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

August 28, 2014

Mr. Steven D. Capps
Vice President
McGuire Nuclear Station
Duke Energy Carolinas, LLC
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2: REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO IMPLEMENT A RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION PROGRAM (TAC NOS. MF2934 AND MF2935)

Dear Mr. Capps:

By letter dated September 26, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13276A126), Duke Energy Carolinas, LLC (Duke) submitted a license amendment request to change its fire protection program to one based on the National Fire Protection Association (NFPA) Standard-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), Part 50, Section 50.48(c).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and determined that additional information is needed in order to complete our review. Enclosure 1 describes this request for additional information (RAI). During the regulatory audit that began on August 11, 2014, response dates for the questions in Enclosure 1 were discussed with Duke staff. Enclosure 2 lists the agreed upon response dates for the various questions.

If you have any questions, please call me at 301-415-2481.

Sincerely,

G. Edward Miller, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosure: As stated

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST TO ADOPT

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 805

PERFORMANCE BASED STANDARD FOR FIRE PROTECTION

FOR LIGHT WATER REACTOR GENERATING PLANTS

DUKE ENERGY CAROLINAS, LLC

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369, 50-370

By letter dated September 26, 2013, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13276A126), Duke Energy Carolinas (Duke) submitted a license amendment request to change its fire protection program to one based on the National Fire Protection Association (NFPA) Standard-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), Part 50, Section 50.48(c). In order for the U.S. Nuclear Regulatory Commission (NRC) staff to complete its review of the license amendment request (LAR), the following additional information is requested.

Fire Protection Engineering (FPE) Request for Additional Information (RAI) 01

LAR (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13276A126) Attachment A, Section 3.4.1(c) states that fire brigade members are plant operators and "qualifications of individuals in the fire protection organization are administratively controlled to ensure qualification of the individual commensurate with the position being held and activities being performed." NFPA Standard 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants" (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 to understand the effects of fire and fire suppressants on nuclear safety performance criteria. In Section 1.6.4.1, "Qualifications" of NRC Regulatory Guide (RG) 1.189, "Fire Protection for Nuclear Power Plants", Revision 2, September 2009, (ADAMS Accession No. ML092580550) the NRC staff has acknowledged the following example for the fire brigade leader as sufficient:

> The brigade leader should be competent to assess the potential safety consequences of a fire and advise control room personnel. Such competence by the brigade leader may be evidenced by possession of an operator's license or equivalent knowledge of plant systems.

Provide additional detail regarding the training provided to the fire brigade leader and members that addresses their ability to assess the effects of fire and fire suppressants on nuclear safety performance criteria.

FPE RAI 02

LAR Attachment A, Section 3.11.5 states that Electrical Raceway Fire Barrier Systems (ERFBS) such as Thermo-Lag, 3M Interam, Hemyc, MT, or Darmatt systems are not utilized for Chapter 4 compliance. However, in LAR Attachment C, Table B-3, Hemyc is cited by engineering evaluations as adequate for the hazard in fire areas 2A (Unit 1 Turbine Driven CA Pump Room), and 3A (Unit 2 Turbine Driven CA Pump Room).

Provide clarification of the use of Hemyc materials. If Hemyc is used in a NFPA-805 compliance basis, then provide a description and location of the credited Hemyc fire barriers used for the Nuclear Safety Capabilities Assessment (NSCA). Provide the basis for credited ratings of the barriers as ERFBS. Identify and briefly describe any proposed plant modifications to barriers using Hemyc or MT. Identify if any compensatory measures are currently in place and the justification for their use, and whether compensatory measures will remain after completion of any proposed plant modifications. If performance-based methods are used, include consideration of safety margin and defense-in-depth (DID) in the evaluations.

FPE RAI 03

LAR Attachment I, Table I-1 "Definition of Power Block" states that structures required to meet the radioactive release criteria described in Section 1.5 of NFPA-805 but not required to meet the nuclear safety criteria are not defined within the power block. Currently, the endorsed guidance of Nuclear Energy Institute (NEI) 04-02, "Guidance for Implementing a Risk-Informed, Performance-Based Program Under 10 CFR 50.48(c)," states that, where used in Chapter 3, "power block" and "plant" refers to structures that have equipment required for nuclear plant operations, such as containment, auxiliary building, service building, control building, fuel building, radiological waste, water treatment, turbine building, and intake structure, or structures that are identified in the facility's current license basis. As currently described in the LAR Attachment E, the Rad Waste Facility is a standalone building within the Yard Fire Area. Additionally, the Contaminated Material Handling and Waste Handling areas are described as part of the Auxiliary Building. Included in this compartment are Building 1202 and the Waste Solidification Building.

Provide clarification that those structures listed within the guidance are accounted for as either within or not within the power block.

FPE RAI 04

LAR Attachment L, Approval Request 2 requests to provide a performance-based evaluation in place of the NFPA-805 Section 3.3.5.1 requirement that wiring above suspended ceiling shall be kept to a minimum and where installed, electrical wiring shall be listed for plenum use, routed in armored cable, routed in metallic conduit, or routed in cable trays with solid metal top and bottom covers. The LAR stated that the wiring/cable is installed above suspended ceilings which may not comply with the requirements and that the wiring has no impact to nuclear safety.

Describe the proximity of these unqualified cables to nuclear safety capability components or cables, and address the likelihood and significance of potential fires adjacent to those nuclear safety capability components or cables. Additionally, describe what mechanisms are in place to prevent future non-code compliant installations.

FPE RAI 05

LAR Attachment L, Approval Request 6 provides for a performance-based evaluation for the non-dedicated use of the fire water system.

For those evolutions that initiate and control non-dedicated fire water use of the fire protection system:

a) Describe the administrative controls in place for these evolutions to occur;
b) Describe how approvals are obtained to establish these alternative uses;
c) Describe whether these activities are conducted simultaneously; and
d) Describe how they are controlled in the event of a fire.

FPE RAI 06

LAR Attachment K, Licensing Action 11, identifies that the licensing action will transition. However, the licensee stated that MCC-1435.00-00-0033, "NFPA 20 Code Compliant Report" evaluated fire pumps A, B, and C present compliance with NFPA 20, "Standard for the Installation of Stationary Pumps for Fire Protection," 2007 edition. The licensee further stated that once the non-compliances identified are addressed, the fire pumps will be considered functionally equivalent and therefore, the licensing action is not required for transition.

Provide clarification with regard to the desired transition compliance method. Additionally, lack of compliance with NFPA 20 is identified in LAR Attachment L, Approval Request 5. Describe the differences between Licensing Action 11 and Approval Request 5.

FPE RAI 07

LAR Attachment C, Table C-2 provides a consolidated summary of the required fire protection systems and features as identified for each fire area. In general, the licensee has identified where required systems are installed on a room basis, however, in the Turbine Building (TB), for example, the licensee has only identified that required suppression and detection is installed. The staff could not determine if all systems in the Turbine Building are required or only certain systems. In addition, LAR Attachment C, Table C-2 identifies in TB1 and TB2 "Water Suppression" and "Suppression" and "Detection System" and "Detection" as required but does not specify the type of suppression or detection system (e.g., sprinkler, deluge, or preaction; smoke or UV).

Provide clarification regarding the types of suppression and detection systems provided in the TB and include a description of which systems are required.

FPE RAI 08

For the existing Appendix R deviations being transitioned as identified in LAR Attachment K, several licensing actions rely on fire protection features which do not appear in LAR Attachment C, Table C-2.

Licensing Action 01, the fire protection feature relied upon in this deviation included silicon dioxide insulated cable as a 3-hour rated barrier, but in LAR Attachment C, Table C-2 for fire area 9-11, the cable is identified as only required for risk.

Provide a clarification for this, and any similar discrepancies, for example, systems relied on for engineering evaluations.

FPE RAI 09

In LAR Attachment A, Table B-1, Section 3.3.5.3., the LAR indicates that electrical cables comply with IEEE-383 flame propagation testing (Institute of Electrical and Electronics Engineers Standard 383 "IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations"). The staff noted that the LAR only describes armored cables in conjunction with a discussion of an outer jacket, but the licensee's analysis includes unjacketed armored cables and the staff notes that rapid and significant flame spread is associated with unjacketed armored cables.

a. Describe whether unjacketed armored cable is installed, and if it is, describe the extent and installed locations.

b. Describe the qualification of unjacketed cables and, if this configuration is unqualified, describe how the lack of qualification has been addressed, including in the performance-based analyses.

c. If the unjacketed cables are unqualified, describe the impact on the Fire Probabilistic Risk Assessment (PRA) analysis.

FPE RAI 10

NFPA-805, Section 3.3.7.2, requires that "Outdoor high-pressure flammable gas storage containers shall be located so that the long axis is not pointed at buildings." In LAR Attachment A, the compliance statement for this element is listed as "Complies via Use of EEEE," with a reference to the licensee calculation that should demonstrate compliance of the installed configuration. However, the staff noted that the referenced licensee document does not make a conclusion regarding acceptability. The staff also noted that the text in the compliance basis does not align with the compliance statement for this element.

Therefore, provide:

a. A summary of the calculation which demonstrates the acceptability of the installed configuration, including the key assumptions, results, and acceptance criteria;

b. A revised compliance statement for this NFPA-805 Chapter 3 element which references the correct document; and

c. A revised compliance basis which aligns with the compliance statement.

Safe Shutdown Analysis (SSA) RAI 01

LAR Attachment B, Table B-2, identifies certain attributes of NEI 00-01, "Guidance for Post-Fire Safe Shutdown Circuit Analysis" Revision 1, as "Aligns with Intent." For the following attributes, the alignment basis does not fully explain why there are deviations from the recommendations of the attribute.

For each attribute listed below, provide a detailed justification as to what specifically does not align.

a. 3.1C Spurious Operation
b. 3.1.1.7 Offsite power
c. 3.1.1.11 Multiple units
d. 3.2.1.6 Spurious components
e. 3.3.1.3 Isolation Devices
f. 3.3.1.6 Auto Initiation Logic
g. 3.3.1.7 Circuit Coordination
h. 3.5.1.3 Duration of Circuit Failures
i. 3.5.2.1 Circuit Failures Due to an Open Circuit
j. 3.4.1.4 Manual Actions

SSA RAI 02

LAR Attachment B, Table B-2, Section 3.1[C, Spurious Operation], states that the high/low pressure interfaces consist solely of interface with the residual heat removal (RHR) system in accordance with Safety Evaluation Report, NUREG-0422, "Transient Analysis of the Research Reactor MARIA MC Fuel Elements Using RELAP5 Mod 3.3," Supplement 6. The NRC staff noted that the cited reference, however, does not explicitly state that the RHR is the only high/low pressure interface of concern. NEI 00-01 defines high/low pressure interface as "a subset of components considered for spurious actuation involves reactor coolant pressure boundary (RCPB) components whose spurious operation can lead to an unacceptable loss of reactor pressure vessel/reactor coolant system (RPV/RCS) inventory via an interfacing system loss of coolant accident...selected RCPB valves are defined as high/low pressure interface valve components requiring special consideration and criteria," as endorsed by the NRC through Frequently Asked Question (FAQ) 06-0006, "High-Low Pressure Interface Definition and NEI 00-01/NFPA 805 Discrepancies."

a. Provide more detail with regard to the statement that RHR is the only high/low pressure interface to be evaluated as such. If the basis of this limitation is prior approval by the NRC, then justify why the alignment statement is not "Does Not Align but has Previous Approval," or change the entry to revise the alignment statement.

b. For other reactor coolant boundary valves (e.g., RCS high point vents, RCS letdown isolation valves) that are typically considered high/low pressure interface valves, provide a description of the spurious operation analysis performed for those that justifies not evaluating them as high/low pressure interfaces.

SSA RAI 03

LAR Attachment F, "Fire-Induced Multiple Spurious Operations Resolution," provides a description of the process for evaluating potential multiple spurious operations (MSOs). In order to clarify the methodology, provide the following:

a. In describing the documents used for guidance by the expert panel, LAR Attachment F stated that some of these documents (NEI 00-01, NEI 04-06, Fire PRA Task Instruction, and pressurized-water reactor owners group (PWROG) MSO list) were identified as "draft." Describe what reconciliation was done to ensure completeness of the analysis with the final documents.

b. LAR Attachment F stated that the expert panel consisted of MNS fire protection and post-fire safe shutdown, McGuire Nuclear Station (MNS) Operations, PRA, and members of the Strategic Alliance for NFPA-805 Transition team. Describe what the "Strategic Alliance" is, and what qualifications or experience they provided the expert panel.

SSA RAI 04

LAR Attachment G, "Recovery Actions Transition," identifies a "third" category of recovery actions (beyond risk reduction and defense-in-depth) as additional actions that screened out due to no or very low risk. The LAR stated that these actions are not considered recovery actions for NFPA-805 and therefore, feasibility is not evaluated against the criteria in NFPA-805 Section B.5.2(e), NEI 04-02, and FAQ 07-0030, "Establishing Recovery Actions."

a. Provide a detailed description of these recovery actions, including:
   - how they were originally identified;
   - what nuclear safety performance goals they are associated with;
   - what fire safe shutdown function they provide; and
   - whether they are currently listed in LAR Attachment G.

b. Describe whether these recovery actions will remain in the procedures. If they will remain in the procedures, justify why feasibility evaluations are not performed for these actions.

c. Provide examples of these types of recovery actions.

SSA RAI 05

LAR Section 4.2.1.1, "Comparison to NEI 00-01 Revision 2," states that post fire manual operation of rising stem valves in the fire area of concern, noted as an additional NEI 00-01

Revision 2 element, will be evaluated as part of the feasibility evaluation conducted as documented in "NFPA-805 Recovery Action Feasibility Review". LAR Attachment B, Table B-2, Section 3.2.1.2, identifies MCC-1435.00-00-0045 Rev. 0 – "NFPA 805 Transition Recovery Action Feasibility Review," as the referenced documentation. However, there is no identification of this element in the recovery action feasibility review. It appears that neither the assumptions nor the criteria in the recovery action feasibility review address this element.

Provide more detail with regard to which recovery actions require operation of rising stem valves in the fire area of concern. Identify where the criterion used in the evaluation is specifically identified, and how the criterion is evaluated.

SSA RAI 06

LAR Attachment B, Table B-2, Section 3.2.1.2, "Fire Damage to Mechanical Components," states that heat sensitive piping materials, including tubing with brazed or soldered joints are not included in the assumption of no mechanical damage. The licensee's analysis stated that instrument sensing lines were evaluated as if the fluid boundary remains intact.

Provide the justification for this assumption specifically with regard to heat sensitive piping materials, including tubing with brazed or soldered joints.

SSA RAI 07

LAR Attachment D describes the methods and results for non-power operations (NPO) transition. Provide the following additional information:

a. A description of any actions that are credited to minimize the impact of fire-induced spurious actuations on power operated valves (e.g., air-operated valves and motor-operated valves) during NPO either as pre-fire plant configuring or as required during the fire response recovery.

b. Identify those recovery actions relied upon in NPO and describe how recovery action feasibility is evaluated.

Programmatic RAI 01

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 site Quality Assurance (QA) program as well as to site procedures to incorporate NFPA 805 requirements.

Describe the changes to the QA program and site procedures to ensure NFPA-805 fire protection requirements are incorporated into existing processes and programs. Further, discuss how NFPA-805 Section 2.7.3 requirements are or will be included within and implemented by the existing QA program and any planned modifications.

Fire Modeling (FM) RAI 01

NFPA 805-Section 2.4.3.3 states that the PRA approach, methods, and data shall be acceptable to the NRC. The NRC staff noted that the fire modeling analysis comprised the following:

- The Generic Fire Modeling Treatments (GFMTs) approach was used to determine the Zone of Influence (ZOI) for ignition sources and the time to Hot Gas Layer (HGL) conditions in all fire areas throughout McGuire Nuclear Station, Unit 1 and 2.

- The Consolidated Fire Growth and Smoke Transport (CFAST) model was used to assess the main control room (MCR) abandonment time calculations.

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

Regarding the acceptability of CFAST for the MCR abandonment time calculations:

a. A luminous slotted ceiling covers part of the MCR area, while the remainder of the suspended ceiling consists of acoustical tile. The latter is ignored in the CFAST fire modeling calculations and the MCR area below the false ceiling and the interstitial space above the ceiling are combined into one large volume. Provide technical justification for ignoring the separation provided by the acoustical tile ceiling, or demonstrate that the abandonment times calculated based on the combination of the two spaces are conservative and bounding.

b. In the MCR abandonment time analysis, it is assumed that the external doors of the MCR open at 15 minutes based on an estimated fire brigade arrival time. Provide a technical justification for the assumption that the fire brigade will arrive 15 minutes after a fire event based on historic drill records or demonstrate that this assumption is conservative.

c. For the case where cables in an adjacent electrical cabinet are in direct contact with the separating wall, NUREG/CR-6850, "EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities, Final Report," Appendix S recommends a fire spread time of 10 minutes. Provide technical justification for using the assumption in the MCR abandonment time calculations that fire spreads to adjacent cabinets in 15 minutes.

d. LAR Attachment H, Table H-1 indicates that FAQ-08-0052, "Transient Fires: Growth Rates and Control Room Non-Suppression" was used in the MCR abandonment time calculations. Describe and provide technical justification for any deviations taken from the guidance in FAQ 08-0052 "Transient Fires: Growth Rates and Control Room Non-Suppression," in the MCR abandonment time calculations, including to transient fire growth rates.

e. Explain what CFAST input value (or values) was (were) used for the heat of combustion of cables in the MCR. Describe whether the soot yield and heat of combustion values that were used in the analysis result in conservative estimates of the soot generation rate.

f. Explain if and when the door between the Main Control Board (MCB) and the MCR area was opened in any of the scenarios that were modeled.

g. Explain why, based on the sensitivity analysis, it appears that variations in the initial ambient temperature do not affect the abandonment times for the MCB fire scenarios.

Specifically regarding the acceptability of the GFMTs approach:

h. The GFMTs approach describes the critical heat flux for a target that is immersed in a thermal plume. Explain how the modification to the critical heat flux was used in the ZOI and HGL timing determinations.

Specifically regarding the acceptability of the PRA approach, methods, and data:

i. Identify whether any fire modeling tools and methods have been used in the development of the LAR that are not discussed in LAR Attachment J. One example would be a methodology used to convert damage times for targets in Appendix H of NUREG/CR-6850 to percent damage as a function of heat flux and time.

j. Regarding the flame spread and fire propagation in cable trays:

Section V.2.3 of the LAR and the licensee's response to F&O FSS-C2-01 indicate that the licensee did not calculate fire propagation in, and the resulting HRR of, cable trays as described in NUREG/CR-6850, Section R.4.2. The licensee's justification appears to be based on EIR 51-9160514-000, which as stated in the response to F&O FSS-C2-01, "... suggests that armored cables will not contribute to fire growth and spread ..." (see LAR, Attachment V, page V-8).

The NRC staff has the following observations:

1. During the audit the NRC staff reviewed the summary in EIR 51-9160514-000 of selected results of a test program conducted by the licensee, and determined on the basis of this summary that the horizontal flame spread rate over armored cable with a PVC jacket in the test was between 0.5 and 2.2 mm/s.

2. During the audit plant walkdowns the NRC staff noticed several trays in different areas of the plant that appeared to contain some unarmored cable (for example, tray 3972 in Fire Area 13). The NRC staff notes that for thermoplastic and thermoset cables NUREG/CR-6850, Section R.4.1.2 recommends a flame spread rate of 0.9 mm/s or 0.3 mm/s, respectively.

3. During the audit the NRC staff reviewed the licensee's Design Basis Specification for Fire Protection and noted that 45% of the combustible mass of armored power cable, and 60% of the combustible mass of armored control cable is outside the armor. The contribution to the HRR from the PVC jacket around the armor is therefore expected to be not negligible.

4. FAQ 08-0049 provides guidance on calculation of cable tray ignition, fire propagation between cable trays, and HRR. The FAQ indicates that the licensee will need to develop and justify plant-specific, configuration-specific models if they are to be used outside the original ZOI, and that these models will be an area of detailed staff review.

In light of these observations the analysis should account for the impact of the horizontal flame spread, vertical fire propagation and the resulting additional HRR on the ZOI and HGL temperature timing determination for fires that involve cables. Provide a summary of this re-evaluation, including the impact on the risk and delta risk.

k. Regarding the fires in the proximity of a wall or a corner, explain how the GFMTs approach was applied for a fire against a wall or in a corner. Explain how wall and corner effects in the ZOI and HGL timing calculations were accounted for, or provide a technical justification if these effects were not considered.

l. Regarding high energy arcing fault (HEAF) generated fires, describe the criteria that were used to decide whether a cable tray in the vicinity of an electrical cabinet will ignite following a HEAF event in the cabinet. Explain how the ignited area was determined and subsequent fire propagation was calculated. Describe the effect of tray covers and fire-resistant wraps on HEAF induced cable tray ignition and subsequent fire propagation.

Fire Modeling RAI 02

American Society of Mechanical Engineers/American Nuclear Society (ASME/ANS) Standard RA-Sa-2009, "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 FPRA. The standard further states that thermal impact(s) must be considered in determining the potential for thermal damage of systems, structures, and components (SSCs) and appropriate temperature and critical heat flux criteria must be used in the analysis.

Provide the following information:

a. Describe how the installed cabling in the power block, armored and unarmored, was characterized, specifically with regard to the critical damage threshold temperatures and critical heat fluxes for thermoset and thermoplastic cables as described in NUREG/CR-6850.

b. The GFMTs approach includes damage criteria for different types of targets and states that "Damage to IEEE-383 qualified cables is quantified as either an imposed incident heat flux of 11.4 kW/m^2 (1 Btu/s-ft^2) or an immersion temperature of 329°C (625°F) per Nuclear Regulatory Guidance [NRC, 2005, NUREG 6850, 2005]." The GFMTs approach further states: "Damage to non-IEEE-383 qualified cables is quantified as either an imposed incident heat flux of 5.7 kW/m^2 (0.5 Btu/s-ft^2) or an immersion temperature of 204°C (400°F) per Nuclear Regulatory Guidance [NRC, 2005, NUREG 6850, 2005]."

   The NRC staff notes that in the GFMTs approach, IEEE-383 qualified cables are assumed to be equivalent in terms of damage thresholds to "thermoset" cables as defined in Table 8-2 of NUREG/CR-6850. In addition, in the GFMTs approach, non-IEEE-383 qualified cables are assumed to be equivalent to "thermoplastic" cables as defined in Table 8-2 of NUREG/CR-6850. These assumptions may or may not be correct. An IEEE-383 qualified cable may or may not meet the criteria for a "thermoset cable" as defined in NUREG/CR-6850. It is also possible that a non-IEEE-383 qualified cable actually meets the NUREG/CR-6850 criteria for a "thermoset" cable.

   For those areas that are assumed to have thermoset damage criteria, confirm that the cables are actually thermoset and that the potential confusion about IEEE-383/thermoset is not applicable.

c. The resolution to finding and observation (F&O) FSS-C5-01 refers to a licensee analysis as the basis for concluding that the armored cable, which has a thin PVC exterior jacket or thermoplastic coating, can be treated as a thermoset material and its associated damage criteria. NUREG/CR-6850 Section H.1.3 recommends that the failure criteria for thermoplastic materials should be applied for mixed configurations, unless appropriate justification for treatment as a thermoset material is provided. Provide justification for concluding that the armored cable can be treated as thermoset material. In the response, specifically address whether a thermoplastic fire can form in the immediate vicinity of the cables themselves given that thermoplastic materials melt and can form a burning pool of liquid material, and how the cable tray configurations identified in Section H.1.3 of NUREG/CR-6850 correspond to those at the plant.

d. Describe how cable tray covers, conduits and wraps affect the damage thresholds that were used in the fire modeling analyses.

e. Explain how the damage thresholds for non-cable components (i.e., pumps, valves, electrical cabinets, etc.) were determined. Identify any non-cable components that were assigned damage thresholds different from those for thermoset and thermoplastic cables, and provide a technical justification for these damage thresholds.

f. Describe the damage criteria that were used for exposed temperature-sensitive electronic equipment. Explain how temperature-sensitive equipment inside an enclosure was treated, and provide a technical justification for these damage criteria.

Fire Modeling RAI 03

NFPA-805, Section 2.7.3.2, states that 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, states that fire modeling was performed as part of the FPRA development (NFPA-805 Section 4.2.4.2). Reference is made to Attachment J, for a discussion of the verification and validation (V&V) of the fire models that were used. Furthermore, LAR Section 4.7.3 states that "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, for any fire modeling tool or method that was used in the development of the LAR or that is identified in the responses to the above fire modeling RAIs, provide the V&V basis if it is not already explicitly provided in the LAR (for example in LAR Attachment J).

Fire Modeling RAI 04

NFPA-805, Section 2.7.3.3, states that 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, states that engineering methods and numerical models used in support of compliance with 10 CFR 50.48(c) are used and applied appropriately as required by Section 2.7.3.3 of NFPA-805.

Regarding the limitations of use, identify uses, if any, of the GFMTs approach outside the limits of applicability of the method and for those cases explain how the use of the GFMTs approach was justified.

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."

LAR Section 4.5.1.2, "Fire PRA," states that fire modeling was performed as part of the FPRA development (NFPA-805 Section 4.2.4.2). This requires that qualified fire modeling and PRA personnel work together. Furthermore, LAR Section 4.7.3, "Compliance with Quality Requirements in Section 2.7.3 of NFPA 805," 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, cognizant personnel who use and apply engineering analysis and numerical models shall be competent in this 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. Duke Energy will develop and maintain qualification requirements for individuals assigned various tasks. Individuals will be qualified to appropriate job performance requirements per ACAD 98-004. Engineering training guidelines 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.

Regarding qualifications of users of engineering analyses and numerical models:

a. Describe what constitutes the appropriate qualifications for 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/procedures for ensuring the adequacy of the appropriate qualifications of the engineers/personnel performing the fire analyses and modeling activities.

c. Describe who performed the walk-downs of the MCR and other fire areas in the plant. Describe whether these were the same people who performed the fire modeling analysis.

d. Explain the communication process between the fire modeling analysts and PRA 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.

e. Explain the communication process between the consulting engineers and MNS 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."

LAR Section 4.7.3, 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 FPRA development.

Regarding the uncertainty analysis for fire modeling:

a. Describe how the uncertainty associated with the fire model input parameters (compartment geometry, radiative fraction, thermophysical properties, etc.) was addressed and accounted for in the analyses.

b. Describe how the "model" and "completeness" uncertainties were accounted for in the fire modeling analyses.

Probabilistic Risk Assessment (PRA) RAI 01

Section 2.4.3.3 of NFPA 805 states that the probabilistic safety assessment (PSA) (PSA is also referred to as PRA) approach, methods, and data shall be acceptable to the authority having jurisdiction (AHJ), which is the NRC. Regulatory Guide (RG) 1.205 identifies NUREG/CR-6850 as documenting a methodology for conducting a Fire PRA and endorses, with exceptions and clarifications, Nuclear Energy Institute (NEI) 04-02, Revision 2, as providing methods acceptable to the NRC 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 for evaluations that could influence the regulatory decision. The primary result of a peer review are the facts and observations (F&Os) recorded by the peer review and the subsequent resolution of these F&Os.

Clarify the following dispositions to fire F&Os and Supporting Requirement (SR) assessment identified in LAR Attachment V that have the potential to impact the FPRA results and do not appear to be fully resolved:

a) PP-B7-01 and PP-C3-01: The resolutions to these F&Os state that "a subsequent walkdown was conducted for plant partitioning and is documented in the Fire Scenario Report." The walkdown sheets provided in Appendix F of the Fire Scenario Report (MCC-1535-0158-003) are principally focused on identifying targets, do not appear to address plant partitioning features, and are all dated prior to the peer review held in September 2009. Provide a description of the subsequent walkdown performed for plant partitioning, the results of this walkdown, and when the walkdown was performed.

b) FSS-C5-02: The resolution to this F&O identifies non-armored cable as primarily related to security and communication (phone, LAN, or fiber optic cables) and concludes that "the low concentration of non-qualified cables, which are not associated with credited circuits, is considered insufficient to impact the results." Identify the other functions that include non-armored cable employed at MNS to provide the basis for concluding that these do not impact the FPRA results, both total and delta risks.

c) HRA-E1-01: The resolution to F&O HRA-E1-01 explains that human error probability (HEP) values for IEPRA actions were increased by a specified factor depending on action time and complexity for actions both inside and outside the control room. Table V-2 of the LAR justifies the peer reviewer assessment for SR HRA-C1 to be acceptable for the NFPA 805 application on the basis that this factor or multiplier methodology is a conservative approach. The methodology, which is essentially an HRA scoping approach, does not follow the NRC-accepted guidance in NUREG/CR-6850 or NUREG-1921. In light of these issues:

   i. Provide further justification that explains how the multiplier methodology for developing HEPs accounts for the various factors discussed in Section 5 of NUREG-1921 for performing a scoping/screening fire HRA. Alternatively, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 03 applying HEP and JHEP values developed using NRC-accepted guidance such as NUREG-1921 or NUREG/CR-6850.

   ii. Provide further explanation of how using conservative or scoping values for HEPs for significant human actions impacts the delta risk results reported in the fire risk evaluations. The response should specifically address each HFE determined to be significant in accordance with the PRA standard. Alternatively, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 03 applying HEP values for risk significant HFEs developed using detailed HRA.

   iii. NUREG-1921 indicates, and NUREG-1792 (Table 2-1) states that joint HEP values should not be below 1E-5. Electric Power Research Institute (EPRI) Table 4-3 provides a lower limiting value of 1E-6 for sequences with a very low level of dependence. Confirm that each joint HEP value used in the FPRA below 1E-5 includes its own justification that demonstrates the inapplicability of the NUREG-1792 lower value guideline. Provide an estimate of the number of these joint HEPs below 1E-5 and at least two different examples of the justification.

d) FSS-D7: The disposition to the peer review assessment for FSS-D7 (LAR Table V-2) does not specifically address how automatic suppression was credited other than in the MCA. Section 10.3 of the Fire Scenario Report identifies that the Halon suppression system was credited in the evaluation of turbine-driven auxiliary feedwater pump fire scenarios and that the generic unavailability for Halon systems from NUREG/CR-6850 was used in the evaluation of these scenarios. According to the PRA standard, the intent for CC-II is to "require a review of plant records to determine if the generic unavailability credit is consistent with actual system unavailability." Provide justification that the generic estimates for credited automatic suppression systems bound actual system unavailability based on an evaluation of plant records and that outlier behavior has not been experienced at MNS. If necessary, provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 03 that appropriately accounts for actual automatic suppression system reliability/availability experience at MNS.

e) HRA-B4: The disposition to the peer review assessment for SR HRA-B4 (LAR Table V-2) does not provide the basis for the conclusion that "this SR is now considered met at CC-II" nor was there a basis provided for how it was concluded that the treatment of instrumentation in the Fire PRA model does not impact delta risk. Provide justification for these conclusions, specifically addressing how undesired operator actions were evaluated, the results of this evaluation, and how these results were incorporated in the Fire PRA model.

PRA RAI 02

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 FPRA 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.

Clarify the following dispositions to Internal Events F&Os and SR assessment identified in LAR Attachment U that have the potential to impact the FPRA results and do not appear to be fully resolved:

f) The dispositions to F&O IE-02 and IE-C14 concludes that any additional risk would be small and would not have a significant impact on the Fire PRA results or results for the NFPA-805 application. Define what is meant by small and non-significant impact. The response should address small and non-significant in the context of both the RG 1.174 risk guidelines for transition and the post-transition change evaluation criteria, which is two orders-of-magnitude less than the RG 1.174 risk guidelines for Region II.

g) AS-04: The peer review Finding is that seal injection cooling must be restored within 15 minutes or seal failure may occur, which apparently was not accounted for in the PRA model at the time for scenarios in which control was transferred to the Safe Shutdown Facility (SSF). It is unclear how the disposition to the Finding, incorporating the updated WOG2000 seal leakage model and the performance of MAAP runs that determined that core uncovery time is less than 3 hours, addresses the Finding. Provide further explanation for how the PRA model was updated to address the peer review Finding.

h) TH-02: The disposition to this F&O concludes that difference in the time to core damage is not significant when using either 2000 Deg F or 4000 Deg F "because the exothermic nature of the zircaloy-water reaction rapidly increases the fuel temperature." Relatively small changes in "the time available for human recoveries or other nonrecovery events such as loss of offsite power recoveries" could change the likelihood of some events. Provide further clarification on the difference in the time available and what is meant by not significant and negligible impact. The response should address not significant and negligible in the context of both the RG 1.174 risk

guidelines for transition and the post-transition change evaluation criteria, which is two orders-of-magnitude less than the RG 1.174 risk guidelines for Region II.

i) QU-02: The disposition to this F&O addresses the broader issue of lack of a systematic process for applying recovery rules, however, the specific example wherein one Unit 2 nuclear service water (RN) pump is always assumed to be available for cross-tie to Unit 1, even during Modes 5 and 6 at Unit 2, is not addressed. Clarify if unavailability of the Unit 2 RN pump is now appropriately accounted for in the modeling of the cross-tie to Unit 1, and vice-versa. If not, provide justification for the treatment of this cross-tie in the PRA model and the implications of this treatment on the risk and delta risk results reported in the LAR.

j) HR-01: The disposition to this F&O concludes that the absence of miscalibration errors in the PRA model is not significant to the FPRA results based on the results of a sensitivity study adding four miscalibration events to the PRA. Provide further justification for this conclusion, including discussing why modeling just the four miscalibration events in the sensitivity study is a reasonable representation of potential miscalibration errors at MNS. The response should characterize what is meant by not significant impact in the context of both the RG 1.174 risk guidelines for transition and the post-transition change evaluation criteria, which is two orders-of-magnitude less than the RG 1.174 risk guidelines for Region II.

k) F&Os DE-04 and DA-05: Address the following regarding common cause failure (CCF) modeling in the PRA model:

   iv. The disposition to SR DA-D5 indicates that a single CCF event is utilized that combines the various combinations of failures. It is not clear how this approach is implemented and if it impacts the FPRA for situations when a CCF and a fire failure may be combined in a fire scenario. Provide justification that the CCF modeling methodology does not underestimate the fire risk.

   v. Clarify if the updated CCF modeling made in response to these F&Os was incorporated in the Fire PRA risk results reported in the LAR. If not, provide further justification for the conclusions for various SRs that there is no impact to the FPRA or NFPA-805 from the CCF modeling changes or that CCF is not a significant contributor to fire risk. The response should address not significant in the context of both the RG 1.174 risk guidelines for transition and the post-transition change evaluation criteria, which is two orders-of-magnitude less than the RG 1.174 risk guidelines for Region II.

l) SR HR-D6: The status of this SR is reported as "open" and the disposition states "the HRA values have been updated to mean values during the Fire PRA development." The disposition further states that "the suggested data refinement is not expected to have a significant impact on applications." Clarify what the "suggested data refinement" issue is from the 2008 self-assessment, and how the disposition resolves the issue, and why the issue is considered to be an "open" item. If further changes to the PRA are necessary to resolve the issue, discuss their potential impact to the Fire PRA and results reported in the LAR.

m) SR HR-G6: The 2013 self-assessment concludes that this SR is not met and the status of this SR is reported as "open." The disposition further states that a meeting will be conducted with the PRA model integrator, the human reliability analysis (HRA) specialist and plant operators to perform a formal consistency check of the post-initiator human error probability quantifications. Clarify if this action has been completed and, if so, discuss the results of the review and if it resulted in any PRA model changes. If changes to the PRA were necessary to resolve the issue, discuss their potential impact to the FPRA and results reported in the LAR.

PRA RAI 03

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 core damage frequency (CDF), large early release frequency (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 additional information that is required to fully characterize the risk estimates.

The PRA methods currently under review in the LAR include:

- PRA RAI 01.c regarding the Fire PRA HRA
- PRA RAI 01.d regarding credit for automatic suppression
- PRA RAI 06 regarding application of state-of-knowledge correlations (SOKC)
- PRA RAI 09 regarding deviations from NRC guidance
- PRA RAI 10 regarding reduced circuit failure probabilities
- PRA RAI 11 regarding ignition bins missing from the sensitivity study
- PRA RAI 12 regarding main control room (MCR) abandonment on loss of habitability
- PRA RAI 13 regarding treatment of recovery actions
- PRA RAI 16 regarding sensitive electronics
- PRA RAI 17 regarding reduced heat release rate (HRR) for transients
- PRA RAI 19 regarding fire propagation from electrical cabinets and fire frequency allocation
- PRA RAI 20 regarding the multi-compartment analysis (MCA)
- PRA RAI 21 regarding modeling of multiple spurious operations (MSOs)
- PRA RAI 22 regarding modeling of junction boxes
- PRA RAI 23 regarding modeling of cable fires caused by welding and cutting (CFWC)
- FM RAI 01.j regarding flame spread on cable trays

Provide the following:

a) Results of an aggregate analysis that provides the integrated impact on the fire risk (i.e., the total transition CDF, LERF, ΔCDF, ΔLERF) of replacing specific methods

identified above with alternative methods that are acceptable to the NRC. In this aggregate analysis, for those cases where the individual issues have a synergistic impact on the results, a simultaneous analysis must be performed. For those cases where no synergy exists, a one-at-a-time analysis may be done. For those cases that have a negligible impact, a qualitative evaluation may be done. It should be noted that this list may expand depending on NRC's review of the responses to other RAIs in this document.

b) For each method (i.e., each bullet) above, explain how the issue will be addressed in 1) the final aggregate analysis results provided in support of the LAR, and 2) the PRA that will be used at the beginning of the self-approval of post-transition changes. In addition, provide a process to ensure that all changes will be made, that a focused-scope peer review will be performed on changes that are PRA upgrades as defined in the PRA standard, and that any findings will be resolved before self-approval of post-transition changes.

c) In the response, explain how the RG 1.205 risk acceptance guidelines are satisfied for the aggregate analysis. If applicable include a description of any new modifications or operator actions being credited to reduce delta risk as well as a discussion of the associated impacts to the fire protection program.

d) If any methods identified above will be retained in the PRA and will be used to estimate the change in risk of post-transition changes to support self-approval, explain how the quantification results for each future change will account for the use of these methods.

PRA RAI 04

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 additional information that is required to fully characterize the risk estimates.

LAR Section 4.5.1.3 has the following statement: "All F&Os that were defined as suggestions have been dispositioned and will be available for NRC review along with the dispositions related to the supplemental F&Os that were generated outside the consensus process." Discuss the process and basis for the development of these "supplemental" F&Os generated outside the consensus process. If they are peer review F&Os, provide the F&O and associated dispositions.

PRA RAI 05

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 additional information that is required to fully characterize the risk estimates.

LAR Section 4.5.2.2 provides a high-level description of how the impact of transition to NFPA-805 impacts DID and safety margin was reviewed, including using the criteria from Section 5.3.5 of NEI 04-02 and from RG 1.205. However, no explanation is provided of how specifically the criteria in these documents were utilized and/or applied in these assessments.

a) Provide further explanation of the method(s) or criteria used to determine when a substantial imbalance between DID echelons existed in the Fire Risk Evaluations (FREs), and identify the types of plant improvements made in response to this assessment.

b) Also, provide further discussion of the approach in applying the 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) criteria for assessing safety margin in the FREs.

PRA RAI 06

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's review of the information in the LAR has identified additional information that is required to fully characterize the risk estimates.

LAR Section 4.7.3 explains that the sources of uncertainty in the FPRA were identified and specific parameters were analyzed for sensitivity in support of the NFPA-805 FRE process. It is further explained that during the Fire Risk Evaluation process, the uncertainty and sensitivity associated with specific FPRA parameters were considerations in the evaluation of the change in risk relative to the applicable acceptance thresholds. Based on these explanations it is apparent that the risk results presented in Attachment W of the LAR are point estimates and do not include parameter uncertainty. Explain how SOKCs were taken into account in the FPRA quantification, including fire ignition frequencies, circuit failure likelihood and hot short duration, and non-suppression probabilities. If SOKC for these parameters were not accounted for in the

Fire PRA quantification, then include the impact of the SOKC for these parameters in the integrated analysis performed in response to PRA RAI 3.

PRA RAI 07

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 additional information that is required to fully characterize the risk estimates.

LAR Attachment G identifies three categories of operator manual actions [OMA(s)] in post-fire procedures: (1) recovery actions (RAs) to reduce risk, (2) RAs required for DID, and (3) actions associated with VFDRs but are screened out due to no or very low risk and are not considered recovery actions. Provide the following regarding these screened actions:

a) Are the screened OMAs the same as the "pre-existing" OMAs discussed on Page 40 of the LAR? If not, explain the difference.

b) Describe the criteria for screening OMAs as RAs.

c) Discuss how the screened-in OMAs are treated or modeled in the FPRA.

d) Explain how the screened-out OMAs will be treated in the post-transition fire procedures. If they will be retained in the procedures, clarify that they have been evaluated for adverse impact on the PRA (e.g., the HRA/feasibility analysis of RAs considered these OMAs in development of timing, operator availability, etc.).

PRA RAI 08

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 additional information that is required to fully characterize the risk estimates.

LAR Table S-3, Implementation Item #12 commits to updating the FPRA and re-evaluating the risk results after installation of the plant modifications identified in Table S-2 are completed. This implementation item does not address completion of the implementation items identified in Table S-3. Discuss your plans for re-evaluating the risk results following completion of the

Table S-3 implementation items, guidelines for taking action based on the results, and actions that will be taken if the guidelines are exceeded.

PRA RAI 09

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 additional information that is required to fully characterize the risk estimates.

LAR Attachment V Section V.2.1 states that the "The MNS Fire PRA does not employ any unreviewed analysis methods as identified in NRC Letter dated June 21, 2012" (ADAMS Accession No. ML12171A583). Indicate if any other methods were employed that deviate from guidance in NUREG/CR-6850 or other acceptable guidance (e.g., FAQs or interim guidance documents). If so, describe and justify any proposed method that deviates from NRC guidance, or replace the proposed method with an accepted method. Also, include the proposed method as a method "currently under review" as part of the integrated analysis in the response to PRA RAI 3.

PRA RAI 10

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 additional information that is required to fully characterize the risk estimates.

LAR Section V.2.2 states that reduced circuit failure probabilities for circuits with control power transformers (CPTs) was not credited in the FPRA. Recently, new guidance on using conditional probabilities of spurious operation for control circuits was issued by the NRC in Section 7 of NUREG/CR-7150, Volume 2. This guidance included: a) replacement of the conditional hot short probability tables in NUREG/CR-6850 for Option #1 with new circuit failure probabilities for single break and double break control circuits, b) Option #2 in NUREG/CR-6850 is not an adequate method and should not be used, c) replacement of the probability of spurious operation duration figure in FAQ 08-0051 for AC control circuits, d) aggregate values for circuit failure probabilities should be used unless it is demonstrated that a cable is only susceptible to a single failure mode, e) incorporation of the uncertainty values for the circuit failure probabilites and spurious operation duration in the SOKC for developing the mean CDF/LERF, and f) recommendations on the hot short probabilities to use for other cable configurations, including

panel wiring, trunk cables, and instrument cables. Provide an assessment of the assumptions used in the McGuire FPRA relative to the updated guidance in NUREG/CR-7150, Volume 2, specifically addressing each of these items. If the FPRA assumptions are not bounded by the new guidance provide a justification for each difference or provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 03, utilizing the guidance in NUREG/CR-7150.

PRA RAI 11

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 additional information that is required to fully characterize the risk estimates.

LAR Section V.2.6 indicates that only Bins 4 and 15 are applicable to the fire ignition frequency sensitivity analysis. For each of the other Bins having an alpha of less than or equal to 1, provide the basis for concluding that each does not impact the VFDR delta risk results.

PRA RAI 12

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.

LAR Section V.2.7 describes two MCR abandonment on loss-of-habitability scenarios, W1 and W2, where, in both cases, "failures were assumed which virtually eliminated all success paths other than the Standby Makeup Pump and the TD CA [turbine-driven auxiliary feedwater] pump from the SSF [Safe Shutdown Facility]." It is further explained that the conditional core damage probability (CCDP) for these scenarios is based on the highest CCDP for main control board (MCB) and non-MCB fires with additional failures as necessary to ensure no credit for functions that require continued presence in the MCR. Regarding this analysis, provide the following:

a) Summarize what "failures were assumed" and why they were assumed. Specifically, are they assumed because of general issues (e.g., unknown cable routing for functions always assumed failed) or are the assumptions only used for MCR abandonment scenarios?

b) An explanation of how the CCDPs account for the range of probabilities for properly shutting down the plant, and discussion of how they were applied in the scenario analysis. In doing so, provide examples over the full range of values utilized, a characterization of the scenarios to which these values are applied, and a summary of how each value is developed.

   This information should include explanations of how the following scenarios are addressed:

   i. Scenarios where the fire fails few functions aside from MCR habitability and successful shutdown is straightforward.

   ii. Scenarios where the fire could cause some recoverable functional failures or spurious operations that complicate the shutdown but successful shutdown is likely.

   iii. Scenarios where the fire induced failures cause great difficulty for shutdown by failing multiple functions and/or causing complex spurious operations that make successful shutdown unlikely.

c) Explanation of the timing considerations (i.e., total time available, time until cues are reached, manipulation time, and time for decisionmaking) made to characterize scenarios in Part (b). Include in the explanation the basis for any assumptions made about timing.

d) Discussion of how the probability associated with failure to transfer control to the SSF is taken into account in Part (b).

e) Description of how the feasibility of the operator actions supporting the alternate shutdown pathway was considered by the scenario characterization performed in Part (b).

PRA RAI 13

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 staffs review of the information in the LAR has identified additional information that is required to fully characterize the risk estimates.

LAR Section V.2.7 states "Control room abandonment is only considered for cases where the Control Room environment (temperature and smoke) reaches the criteria specified in NUREG/CR 6850. For non-abandonment cases credit may be taken at the Primary Control Station (PCS) as needed to control functions impacted for a given Control Room panel fire."

LAR Table G-1 identifies PCS actions for the following 11 fire areas: 01 (U1 and U2), 02, 03, 04 (U1 and U2), 13 (U1 and U2), 14 (U1 and U2), 19, 20, 21 (U1 and U2), 24 (U1 and U2), and 25 (U1 and U2). If primary command and control is retained in the MCR (i.e., the MCR is not abandoned), then RG 1.205 states, "operation of dedicated or alternative shutdown controls while the main control room remains the command and control location would normally be considered a recovery action." In light of this, provide the following:

a) Clarify if primary command and control is retained in the MCR for fire scenarios in each of these 11 fire areas and explain how this decision is reached. If primary command and control is retained in the MCR, actions taken at the PCSs should be recovery actions. If these actions are not considered recovery actions in your analysis, please justify. Provide the additional risk of all recovery actions for each fire area if not already provided in the LAR. Also, discuss the results of the feasibility and reliability evaluation in accordance with FAQ 07-0030.

b) If command and control is not retained in the MCR and is transferred to the PCS, the actions taken at the primary control station are not recovery actions and the MCR is assumed to be abandoned on loss-of-control. Describe how PCS actions are modeled in the FPRA and the modeled abandonment scenarios. Describe the HRA performed for these actions. In the response, describe the cues that result in the decision to abandon and the timing of these cues, identify the instruments being relied upon to make the abandonment decision and discuss whether these instruments are protected, and discuss how failure to transfer control to the primary control stations is taken into account.

PRA RAI 14

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 additional information that is required to fully characterize the risk estimates.

LAR Section W.2.1 describes only one method for estimating the delta risk, as follows: "The compliant case was created by manipulating the Fire PRA model to 'remove' the VFDR(s). Fire PRA manipulations involved 'oggling off' or excluding specific PRA basic events to remove the potential fire induced failure associated with the VFDRs." It does not address if there are any exceptions to this method, such as potentially with MCR abandonment scenarios or the use of bounding methods per FAQ 08-0054 (use of the bounding method seems to be implied by the delta risk results presented in Tables W-3 and W-4 for some fire areas). Provide further description of the methods used to determine the change in risk values reported in LAR Tables W-3 and W-4 and additional discussion of the results as requested below.

a) RG 1.174 states that combined change requests (i.e., those that combine risk increases with risk decreases) should report the risk increases and risk decreases separately. Please explain how these values can be obtained from the tables in Appendix W or provide for the post-transition plant an estimate of the risk increase from the retained VFDRs and, separately, the risk decrease associated with modifications made only to reduce risk.

b) Were any methods other than the basic event toggling already described used to determine the fire area change in risk or delta risk reported in LAR Tables W-3 and W-4? If so, describe each method.

c) Describe how the change in risk was determined for MCR abandonment scenarios, including a summary of how the CCDP was determined for the compliant and the variant plants. Note that an overestimate of the compliant plant risk, unless offset with a similar overestimate in the variant plant risk, results in a non-conservative analysis of the delta risk. If the method described applies different assumptions to the variant and the compliant plant risk estimates, an indeterminate but non-conservative impact on the change-in-risk estimate may result.

PRA RAI 15

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 additional information that is required to fully characterize the risk estimates.

LAR Tables W-3 and W-4 report results for total delta LERF of 1.06E-06 per year for Unit 1 and 9.32E-07 per year for Unit 2. These tables also report an "Offset Risk" from crediting a risk reduction modification to the Liquid Waste Recycle System (WL) that results in a substantial reduction in the reported total delta LERF values for both units, yielding a net reduction in delta LERF from the transition to NFPA-805. Given the importance of this modification to the transition, provide a description of how the risk reduction from this modification was calculated. The response should include a discussion of key assumptions and non-conservatisms, and the impact of any non-conservatisms on the reported "Offset Risk."

PRA RAI 16

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 FPRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the NRC staff for adopting a fire protection program consistent with NFPA-805. 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.

In regard to modeling fire damage to sensitive electronics, neither Appendix H of the LAR or the licensee's procedures refer to use of FAQ 13-0004, "Clarifications on Treatment of Sensitive Electronics", dated December 3, 2013 (ADAMS Accession No. ML13322A085). Describe the treatment of sensitive electronics for the FPRA and explain whether it is consistent with the guidance in FAQ 13-0004, including the caveats about configurations that can invalidate the approach (i.e., sensitive electronic mounted on the surface of cabinets and the presence of louver or vents). If the approach is not consistent with FAQ 13-0004, justify the approach or replace the current approach with an acceptable approach in the integrated analysis performed in response to PRA RAI 3.

PRA RAI 17

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 FPRA 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. 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.

The licensee's analysis indicates that the ZOI associated with a 142 kilo-watt (kW) heat release rate (HRR) (75th percentile) transient fire was used in almost all fires areas. Discuss the key factors used to justify the reduced rate below 317 kW per the guidance provided in the June 21, 2012, memo from Joseph Giitter to Biff Bradley ("Recent Fire PRA Methods review Panel Decisions and EPRI 1022993, 'Evaluation of Peak Heat Release Rates in Electrical Cabinets Fires'," ADAMS Accession No. ML12171A583). Include in this discussion:

a) Identification of all fire compartments/areas where a ZOI for a reduced HRR of 142 kW (75th percentile) was used. The guidance in the referenced June 21, 2012, memo indicates that a reduced HRR would be an exception supported by rigorous controls and restrictions. Please discuss how using a reduced HRR for almost all fire areas, if correct, is consistent with the guidance.

b) For each location (or group of similar locations) where a reduced HRR is credited, a description of the administrative controls that justify the reduced HRR including how location-specific attributes and considerations are addressed.

c) The results of a review of records related to violations of the transient combustible and hot work controls.

d) Confirm that 142 kW and 317 kW HRRs were the only transient fire sizes used in the FPRA.

PRA RAI 18

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 FPRA 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. 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.

The MCB is described as having a horseshoe arrangement that is fully enclosed and is effectively a sub-enclosure. The analysis of MCB fires treats the front and back panels of the horseshoe as an integral part of the MCB.

a) FAQ 14-0008 provides guidance on how MCB fires should be treated for MCBs that are sub-enclosures. Describe how your MCB configuration and MCB fire scenario analysis is consistent with the FAQ.

b) Describe how MCB fire scenarios are postulated and evaluated, including how the fire ignition frequency is determined for each scenario, how NUREG/CR-6850 Appendix L is applied to individual scenarios, how partitions between panels/cabinets are treated if credited, and how propagation between the front and back sides of the MCB is evaluated including identification of and evaluation of damage to target sets.

PRA RAI 19

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 NRC staff for adopting a fire protection program consistent with NFPA-805. 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.

The licensee's analysis appears to indicate that fires within some Bin 15 cabinets above 440V [e.g., motor control centers (MCCs)], are not assumed to propagate outside of the cabinet. In addition, it is indicated that the damage for some well-sealed MCC fires is limited through the application of a 0.20 severity factor. Guidance in Frequently Asked Question 08-0042 from Supplement 1 of NUREG/CR-6850 applies to electrical cabinets below 440 V. With respect to Bin 15 as discussed in Chapter 6, it clarifies the meaning of "robustly- or well-sealed" when used in conjunction with these lower voltage cabinets. For those cabinets of 440 V and higher, the original guidance in Chapter 6 remains: "Also note that panels that house circuit voltages of 440 V or greater are counted because an arcing fault could compromise panel integrity (an arcing fault could burn through the panel sides, but this should not be confused with the high energy arcing fault type fires)." Therefore, propagation of fire outside the ignition source panel must be evaluated for all Bin 15 panels that house circuits of 440 V or greater.

a) Describe how fire propagation outside of well-sealed cabinets greater than 440 V is evaluated.

b) Clarify under what circumstances the 0.20 severity factor is used, how it is used, and what is the justification.

c) If well-sealed cabinets less than 440 V are included in the Bin 15 count provide justification for using this approach.

PRA RAI 20

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 FPRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the NRC staff for adopting a fire protection program consistent with NFPA-805. 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.

A severity factory of 0.20 is applied to all MCA scenarios "to account for the probability that only 1 in 5 fires are expected to challenge the zone boundary." This is an industry average-type factor that does not account for the design-specific considerations and potential for hot gas layer (HGL) formation at MNS. In addition, a barrier failure probability of 7.4E-03 is also applied to all MCA scenarios, which only accounts for the barrier having the highest probability of failure (e.g., non-rated barrier, door, damper, or wall)."

a) Is the 0.20 factor only applied when there is a rated fire barrier? If not provide further justification of the use of any factor.

b) Provide justification for the use of the single barrier failure probability appropriately accounting for the MNS-specific design and potential for HGL formation potential in the MCA, or provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 03 without the severity factor and summing the barrier failure probabilities for each type of barrier present per NUREG/CR-6850.

PRA RAI 21

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 FPRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the NRC staff for adopting a fire protection program consistent with NFPA-805. 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.

The licensee's analysis dispositions how each MSO from the industry generic list was addressed in the FPRA model. This list is not consistent with the generic MSO list in Appendix G of NEI 00-01, Rev. 2 which, according to Attachment F of the LAR, may not have been the source of the generic MSO list used in the FPRA. Identify the MSOs in Appendix G of NEI 00-01, Rev. 2, that are not identified in Table A-1 of the Fire Model Development Report and describe how these are dispositioned in the FPRA model. Provide justification for any generic MSOs not identified in Table A-1 or provide updated risk results as part of the aggregate change-in-risk analysis requested in PRA RAI 03 that incorporates the additional MSOs in the FPRA model.

PRA RAI 22

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 FPRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the NRC staff for adopting a fire protection program consistent with NFPA-805. 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.

The MNS FPRA does not employ junction boxes based on scenario walk downs and due to utilization of armored cables, and therefore there were no Bin 18 fires assumed in the MNS Fire PRA. However, per FAQ 13-0006, it is noted that junction box frequencies should be included for both thermoplastic and thermoset cables as the fire event experience suggests that these fires start due to small arcs generated by bad connections, which is not influenced by the cable insulation or jacket type. Provide further justification for not including junction box fires in the FPRA by specifically addressing the definition and characteristics of junction boxes in FAQ 13-0006. If the apportioning method used is not in conformance with the acceptable methods defined in NUREG/CR-6850 or FAQ 13-0006, provide a detailed justification for the alternate method that includes a discussion of conservatisms and non-conservatisms relative to the accepted methods and assesses the associated impacts on the fire total and delta risk results, or replace the current approach with an acceptable approach in the integrated analysis performed in response to PRA RAI 3.

PRA RAI 23

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 FPRA and endorses, with exceptions and clarifications, NEI 04-02, Revision 2, as providing methods acceptable to the NRC staff for adopting a fire protection program consistent with NFPA-805. 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.

The fire ignition frequency for cable fires caused by welding and cutting is apportioned based on the number of raceways in each compartment in lieu of cable loading per NUREG/CR-6850. Provide a detailed justification of your method that includes a discussion of conservatisms and non-conservatisms relative to the accepted methods and assesses the associated impacts on the fire total and delta risk results, or replace the current approach with an acceptable approach in the integrated analysis performed in response to PRA RAI 3.

Request for Additional Information	Response Date
Programmatic 1 FPE 1, 2, 4, 5, 6, 7, 8, 10 SSA 2, 3.b, 6, 7 FM 1.b, 1.h, 1.i, 2.c, 2.d, 3, 5 PRA 1.a, 4, 5, 7.a, 7.b, 7.c, 8, 14, 15, 18, 21	10/13/2014 (60 days*)
FPE 3, 9 SSA 1, 3.a, 4, 5 FM 1.k, 2.e, 2.f PRA 1.d, 12, 17	11/12/2014 (90 days*)
FM 1.a, 1.c, 1.d, 1.e, 1.f, 1.g, 1.j, 1.l, 2.a, 2.b, 4, 6 PRA 1.b, 1.c, 1.e, 2, 3**, 6, 7.d, 9, 10, 11, 13, 16, 19, 20, 22, 23	12/12/2014 (120 days*)

*from conclusion of audit on August 14, 2014
**response to subpart (a) of PRA 3 may need to come later

Acronyms:
FPE – Fire Protection Engineering
SSA – Safe Shutdown Analysis
FM – Fire Modeling
PRA – Probabilistic Risk Assessment

August 28, 2014

Mr. Steven D. Capps
Vice President
McGuire Nuclear Station
Duke Energy Carolinas, LLC
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2: REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TO IMPLEMENT A RISK-INFORMED, PERFORMANCE-BASED FIRE PROTECTION PROGRAM (TAC NOS. MF2934 AND MF2935)

Dear Mr. Capps:

By letter dated September 26, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13276A126), Duke Energy Carolinas, LLC (Duke) submitted a license amendment request to change its fire protection program to one based on the National Fire Protection Association (NFPA) Standard-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), Part 50, Section 50.48(c).

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's submittal and determined that additional information is needed in order to complete our review. Enclosure 1 describes this request for additional information (RAI). During the regulatory audit that began on August 11, 2014, response dates for the questions in Enclosure 1 were discussed with Duke staff. Enclosure 2 lists the agreed upon response dates for the various questions.

If you have any questions, please call me at 301-415-2481.

Sincerely,

/RA/
G. Edward Miller, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosure: As stated

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DATE	08/28/14	08/28/14	08/15/14	08/15/14	08/28/14

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