA interfacing system LOCA events.

s) LE-E4-01 (Finding, Not Met at CC-I):

The Finding indicated that a dependency analysis had not been performed. Please indicate whether this analysis has been completed. If so, please provide a summary of the results of this analysis.

Please note that review efforts on this task (TAC No. MF0404) are continuing, and additional RAIs may be needed.

If you have any questions, please contact me at (301) 415-1480 or by e-mail at kaly.kalyanam@nrc.gov.

Sincerely,

/ra/

N. Kalyanam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Request for Additional Information

cc w/encl: Distribution via Listserv

DISTRIBUTION:
PUBLIC
LPLIV Reading
RidsAcrsAcnw_MailCTR Resource
RidsNrrDorlLpl4 Resource
RidsNrrDraAfpb Resource
RidsNrrDraApla Resource
RidsNrrLAJBurkhardt Resource
RidsNrrPMWaterford Resource
RidsRgn4MailCenter Resource
PLain, NRR/DRA/AFPB
HBarrett, NRR/DRA/AFPB
SDinsmore, NRR/DRA/APLA
LFields, NRR/DRA/AHPB
JRobinson, NRR/DRA/AFPB

ADAMS Accession No.: ML13235A005 *RAI input email ML13234A410

OFFICE	NRR/DORL/LPL4/PM	NRR/DORL/LPL4/LA	NRR/DRA/AFPB&APLA/BC	NRR/DORL/LPL4/BC	NRR/DORL/LPL4/PM
NAME	NKalyanam	JBurkhardt (BClayton for)	AKlein & HHamzehee*	MMarkley	NKalyanam
DATE	9/4/13	8/30/13	8/22/13	9/11/13	9/11/13

OFFICIAL RECORD COPY