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

November 18, 2009

Mr. Dave Baxter
Vice President, Oconee Site
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 - REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TRANSITION TO TITLE 10 OF THE *CODE OF FEDERAL REGULATION*, SECTION 50.48(c), NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NFPA 805 (TAC NOS. MD8822, MD8823, AND MD8824)

Dear Mr. Baxter:

By letter dated May 30, 2008 as supplemented October 31, 2008, January 30, 2009, February 9, 2009, February 23, 2009, May 31, 2009, August 3, 2009, and September 30, 2009, Duke Energy Carolinas, LLC, submitted a license amendment request (LAR) to transition the fire protection licensing basis at Oconee Nuclear Station Units 1, 2, and 3 from Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.48(b) to 10 CFR 50.48(c), *National Fire Protection Association Standard NFPA 805.*

To complete our review of the LAR, the U.S. Nuclear Regulatory Commission (NRC) staff needs additional information. The NRC staff's request for additional information (RAI) is enclosed. On September 24, 2009, your staff stated that the response to all of the RAIs would be provided by November 30, 2009.

If you have any questions, please call me at 301-415-1345.

Sincerely,

John Stang, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure:
As stated

cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION (RAI)

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

TRANSITION TO TITLE 10 OF THE *CODE OF FEDERAL REGULATION*, SECTION 50.48(c),

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NFPA 805

By letter dated May 30, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081650476), as supplemented by letters dated October 31, 2008 (ADAMS Accession No. ML083120362), January 30, 2009 (ADAMS Accession No. ML091040205), February 9, 2009 (ADAMS Accession No. ML090480143), February 23, 2009 (ADAMS Accession No. ML090700134), May 31, 2009 (ADAMS Accession No. ML091590045), and August 3, 2009 (ADAMS Accession No. ML092190212), Duke Energy Carolinas, LLC (the licensee), submitted a license amendment request (LAR) for the U.S. Nuclear Regulatory Commission (NRC) staff's review and approval. The proposed LAR would approve the transition of the fire protection licensing basis at Oconee Nuclear Station (ONS) Units 1, 2, and 3 from Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.48(b) to 10 CFR 50.48(c), *National Fire Protection Association Standard (NFPA) 805.*

The NRC staff has determined that the following information is needed in order to complete its review of the LAR.

**ONS RAI 1-3**

The second sentence in Section 1.1.1 of the ONS Transition Report states:

> "... 10 CFR 50.48(c) endorses, with exceptions, NFPA 805, Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants - 2001 Edition, as a voluntary alternative for demonstrating compliance with 10 CFR 50.48 Section (b), Appendix R, and Section (f), Decommissioning."

This sentence is incorrect. The change to 10 CFR 50.48 incorporates the NFPA standard by reference, with exceptions, resulting in the standard actually becoming a part of the regulation.

Similarly, the footnote on page 8 of the ONS Transition Report appears to be in error since the regulations do not "endorse" NFPA 805. The NFPA 805 rule took exception to the Life Safety and Business Interruption goals, objectives and performance criteria and incorporated by reference the remaining sections of NFPA 805.

Revise the Transition Report accordingly.

Enclosure

**ONS RAI 1-4**

Section 3.1 of the ONS Transition Report does not include any mention of the need to complete committed modifications.

Is the completion of any required modifications meant to be included in item "(7) complete implementation of the new licensing basis"? If so, this needs to be explicitly included in the discussion since completion of required modifications is required to complete transition. Provide a summary of proposed modifications, a schedule for implementation of those modifications, and a proposed license condition reflecting the commitment and schedule for installation of the modifications.

**ONS RAI 1-5**

Section 4.2.2.3 of the ONS Transition Report includes a bullet for "open items." The use of the term "Open Item" implies that further analysis is required. The NRC staff cannot approve a request for transition to a risk-informed, performance-based fire protection program if the analyses required have not been completed.

Title 10 CFR Part 50.48(c)(3)(ii) states:

> "The licensee shall complete its implementation of the methodology in Chapter 2 of NFPA 805 (including all required evaluations and analyses) and, upon completion, modify the fire protection plan required by paragraph (a) of this section to reflect the licensee's decision to comply with NFPA 805, before changing its fire protection program or nuclear power plant as permitted by NFPA 805."

The licensee should provide a statement under oath or affirmation that all required engineering analyses have been completed and that compliance with the requirements has been achieved.

**ONS RAI 1-6**

Attachment P of the ONS Transition Report is based on the approach documented in NFPA 805, Frequently Asked Question (FAQ) 06-0008, Revision 8. Agreement was reached and a closure memo was approved based on Revision 9. To obtain the benefit of the approach documented in Revision 9, the Transition Report must reference the appropriate version. Explain how the LAR, including Attachment P, would change based on Revision 9 of FAQ 06-0008.

**ONS RAI 2-7**

Item (3) of NFPA 805, Section 3.2.3, requires reviews of fire protection program related performance and trends. Describe how compliance to Section 3.2.3 (3) will be achieved.

**ONS RAI 2-8**

NFPA 805, Section 4.1, states: "Once a determination has been made that a fire protection system or feature is required to achieve the performance criteria of Section 1.5, its design and qualification shall meet the applicable requirement of Chapter 3."

The discussion of the fire area-by-fire area review on page 45 of the ONS LAR includes requirements to answer these two questions; "Suppression Required?" and "Detection Required?" Provide the following information concerning these systems.

a. When either of these questions is answered "Yes," what requirements apply with respect to the design and qualification of that system?

b. What quality requirements apply to a system that has been designated as required in Attachment C of the LAR?

c. On page 45, under Suppression Required? (Yes/No):, there is a bullet that states that systems required to meet Chapter 4 performance-based compliance (including systems credited for DID) are summarized in change evaluations. This passage implies that systems credited for defense-in-depth in plant change evaluations should be considered. If a system is required by Chapter 4 its design and qualification would need to meet the applicable requirement of Chapter 3. Is that implication correct? What design, qualification and quality controls apply to fire detection and suppression systems that are credited for defense-in-depth?

**ONS RAI 2-9a**

Some NFPA 805, Chapter 3, elements are complicated or have multiple varied applications throughout the plant. The results in some elements require more that one compliance strategy entry to fully capture the licensee's compliance basis.

ONS's B-1 Table currently contains compliance statements for each NFPA 805, Chapter 3, element or sub-element. Where ONS relies on more than one compliance strategy for a particular element, the B-1 Table must fully capture all of ONS's methods of compliance. Ensure that where necessary, all of ONS's compliance strategies are captured in the B-1 Table. The description of the B-1 Table methodology in the Transition Report (i.e., Section 4.1) should be updated to reflect any changes required by multiple compliance strategies. ONS must also ensure that all aspects of each particular Chapter 3 element or sub-element are addressed by the appropriate compliance statements.

For example, Table B-1 of the LAR fundamental element NFPA 805, Section 3.11.2, identifies two compliance statements; "NRC prior Approval" and "Licensee Evaluation" for fire barriers. Both of these are described as "fire barriers between the major buildings". This description does not provide any distinction between the two. The NRC staff is unable to identify which barriers fall into which category. Please clarify the distinction. Additionally, these are the only compliance strategies for fire barriers. This would imply that no fire barriers simply meet tested/listed

configurations for walls and all fire barriers are covered by only those two compliance strategies. Clarify that this is true.

**ONS RAI 2-9b**

Evaluations of ONS's compliance with several NFPA standards are referenced in a number of B-1 Table elements. A detailed summary of the results of each of these compliance evaluations should be provided in the LAR and referenced in the B-1 Table. These summaries may be compiled in a separate attachment to the submittal.

At a minimum, each summary should include:

1. a description of all evaluated conditions determined to be acceptable based on an engineering, or other type of, evaluation, including:

    - a summary of each condition;
    - a summary of the evaluation of each condition; and
    - a summary of the resolution of each condition.

2. a description of all apparent code deviations, including:

    - a summary of each deviation;
    - a summary of the evaluation of each deviation; and
    - a summary of the resolution of each deviation.

If ONS wishes to treat these compliance evaluations like existing engineering equivalency evaluations, then this information need not be submitted but available for future review.

Unless specifically limited by the Chapter 3 element, these evaluations should be completed, at a minimum, for all power block areas. (Note that certain standards, such as NFPA 600, apply plant-wide by their nature, and cannot be so limited.)

A partial list of the NFPA standards referenced is:

- NFPA 10
- NFPA 13
- NFPA 14
- NFPA 20
- NFPA 24
- NFPA 30
- NFPA 51B
- NFPA 55
- NFPA 600
- NFPA 72D
- NFPA 80
- NFPA 90A

**ONS RAI 2-10**

In 10 CFR 50.48(c), the NRC has specifically not endorsed sections of the NFPA 805 standard. Generally this text should not be part of ONS's licensing basis. Two examples in the B-1 table are the exceptions to 3.3.5.3 and the exception to 3.6.4. What is the basis for providing none endorsed text of the NFPA 805 standard in the B-1 table?

**ONS RAI 2-11**

B-1 Table: Compliance Strategy: Complies Via Previous Approval

For Chapter 3 elements with a "Complies via Previous Approval" compliance strategy, the following details are required to be provided: (1) appropriate excerpts from submittals regarding the issue for which previous approval is being claimed, followed by (2) appropriate excerpts from the NRC documents that provide the formal approval of the fire protection system/feature. References for both submittal and approval documents are also required. Additionally, there must be a positive statement with regard to condition(s) in place at the time of approval being still in effect for the NFPA 805 compliance strategy. For example, from Table B-1, Section 3.11.3, Fire Barrier Penetrations, fire dampers (pages 76 of 80) were to be upgraded as a condition for approval of the condition (Safety Evaluation (SE) Section 4.9.3). However, no positive statement delineating that all conditions and modifications have been completed or otherwise dispositioned as conditions of acceptance was provided in the Transition Report. During the review, the NRC staff identified a number of entries where the above requirements were not met. The following matrix details the inadequacies that were identified during the review. ONS should correct these and ensure that there are no others.

| Chapter 3 Element | Identified Issue |
|---|---|
| 3.3.5.3 | Provide submittal and approval excerpts for each deviating detail.<br><br>Order the excerpts so that the submittal excerpt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |
| 3.5.1 | Provide an excerpt from the submittal document.<br><br>Order the excerpts so that the submittal excerpt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |

| Chapter 3 Element | Identified Issue |
|---|---|
| 3.5.3 | Provide an excerpt from the submittal.<br><br>Order the excerpts so that the submittal excerpt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |
| 3.5.4 | Provide an excerpt from the submittal.<br><br>Order the excerpts so that the submittal excerpt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |
| 3.5.5 | Provide an excerpt from the submittal.<br><br>Order the excerpts so that the submittal excerpt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |
| 3.5.13 | Provide a submittal document reference.<br><br>Provide an excerpt from the submittal document.<br><br>Order the excerpts so that the submittal exceprt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |
| 3.6.1 | Provide a submittal document reference.<br><br>Provide an excerpt from the submittal document.<br><br>Order the excerpts so that the submittal exceprt is followed by the approving document excerpt.<br><br>Provide a positive statement that all SE conditions for approval are met and still in effect. |

**ONS RAI 2-12**

During the review of the Table B-1, the NRC staff identified the following issues that are linked to specific table elements. ONS should review the submittal and ensure that any similar conditions are resolved appropriately.

B-1 Table: Element 3.3.1.1

NFPA 805, Section 3.3.1.1, states: "The fire prevention activities shall include but not be limited to the following program elements:" Provide a compliance statement that addresses the "... but not be limited to ..." part of the requirement.

B-1 Table: Element 3.3.1.2

NFPA 805, Section 3.3.1.2, states, in part: "These procedures shall include but not be limited to the following program elements: ...." Provide a compliance statement that addresses the "... but not be limited to ..." part of the requirement.

B-1 Table: Element 3.3.1.2.(5)

Identify in the table which other NFPA standards were determined to be applicable, and provide references to code compliance calculations for these other standards.

B-1 Table: Element 3.3.1.2.(6)

Identify in the table entry which NFPA standards were determined to be applicable, and provide references to code compliance calculations for these standards.

B-1 Table: Element 3.3.1.3.1

Address ONS compliance with NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations, as required by this section of NFPA 805.

B-1 Table: Element 3.4.1

- Provide point-by-point compliance statements for the subsections of this element.
- Provide a positive statement concerning which NFPA standard ONS follows.

B-1 Table: Element 3.4.2.1

The Compliance Basis for this element refers to another document not submitted. In the LAR, list what categories of information the ONS pre-fire plans actually contain.

B-1 Table: Element 3.4.3.(a)

Provide point-by-point compliance statements and references for the numbered subsection of this element. Compliance with all of these points is required.

B-1 Table: Element 3.4.3.(c)

Provide point-by-point compliance statements and references for the numbered subsection of this element. Compliance with all of these points is required.

B-1 Table: Element 3.5.13

Address the seismic portion of this requirement and provide appropriate compliance information.

B-1 Table: Element 3.6.2

Ensure that the Compliance Strategy for this element is correct (i.e., how does the code compliance evaluation relate to the "Comply" Compliance Strategy?).

B-1 Table: Element 3.11.1

Does ONS utilize the exception? If so, provide a detailed summary of the completed performance based analysis.

B-1 Table: Element 3.11.3

ONS needs to address the compliance to NFPA 101 for this element. The NRC staff did not take exception to its inclusion in this element. Therefore, the provisions of NFPA 101 related to this element (i.e., the characteristics of fire barrier penetration protective devices fire doors and dampers) do apply. ONS must address these requirements and correct this entry.

**ONS RAI 2-13**

Table B-1: Document Detail

The purpose of the Document Detail field in the Table B-1 is to help ensure traceability for the licensee's licensing basis. During the review, the NRC staff identified that Document Detail for traceability was not used. ONS should review the table and ensure that entries are completed where applicable.

**ONS RAI 2-14**

Attachment L of the Transition Report discusses specific deviations from NFPA 805, Chapter 3, requirements (Sections 3.3.1.2(1), 3.3.1.3.4, and 3.3.7) for which ONS is seeking approval. Provide the following relative to these requested deviations:

- The regulatory basis (i.e., 10 CFR 50.48(c)(2)(vii) or 10 CFR 50.48(c)(4)) and an appropriate regulatory justification for each deviation request.

- The level of technical justification or basis for request and detail provided for these deviation requests is currently insufficient as a basis for an SE. For each deviation request, ONS should provide a level of detail and technical justification equivalent to that submitted for stand-alone licensing actions.

- The technical justification must show how the performance-based approach:

    1. Satisfies the performance goals, performance objectives, and performance criteria specified in NFPA 805 related to nuclear safety and radiological release;
    2. Maintains safety margins; and
    3. Maintains fire protection defense-in-depth (fire prevention, fire detection, fire suppression, mitigation, and post-fire safe shutdown capability).

**ONS RAI 2-15**

The current licensing basis (CLB) includes fire protection commitments in the updated final safety analysis report (UFSAR) 9.5-1, elements of lessons learned incorporated into the fire protection program, and UFSAR description of barriers and controls in place to assist the program in protecting the established goals. In the new NFPA 805 LAR, these commitments and lessons learned are not being retained (e.g., not specifically identified in the Tables B-1, B-2, or B-3; not part of an exemption or evaluation carried forward in the LAR; not part of the UFSAR update provided in Attachment R). Examples of items not included are:

- Guidance in NRC Document "Nuclear Plant Fire Protection Functional Responsibilities, Administrative Controls and Quality Assurance" has been incorporated (ONS UFSAR Section 9.5.1.3, pages 9-70). This first example identifies the 10-point fire protection quality assurance (QA) program. This commitment controls the fire protection program procurement, testing, non-conforming actions, and many more aspects of the QA program not identified in NFPA 805.
- Reviews are conducted of work requests by the ONS planning section to determine the effects of these activities on station fire barriers or stops. This identification then alerts personnel to special precautions that must be taken (ONS FSAR Section 9.5.1.3, pages 9-71).
- Work involving ignition sources such as welding and burning is performed under closely controlled conditions. The Site Fire Protection Engineer audits the welding and burning program to assure its proper implementation.
- Transformers that are oil-filled and within 50 feet of a building containing safety related systems are protected with an automatic water spray system (ONS FSAR Section 9.5.1.3, pages 9-72).

Identify the CLB fire protection features and elements that are not addressed in the ONS NFPA 805 LAR. Clarify ONS intentions regarding these identified fire protection features and elements.

**ONS RAI 3-12**

The discussion of Non-Power Operational Modes included in Sections 4.3.1, 4.3.2, and Table F-1, pages 1of 6, of the ONS Transition Report states that it is based on NFPA 805, FAQ 07-0040, without citing a revision number. Section 4.3.1 also cites FAQ 07-0040, Revision 5. FAQ 07-0040, Revision 4, has been referenced in Table F-1 (pages 2 and 3 of 6). Identify the correct revision to which the evaluation has been completed. Table H-1, page H-6, identifies FAQ 07-0040, Revision 2, as the referenced version. The information in Section 4.3 (Table 4-1) does not appear to be entirely consistent with the closed version of FAQ 07-0040. Ensure the closed

version of FAQ is used and provide justification for any deviations from the closed version of FAQ 07-0040.

**ONS RAI 3-13**

Attachment C and Table 4-4 of the ONS Transition Report lists both Deterministic (4.2.3) and Performance-Based (4.2.4) sections as the regulatory basis post-transition for numerous fire areas. NFPA 805, Section 4.2.2, states that either a deterministic or performance-based approach shall be selected. Listing both sections does not meet this requirement.

**ONS RAI 3-14 - Withdrawn**

**ONS RAI 3-15 - Withdrawn**

**ONS RAI 3-16**

In Attachment F of the ONS Transition Report, page F-2, the ONS process/results description for Step 2 includes a discussion about a second expert panel that was conducted on February 16, 2006. Relative to this expert panel, provide the following:

- a general description of the composition of the expert panel, including number of licensee staff participating, disciplines and experience represented by the participants, and use of contractors/independent experts.

- an expanded description of the expert panel process that includes a description of the process used to reach consensus on the multiple spurious operations (MSOs) kept for further assessment and a description of the criteria used in the selection process.

- a list of MSOs that were reviewed, any revisions subsequently made to the list, and the source of the MSOs that were reviewed (plant unique issue identified by the expert panel, generic industry MSO lists, operating experience, industry guidance documents, etc.).

**ONS RAI 3-17**

The definition of "Primary Control Station" provided in Attachment G, page G-2, appear to potentially exclude what the NRC staff would consider to be valid recovery actions. The NRC staff considers the definition provided in Draft Guide (DG)-1218 to be more appropriate for NFPA 805 transition. If the definition in the DG were utilized for ONS, what additional recovery actions would be required, and what would the additional risk of their performance be?

**ONS RAI 3-18**

In Attachment G, page G-3, there is a discussion of the use of DID manual actions. Explain how the use of DID actions that are not modeled in the fire probabilistic risk assessment (FPRA) meets the requirements of NFPA 805, Section 2.4.3.3, requires the fire risk analysis to: "...be based on the as-built and as-operated and maintained plant, and reflect the operating experience at the plant."

**ONS RAI 3-19**

In Attachment G, page G-4, of the Transition Report states that, "OMAs [operator manual actions] that are allowed and/or have been previously reviewed and approved by the NRC (as documented in an approved exemption/deviation/SE) can be transitioned without using the change evaluation process."

However, use of the performance-based approach under NFPA 805, Section 4.2.4, also requires the assessment of risk. NFPA 805, Section 4.2.3, states that use of recovery actions automatically implies the use of the performance-based approach. Section 4.2.4 states, "When the use of recovery actions has resulted in the use of this approach, the additional risk presented by their use shall be evaluated." When the risk evaluation option of the performance-based approach is selected, the calculations required by Section 4.2.4.2 are required by NFPA 805. Attachment G, lists 17 OMAs being transitioned as recovery actions. Provide the evaluation of the additional risk presented by the use of these 17 recovery actions.

**ONS RAI 3-20**

In Attachment G of the ONS Transition Report, page G-6, the example cited in the third bullet states that an area without automatic detection and a high scenario conditional core damage probability may warrant a DID action. How would the operator know that he had to take the DID action if there is no detection in the area? Explain how the action could be taken if the operator does not know there is a fire in the area.

**ONS RAI 3-21**

In Attachment G, page G-8, the ONS Transition Report states: "The alternative shutdown recovery actions are not explicitly modeled in the FPRA." NFPA 805, Section 4.2.4, requires that the additional risk of recovery actions be evaluated. Explain how this requirement is being met if the recovery action is not modeled in the FPRA.

**ONS RAI 3-22**

In Attachment G, page G-11, the ONS Transition Report states: "OMAs that can contribute significantly to the overall integrated decision-making process associated with the NFPA 805 transition should be identified." Was this done for ONS? If yes, what were they? What is the additional risk associated with their use?

**ONS RAI 3-23**

In Attachment G, page G-12, the ONS Transition Report states: "Due to the low risk benefit of performance of defense-in-depth actions, the additional effort per NUREG-1852 does not add measurable benefit." NFPA 805, Section 2.4.2.1, states that the availability and reliability of equipment selected shall be evaluated. The DID actions can directly impact that reliability. Explain how this requirement is being met if the DID actions have not been evaluated for reliability.

**ONS RAI 3-24**

In Attachment G, page G-13 of the ONS Transition Report, Table G-1 states that for emergency lighting, tools,-equipment, actions in the fire area, and time, the feasibility criterion will be performed for time critical recovery and DID actions (less than 2 hours).

NFPA 805, paragraph 4.2.4.1.6, requires on recovery actions that all recovery actions must be shown to be feasible including consideration of the time available to perform the action before the plant experiences a non-recoverable condition. If tools or other equipment is required to perform the recovery action, they must be on hand and available. Crediting actions in the fire area will require a performance-based analysis to demonstrate that the actions can be reliably taken when needed without causing a life-threatening condition for the operator.

Provide sufficient justification that recovery and DID actions that are required after a 2-hour time-period meet the proposed feasibility criteria in Table G-1 of the LAR.

**ONS RAI 3-25**

In Attachment X of the ONS Transition Report, page X-5, the discussion under Determination of Capability Categories makes the statement: "Internal flood (IF) is not required for the application." Actuation of fire suppression water systems, either as a result of a fire or spuriously, can have a similar impact to pipe and other equipment ruptures. Did the FPRA include consideration of internal flooding caused by fire suppression systems? If not, why not?

**ONS RAI 3-26 - Withdrawn**

**ONS RAI 3-27**

Provide a justification for your assumption that the use of armored cables, without further consideration of their current installed configuration, is adequate to prevent inter-cable faults due to fire or, alternatively, provide information that reasonably demonstrates that the as-installed configuration of the armor cable grounding scheme is consistent with the original plant design.

The LAR credits armored cables for precluding the occurrence of inter-cable shorts. As a result, only the effects of conductor-to-conductor shorts (intra-cable) within multi-conductor cables were considered. Recent (CAROLFIRE) test results demonstrate that this assumption may not be valid if the armored cables are not appropriately grounded. From the CAROLFIRE Report, Volume 1, Section 7.2.5, Grounded versus Ungrounded CPTs, "Grounded versus ungrounded circuits may be a significant factor influencing the likelihood of spurious actuation for armored cables," and Section 9.2.3, Grounded Versus Un-grounded Power Supply. It appears likely that the presence of the armor itself, which is grounded in typical applications, makes it more likely that a short to ground and fuse blow failure will occur for the grounded power supply cases. In the absence of the armor, the ground plane is available only through either a grounded conductor or the raceway itself. For an un-grounded circuit, a single short to ground will not trip the circuit protection (fuse) and therefore the likelihood of spurious actuation is somewhat higher.

**ONS RAI 3-28**

Provide a technical basis to support the validity of your assumption that fire induced circuit failures will not occur for at least 10-minutes after operators confirm the existence of a challenging active fire. As stated in NFPA 805, Section 4.2.3, the use of recovery actions automatically implies the use of the performance-based approach. Therefore, the validity of this assumption should be demonstrated by a performance-based approach consistent with NFPA 805, Section 4.2.4, which states that the additional risk presented by the use of recovery actions shall be evaluated. When the risk evaluation option of the performance-based approach is selected, the calculations required by Section 4.2.4.2 are required by NFPA 805.

Attachment G of the Transition Report states that, "linking confirmation of a challenging active fire to the beginning of the 10 minute time frame before any spurious equipment operations occur is consistent with the current licensing basis." Identify the license bases documents, which support this position.

NFPA 805, paragraph 4.2.4.1.6, requires that all recovery actions must be shown to be feasible, including consideration of the time available to perform the action before the plant experiences a non-recoverable condition. Section 1.5 of NFPA 805, states that fire protection features shall be capable of providing reasonable assurance that, in the event of a fire, the plant is not placed in an unrecoverable condition. The requirements for the engineering analyses used to support the performance-based fire protection design that fulfills the goals, objectives, and criteria provided in Chapter 1 are provided in Chapter 2 of NFPA 805. With regard to the application of the performance based approach, NFPA 805, Section 2.2 (g), states: When applying a performance-based approach, perform engineering analyses to demonstrate that performance based requirements are satisfied. These analyses shall include, for example, engineering evaluations, probabilistic safety assessments, or fire-modeling calculations (see Section 2.4).

In addition, LAR, Attachment G, states: "The decision to staff the standby shutdown facility (SSF) is tied to confirmation of a challenging active fire." There is concern that the application of this approach could result in a significant delay of transfer of control to the SSF, thereby, increasing the amount of time the plant is vulnerable to the effects of spurious actuations. The occurrence of fire-induced maloperations during this time could have a significant impact on the capability to achieve and maintain safe shutdown (SSD) conditions from the SSF. A similar concern was previously identified for ONS during a 2002 inspection, as described Inspection Report 50-269/02-03, 50-270/02-03, and 50-287/02-03.

**ONS RAI 3-29**

Provide documentation which demonstrates that non-essential circuits and cables which share a common enclosure (junction box, cable tray, etc.) with circuits and/or cables of required shutdown equipment during all modes of operation are provided with appropriately sized electrical protective devices (fuses, circuit breakers, or other suitable isolation device). In addition, provide documentation that (a) demonstrates that the scope of the review performed was adequate to address NFPA 805 nuclear safety capability concerns during all modes of plant operation, and (b) identifies any deficiencies identified during the review and (c) describes how the identified deficiencies have been resolved.

Section 2.4.2.2.2, NFPA 805, states that circuits that share common enclosure with circuits required to achieve nuclear safety performance criteria shall be evaluated for their impact on the ability to achieve nuclear safety performance criteria. The LAR and supporting calculation OSC-9659, (Draft Oconee Nuclear Safety Capability Assessment), assume that adequate electrical circuit protection was included as part of ONS's plant electrical design and has been maintained as part of the design change process. Based on this assumption, an evaluation of the common enclosure concern was not performed. Although proper circuit protection and cable sizing were likely included as part of the original plant electrical design, the adequacy of protection provided in the current as built plant should be verified and demonstrated.

**ONS RAI 3-30**

Provide your evaluation of spurious equipment actuations and/or mal-operations (including multiple spurious operations) during non-power operation.

NFPA 805 requires an evaluation of fire effects during all plant operating modes and conditions, including shutdown and decommissioning.

**ONS RAI 3-31**

Identify the specific document(s) credited for demonstrating conformance to the nuclear safety capability criteria of NFPA 805, Section 2.4.2.

In multiple sections of Table B-2, AREVA Engineering Information Record (EIR) 51-5044354-003, Revision 3, October 18, 2008, is identified as containing the pre-transition license basis for compliance to the post-fire safe shutdown requirements of Appendix R. The extent to which EIR 51-5044354-003, Revision 3 conforms to the provisions of the Nuclear Energy Institute (NEI) 00-01 is documented in Calculation OSC-9291, "NFPA 805 Transition B-2 Table," Revision 1.

Therefore, from Table B-2 it would appear that the ONS nuclear safety capability design basis documentation consists of EIR 51-5044354-003, Revision 3, and Calculation OSC-9291. However, during the site audit, a draft version of calculation OSC-9659, "ONS Nuclear Safety Capability Assessment," was provided for review. This calculation states that it was performed to demonstrate how ONS meets the requirements of 10 CFR 50.48(a) and 10 CFR 50.48(c). However, OSC-9659 is not referenced in the ONS Transition Report. As a result, it is not clear

which documents (EIR 51-5044354-003 and OSC-9291 OR OSC-9659) contain the ONS basis for demonstrating conformance to the nuclear safety capability criteria of NFPA 805.

If OSC-9659 is to be cited as the ONS nuclear safety capability design basis document, provide the following:

- final, approved version of OSC-9659,
- summary of changes in the assumptions, methodology, criteria, and results described in OSC-9659 from those described in EIR 51-5044354-003 and OSC-9291, and
- summary of issues identified by OSC-9659 that were not previously identified by EIR 51-5044354-003 and OSC-9291 and a description of ONS plan to reconcile each issue prior to transition.

Section 2.7.1.2, of NFPA 805, requires the licensee to establish a fire protection program design basis document based on those documents, engineering evaluations, and calculations that define the fire protection design basis for the plant. As described in Standard Review Plan (SRP) Section I.3.7, this document shall include fire hazards identification and nuclear safety capability assessment, on a fire area basis, for all fire areas that could affect the nuclear safety or radioactive release performance criteria defined in NFPA 805, Chapter 1. SRP, Section I.3.4 , further clarifies that the NRC reviewer should verify that the licensee has evaluated the existing post-fire safe shutdown analysis methodology against the requirements and criteria specified in NFPA 805, Chapters 1 and 2, regarding Intent, General Approach, Assumptions and Engineering Analyses.

**ONS RAI 3-32 - Withdrawn**

**ONS RAI 3-33**

Review and revise the Table B-2 alignment basis statements as necessary to ensure they appropriately bound the cited criteria.

Consistent with the guidance of NEI 04-02, Table B-2, provides a comparison of the existing safe shutdown methodology to applicable sections of NEI-00-01. In certain cases, the alignment basis statements of Table B-2 do not adequately address the specific NEI 00-01 criteria evaluated. For example, the text on Page 1 of Table B-2, indicates that the following specific NEI 00-01 criteria were compared to the existing methodology:

- NEI 00-01 criteria and assumptions and
- The requirements of Appendix R Sections III.G.1, III.G.2, and III.G.3.

Although Table B-2 states that, the ONS safe shutdown analysis (SSA) aligns with the NEI guidance, the "alignment basis" states:

> "A deterministic methodology is utilized to assess conformance with Appendix R."

Simply stating that a deterministic analysis was performed does not provide sufficient information to conclude that the analysis conforms to the cited criteria.

Provide revised Table B-2 alignment basis statements which clearly indicate that the existing ONS methodology was compared to and conforms with the cited NEI 00-01 criteria.

As described in SRP, Section I.3.4, the reviewer should verify that the licensee has evaluated the existing post-fire safe shutdown analysis methodology against the requirements and criteria specified in NFPA 805, Chapters 1 and 2, regarding intent, general approach, assumptions and Engineering Analyses. One approach acceptable to the NRC staff for determining the extent that the existing (pre-transition) SSA meets this section is described in NEI 04-02, Revision 1, which recommends a line-by-line comparison of the existing SSA against the methodology provided in Chapter 3 of NEI 00-01, Revision 1.

**ONS RAI 3-34**

Describe how the impact of fire damage to fire detection and suppression systems required by NFPA 805, Section 4.2.3 or 4.2.4, were evaluated at ONS.

Recent inspections have identified instances where fire damage to unprotected cables could significantly affect the operability of fire suppression systems. At two facilities visited, fire damage to plant cables connected to manual pump start switches located in the control room could result in a failure of the fire suppression water supply system to automatically start as designed. Until at least one pump was manually started in the pump house, no water would be provided to fire suppression systems and standpipe hose connections in safety-related areas of the plant. The loss of fire suppression is of particular concern if the fire damage were to occur in areas where suppression is credited for preventing or mitigating fire damage to shutdown equipment and cables (e.g., areas that rely on automatic suppression and separation distance in lieu of 3-hour fire rated barriers). The methodology described in NEI 04-02 does not include an evaluation of fire suppression system equipment and cables.

Section 4.2.1, of NFPA 805, requires one success path necessary to achieve and maintain the nuclear safety performance criteria to be free of fire damage. An evaluation should be provided that demonstrates that the performance of the fire detection and suppression systems needed to protect the success path are not degraded by the fire.

**ONS RAI 3-35**

Describe how High/Low pressure interfaces were identified and evaluated. In addition, describe how FAQ 06-0006 was applied in the ONS nuclear safety performance assessment.

Attachment H of the ONS Transition Report identifies FAQ 06-0006 as one of the FAQs used in the development of the ONS transition process. However, there is no discussion of this FAQ in the Transition Report. If this FAQ was utilized as guidance in the performance of the nuclear safety performance assessment, a discussion should be included explaining how the FAQ was applied at ONS.

**ONS RAI 5-18**

The nuclear safety capability assessment is, by nature, a spatial analysis. In order to fully understand the analyses described, provide the fire protection plant layout drawings that define the:

- Fire PRA analysis areas/compartments
- Current licensing basis fire areas, fire zones, and buffer zones
- Credited fire barriers that define these areas
- Areas covered by detection and suppression systems
- No transient combustible areas
- Major fire hazards

**ONS RAI 5-19**

Concerning the May 31, 2009, submittal, Enclosure 1, pages 4 and 5: "The following modifications will be removed from Attachment S: Re-route of 3TD cables routed over 3TC ... [T]he MSIV modification discussed above will mitigate an overcooling event and reduce base risk to a level that will allow self approval going forward." In the February 9, 2009, response to the Acceptance Review, ONS indicated a fire core damage frequency (CDF) reduction of 1.17E-5/yr due to this planned re-route of the 3TD cables. Will this credit no longer be taken in the "going-forward" FPRA supporting the transition? Has the Fire Probabilistic Risk Assessment or FPRA logic model been amended to remove this credit? What, if any, effect does the removal have on the total "going-forward" fire CDF and large early release frequency (LERF) and any delta-fire CDFs and LERFs associated with plant change evaluations being credited for the transition?

**ONS RAI 5-20**

The May 31, 2009, submittal, Attachment 1: The one remaining modification that ONS has committed for implementation is modeled in the "going-forward" FPRA supporting the transition is that for PSW. Its completion date is scheduled for December 2010. Except for the remaining commitments with due dates "to be provided in RAI response," all others have completion dates later than that for PSW, so should not affect the "going-forward" FPRA prior to completion of the PSW modification. Will any of those listed with dates "to be provided" occur prior to the PSW modification date of December 2010? If so, will they be modeled in the "going-forward" FPRA supporting the transition? If so, how will they be modeled and what will be their effect on total and delta-risk?

**ONS RAI 5-21**

Page 42, Section 4.6.2, ONS LAR 2008-01, states that "Another aspect of risk criteria is establishing performance criteria. These performance criteria will be established for items within the NFPA 805 monitoring scope, regardless of their ability to be measured using risk significant criteria."
It appears that the second sentence contradicts the first, namely that "risk performance criteria" will be developed even without the ability to be measured against risk significance. Correct or explain why there is no contradiction.

**ONS RAI 5-22**

Regarding Assumption 19, page C-3, Attachment C, ONS LAR 2008-01, states that "The interactions of failures caused by a fire in fire area BH3 and their effects on the standby busses and the Unit 1 and Unit 2 main feeder busses are not fully analyzed. The current SSD strategy for a fire in fire area BH3 is based on a simultaneous Unit 1, Unit 2 and Unit 3 shutdown from the SSF. The SSD analysis for fire area BH3 does not support a multiple unit shutdown from the control room for Unit 1 and 2 using their respective standby busses and main feeder busses and also simultaneously shutting down Unit 3 from the SSF."

Is this assumption modeled as is in the FPRA? Estimate the effect on fire risk (CDF and LERF) if this assumption is changed (such as fully analyzing the interactions of failures), e.g., via sensitivity analysis.

**ONS RAI 5-23**

For the BOP, pages 60 and 61, Attachment C, ONS LAR, discuss three sets of variances for which plant change evaluations and delta-risk calculations are performed. Each involves an unallowed or non-feasible manual action. The following statement is made: "The change evaluation determined that upon completion of the modifications the variances will be acceptable based upon: [1] The measured change in CDF and LERF [2] Adequate defense-in-depth and safety margins are maintained."

The modifications are cited in Attachment S of the LAR as yet to be developed and not yet incorporated into the FPRA. Do the calculated fire delta-CDFs and LERFs presume the modification will be such as to retain the unallowed or non-feasible manual actions? If not, discuss how these deltas were estimated. (e.g., if the non-feasible manual action was assumed, was it assigned a failure probability = 1 for the delta calculations? If not, why not?) Also, since the fire delta-CDFs and LERFs lie in region II of the Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," numerical acceptance guidelines, discuss how ONS has assured that the total CDF and LERF, including fire, lie below 1E-4/y and 1E-5/yr, respectively.

**ONS RAI 5-24**

In regard to DID actions, pages G-12 and G-13, Attachment G, to the LAR, states that "the additional effort per NUREG 1852 [Demonstrating the Feasibility and Reliability of Operator Manual Actions in Response to Fire] does not add measurable benefit." Since NUREG-1852 addresses OMA feasibility and reliability criteria in a qualitative manner, and DID actions are addressed qualitatively by ONS, provide the basis for this statement, e.g., what constitutes the "additional effort" and why it would not add "measurable benefit." Also, does the feasibility criteria listed in Table G-1, Section G.6.2, align with those from NUREG 1852? If there is any misalignment, such that the Table G-1 criteria exclude or inadequately reflect the NUREG-1852 criteria, provide the basis and discuss how assurance is provided that an important criterion is not overlooked.

**ONS RAI 5-25**

Page G-14, Section G.4.6.2, Attachment G, ONS LAR 2008-01, states that "Each of the criteria in Table G-1 were assessed for the recovery and DID actions listed in Table G-2. The results of the assessment are included in a calculation entitled 'Recovery and Defense-in-Depth Action Evaluation in Support of Nuclear Safety Capability Assessment.' This calculation also includes a summary of the thermal hydraulic (TH) analysis used to evaluate the timing of actions."

Explain the process by which MSOs that could result in unrecoverable plant conditions based on the plant's current TH analyses were addressed. For example, was there consideration of the time available to complete the action before the plant is placed in an unrecoverable condition or unrecoverable equipment damage occurs for time critical actions? In the event a new MSO combination is identified that requires further review in the Nuclear Safety Capability Assessment, and consideration is being given to using either a DID action or a recovery action to mitigate the plant impact, will the adequacy of the existing TH analyses be reviewed? Will additional TH analysis be performed if necessary? If the new TH analysis concludes that adequate time is not available to complete the proposed action, will an alternative strategy be implemented to resolve the MSO?

**ONS RAI 5-26**

Pages G-15 and G-17, Section G.8.1, Attachment G, of the LAR, states that, "Industry test data as discussed in a recent draft revision to NEI 00-01 (ADAMS Accession No. ML080310056), while not conclusive, supports the assumption that spurious operations will not occur immediately upon exposing cables to fire [e]ffects." Section G.8.2, states, in referring to the 10-minute delay, that "[i]n conclusion, allowing a reasonable diagnostic time to define the appropriate safe shutdown strategy after confirmation of a challenging active fire is an appropriate risk-informed, performance-based (RI-PB) approach."

Discuss how these assumptions address the effects of fires that may be induced by high-energy arcing faults or similarly "very fast" growing fires.

**ONS RAI 5-27**

On page V-3, Attachment V, of the LAR indicates that fire brigade response times longer than 20 minutes were not considered.

Discuss why fire brigade response times longer than 20 minutes apparently were not considered, at least via sensitivity analysis. If such a sensitivity analysis would have changed the results, discuss the implications..

**ONS RAI 5-28**

On page V-5, Attachment V, of the LAR, states that there is "No impact on quantification of Fire PRA or Change Evaluations (seismic-fire interaction is purely qualitative per NUREG/CR-6850 [Fire PRA Methodology for Nuclear Power Facilities]." The responses appear to attempt to justify leaving these findings open. Provide the planned resolutions of the findings.

**ONS RAI 5-29**

The disposition to surveillance requirement (SR) CS-A10, page V-3, Attachment V, of the LAR, implies that there are still some target cables that are identified at an area, or at best, compartment level, while some are located by raceway where applicable.

This would not appear to justify a wholesale reassignment of the area level to Capability Category 3. Discuss the basis for this reassignment given there are still some targets located at an area level, which is Category 1.

**ONS RAI 5-30**

Pages X-5 through X-6, Attachment X, of the LAR, the following Sections B.3, C, D, and E discuss only the following items: (1) the NRC "staff" review of March 2008, which occurred pre-transition, and not any peer reviews that may take place post-transition; (2) the FPRA as it currently exists and not how ONS will determine the FPRA's scope and level of detail as per the FPRA Standard for post-transition applications; (3) the FPRA as it currently exists and not how ONS will compare its FPRA model to the FPRA Standard for post-transition applications; and (4) the FPRA as it currently uses supplementary analyses/requirements (none) and not how ONS will do so for post-transition applications.

The subject of Attachment X is post-transition. Discuss how ONS plans to address the four areas listed above post-transition, not just the current status of the FPRA.

**ONS RAI 5-31**

With regard to sensitivity analysis, pages 23 and 26, Section 5, Attachment 1, of the ONS letter of, February 9, 2009, which states that "a CDF uncertainty band of plus or minus 10 percent (5.5E-05 to 4.5E-05) is more likely than the CDF range of 7.5E-05 to 2.5E-05 due solely to ignition frequency uncertainty of plus or minus 50 percent." With regard to sensitivity analysis, it is also stated that "based on the average impact of all the uncertainty parameters, the CDF uncertainty is judged to be within plus or minus 26 percent."

What is the actual uncertainty (not sensitivity) range from the internal events probabilistic risk assessment (PRA)? Typically, this will be at least a factor of 2 in both directions (90 percent confidence range). Discuss why the uncertainty band estimated here for the FPRA is so much narrower. Is this actually an estimate of the maximum sensitivity effect, rather than a true uncertainty?

**ONS RAI 5-32**

With regard to dominant risk contributors, page 3, Section 4.3, OSC-9378, ONS FPRA Summary Report (NUREG/CR-6850 Task 16), May 2008, states that "at this time identification of significant contributors beyond ignition sources (scenarios) is of little value to the FPRA."

While it is recognized that the use of FRANC vs. an integrated model makes the identification of important risk contributors via the typical importance measures difficult, provide the basis for this claim "of little value."

**ONS RAI 5-33**

With regard to sensitive electronics, pages 24 through 25, Section 6.2, calculation OSC-9375, ONS FPRA Scenario Development (NUREG/CR-6850 Tasks 8 and 11), May 2008, The ONS appears to have relaxed some of the assumptions from NUREG/CR-6850 concerning damage to solid-state components in cabinets within or near the zone of influence of the cabinet serving as the fire ignition source (e.g., cable-based rather than solid-state- component-based zones of influence; 10-min delay time before exposure in "adjacent cabinets").

Provide the results from sensitivity analyses performed to determine the effects of these relaxations on the FPRA.

**ONS RAI 5-34**

With regard to ventilated/open cabinets, pages 27 and 32 through 34, Section 8.4, calculation OSC-9375, ONS FPRA Scenario Development (NUREG/CR-6850 Tasks 8 and 11), May 2008, cite "industry guidance" for assuming an electrical cabinet fire frequency apparently different from, and presumably lower than, that in NUREG/CR-6850. With regard to general transient severity factors, ONS derived these factors to "remove inherent conservatism and to better align with industry fire experience" (presumably in contrast to the current NUREG/CR-6850 approach), including a zero-failure rate approximation approach for the containment, control/auxiliary/reactor buildings, turbine building, and plant-wide to adjust transient fire frequencies

It is unclear whether that adjusted frequency for an electrical cabinet fire was employed, other than as a source of data from which to develop a zero-failure rate approximation factor to adjust fire frequency in low energy cabinets. If that adjusted frequency was used directly in the FPRA calculations, provide the results from a sensitivity analysis performed to determine the effect of its use in lieu of the current corresponding frequencies in NUREG/CR-6850 on the FPRA. Also, provide the results from sensitivity analyses performed to determine the effect of using the general transient severity factors on the FPRA.

**ONS RAI 5-35**

With regard to hot-work fire scenarios, on page 39 of Section 10.1, calculation OSC-9375, ONS FPRA Scenario Development (NUREG/CR-6850 Tasks 8 and 11), May 2008, ONS appears to be reducing the non-suppression probability from the 0.38 value derived by crediting prompt suppression in NUREG/CR-6850 to a value of 0.01 based on several qualitative arguments, one

of which is the use of "precautions consistent with Nuclear System Directive 314." There is an assumption that the hot-work-related fire events in the NUREG/CR-6850 database reflected hot work performed at much earlier dates when such precautions were not in place.

Discuss whether information that the hot-work-related fire events in the NUREG/CR-6850 database reflected hot work performed at much earlier dates when "precautions" were not in place is directly available from the event descriptions. Does ONS operating history indicate no fires or "close-calls" during hot work scenarios? Provide the basis, including the quantitative adjustment method, for what appears to be such a large reduction in non-suppression probability (approximately one and a half orders of magnitude). Recognize that the effect of "precautions" are typically included when assigning the weighting factors for maintenance, occupancy and storage to the transient ignition frequency, such that further crediting of the effects of these "precautions" in terms on non-suppression probability may be "double-counting." Provide the results from a sensitivity analysis performed using the 0.38 non-suppression value to determine the effect on the FPRA.

**ONS RAI 5-36**

With regard to the assumptions, page 6, Section 5.0, calculation OSC-9313, NFPA 805, Transition Non-Power Fire Area Assessments (Pinch Point Analysis), October 30, 2008, states that "Failures of systems, equipment, instrumentation, controls, or power supplies, that are not a direct consequence of the fire, do not occur before, during, or following the fire."

Presumably, random failures of such items would be equally likely whether or not a fire scenario was in progress or immediately afterward, with the likelihood dependent upon the item's failure rate and the length of time over which it may be vulnerable. Provide the basis for this seemingly non-conservative assumption and discuss how an apparently more realistic assumption might affect the results of the nuclear plant operator (NPO) assessment.

**ONS RAI 5-37**

With regard to the assumptions, pages 6 through 7, Section 5.0, calculation OSC-9313, NFPA-805, Transition Non-Power Fire Area Assessments (Pinch Point Analysis), October 30, 2008, repeat the phrase "before, during, or following the fire."

While it is implicitly clear what time period is applicable "during the fire" (the time from fire ignition to final extinguishment), it is not clear what time periods apply "before" or "following" the fire. Presumably, these periods do not extend from the beginning to end of the NPO period. Define the time periods meant by this phrase.

**ONS RAI 5-38**

With regard to technical presentation, page 8, Section 6.0, calculation OSC-9313, NFPA-805, Transition Non-Power Fire Area Assessments (Pinch Point Analysis), October 30, 2008, states that "Limited recommendations are made for [Category 1 fire] ... zones." Subsequently, Table 2 page 12 shows no recommendations for Category 1 fire zones.

Discuss this discrepancy, indicating which is correct. If it is the latter, provide the basis for applying no recommendations.

**ONS RAI 5-39**

With regard to technical presentation on page 12, Section 6.0, specifically, Table 2, and in Attachment 1, calculation SC-9313, NFPA-805, Transition Non-Power Fire Area Assessments (Pinch Point Analysis), October 30, 2008, there appears to be no use of FAQ 40 Recommendation #6 or #8 for any fire zone

Discuss why these are listed with ONS specific recommendations if they are not used.

**ONS RAI 5-40**

With regard to the conclusion, page 4, Section 4.1, calculation OSC-9317, ONS NFPA 805, Transition Change Evaluation – Fire Area RB3, October 24, 2008, states that the three operator manual actions affiliated with open items RB3-07-O, -11-OE and -33-O are not recovery actions.

Provide the basis for this conclusion. Discuss how, if they were treated as recovery actions, the results of the plant change evaluation would be different.]

**ONS RAI 5-41**

With respect to DID and safety margin, Table 6.2.2, page 4, Section 6.2.3, calculation OSC-9317, ONS NFPA 805, Transition Change Evaluation – Fire Area RB3, October 24, 2008, indicates that an ionization-type smoke detection system, portable fire extinguishers and hose stations and hydrants located in the areas are credited for the second element of DID.

With regard to manual suppression, discuss whether or not hose stations installed at each of the five levels of RB3 and, if not, why not. Discuss whether or not there would be timing concerns depending upon how long would it take for an extinguisher, maintained at the reactor building (RB) hatch, to be transported to the most distant potential fire location within RB3, including change in elevation if these are not maintained at each floor level. Provide the basis for these credits. Also, discuss why is there no "required" fire protection feature among the five listed for the second defense-in-depth element.

**ONS RAI 5-42**

With regard to fire area RB3, Table A.1-1, page 16, Section A.1, page 4, Section A.2.1, and pages 5 through 6, Section A.2.2, calculation OSC-9317, ONS NFPA 805, Transition Change Evaluation – Fire Area RB3, October 24, 2008, indicate the following: (1) essentially equal CDF and LERF values for Scenario D, while the LERF for Scenario E is over an order of magnitude lower than the corresponding CDF; (2) with regard to Open Item RB3-11-OE, that "3CCW-269 is only impacted in RB03 Scenarios B1 and D."

While Scenario B1 includes a containment bypass scenario, and, therefore, the near equivalence of CDF and LERF might not be unexpected, both Scenarios D and E appear not to include

LERF-relevant components, such that the typical LERF-to-CDF ratio of less than 0.1 that would be expected is evidenced in Scenario E but not D. Explain this potential discrepancy. Also, address the potential effect of this discrepancy on the subsequent delta-CDF and delta-LERF evaluations for Open Items RB3-07-O and RB3-11-OE (Table A.2-2). Also, assuming that the statement regarding 3CCW-269, above, is meant to exclude Scenario E, discuss how ONS has assured that the non-retained scenarios are not impacted by 3CCW-269.

**ONS RAI 5-43**

With regard to Open Item RB3-33-O, page 7, Section A.2.3, calculation OSC-9317, ONS NFPA 805, Transition Change Evaluation – Fire Area RB3, October 24, 2008, indicates that the FPRA apparently does not model the risk impacts associated with potential failure of feedwater valve 3FDW-347. Therefore, there is no quantification of delta-CDF or delta-LERF, each of which is assigned a value of epsilon in Table A.2-3.

Typically, if a component is not modeled in a PRA, its potential contribution is considered to be bounded by the truncation limit, such that a delta calculation involving that component would be bounded by the truncation limit as well. Explain why the delta-CDF and delta-LERF are not assigned bounding values based on the truncation limit for the FPRA

**ONS RAI 5-44**

With regard to methodology, page 1, Section 2.0, calculation OSC-9268, NFPA 805, Transition Non-Power Operations Component Selection, October 23, 2008, states that some plant operating states (POSs) were identified as inherently lower risk.

In identifying these as such, discuss whether or not consideration was given to the possibility of unique cable routing or placing of combustibles or ignition sources in atypical locations during these POSs before apparently dismissing them as candidates for high risk evolution..

**ONS RAI 5-45**

With regard to methodology, page 6, Section 2.0, calculation OSC-9268, NFPA 805, Transition Non-Power Operations Component Selection, October 23, 2008, guideline (a) to determine whether or not "front-line" system components should be included for KSF support appears to limit the number of "electrically-supervised valves constituting system boundaries" to two. It is subsequently stated in guideline (c) that "valves in the flow path whose spurious operation could adversely affect system operation were included."

Provide the basis for the limitation in guideline (a). For guideline (c), discuss whether or not its inclusion was subject to the "two-valve" limitation of the guideline (a), and whether or not guideline (a) was limited only to "diversion" paths.

**ONS RAI 5-46**

With respect to DID and safety margin, Table 3.2-2, pages 4 through 5, Section 3.2.3, Enclosure 2, to calculation OSC-9321, ONS NFPA 805, Transition Change Evaluation – Fire Area BOP,

October 28, 2008, indicates that an ionization-type smoke detection system, portable fire extinguishers and hose stations and hydrants located in the area(s) are credited for the second element of DID.

Discuss why is there no "required" fire protection feature among the five listed for the second de DID element.

**ONS RAI 5-47**

With regard to the delta-CDF and delta-LERF calculations in Table A.2-2 for open item BOP-46-OP, pages 4 through 5, Section A.2.2, Enclosure 2, calculation OSC-9321, ONS NFPA 805, Transition Change Evaluation – Fire Area BOP, October 28, 2008, states that "consideration of uncertainty (plus or minus 26 percent) will not change this conclusion that the values are not above the acceptance limits]" A similar statement appears for open item BOP-69-operating procedure (OP) in Section A.2.3.

Discuss how this might conclusion be different with respect to RAI-11. (See also RAI-11, to which this is related.)

**ONS RAI 5-48**

With reference to statements in Oconee PIP O-09-04105, discuss whether or not the presence of concealed cables routed through the control room which were not considered originally for compliance with 10 CFR 50.48 has been addressed in the FPRA, along with the consequences of any possible fire-induced damage. If not, provide justification for the exclusion. If addressed, discuss the implications on the FPRA-related results.

**ONS RAI 5-49**

The ONS PRA model does not appear to contain a failure-to-start basic event for the A high-pressure injection (HPI) pump, i.e., the model assumes this pump is always running. While it is true that an HPI pump (combined charging pump) is usually running, this condition may not be true for a LOSP initiator. Discuss this apparent modeling idiosyncrasy and any effect it may have on the FPRA results, especially, when a fire-induced loss of offsite power (LOSP) is triggered.

**ONS RAI 5-50**

Page 35, Section 4.5.1.1, in the LAR, states that "In addition, 24 of the SRs are not applicable to the ONS PRA, either because the referenced techniques are not utilized in the PRA or because the SR is not required for capability category (CC) II."

The reference to CC II seems to imply this constitutes some level of acceptability for the SRs. Is this the intent of the statement? If so, provide the basis for assuming CC II constitutes an acceptable level for SRs in general.

**ONS RAI 5-51**

Page 36, Section 4.5.1.2, in the LAR, states that "For the limited number of cases where the Unit 2 results were not considered to be bounding, a method for adjustment of the Unit 2 results for application to Unit 1 was provided. This is documented in a licensee calculation entitled, "Unit 1 Comparative Screening Analysis."

Provide a summary of the results from this calculation.

**ONS RAI 5-52**

Reference Table S-1, pages S-3 through S-9, Attachment S, to the LAR.

Describe how changes/modifications planned and to which committed will be addressed in the FPRA. Also, are the listed compensatory measures included in whatever version of the FPRA supports this LAR for transition to NFPA 805, and, if so, how?

**ONS RAI 5-53**

Page U-3, Attachment U, to the LAR, lists SR-AS-B3 as a documentation issue.

Discuss how the expected impact considers the possible effects of non-fire environmental effects that may be triggered by fire inducing an internal events initiator such that these non-fire environmental effects could affect the response to the fire itself (e.g., access/egress for fire fighting or local operator actions, spurious signals due to steam).

**ONS RAI 5-54**

For SR HR-G6, page U-3, Attachment U, to the LAR, states that "No impact is expected for documentation issues."

Discuss how the expected impact considers the effect of fires for the cues that alert operators, relevant performance shaping factors (PSFs), and availability of staff.

**ONS RAI 5-55**

For SRs LE-C10 and LE-G5, pages U-23 and U-26, Attachment U, to the LAR states that "No impact is expected for documentation issues."

Discuss how the expected impact for SR LE-C10 considers that fire effects could shift the dominance between the bypass and non-bypass events, such that the crediting for scrubbing on the bypass events could reduce their dominance. Discuss how the expected impact for SR LE-G-5 considers that fire effects could invalidate some of the limitations from the internal events LERF analysis, e.g., if the internal events analysis dismissed containment bypass due to spurious opening of penetrations being very unlikely in non-fire scenarios that would be more likely given fire.

**ONS RAI 5-56**

For SR SY-A14, page U-35, Attachment U, to the LAR, states that "No impact is expected for documentation issues."

Discuss how the expected impact considers that failures screened out for internal events PRA due to low probabilities may have higher probabilities given fire, such that they would need to be included in the FPRA? Discuss how the review of failure modes includes reviewing those previously screened out to ensure such screening remains valid for the FPRA.

**ONS RAI 5-57**

On page V-2, Attachment V, to the LAR, the response for SR CS-B1-1 states that "Breaker coordination impacts are not a contributing factor for top risk contributing scenarios which involve loss of 4KV power or CR abandonment."

Discuss the basis for this conclusion, including whether or not the breaker coordination impacts could have an effect on other risk-contributing scenarios such that they could become important contributors.

**ONS RAI 5-58**

As indicated in the response to SR FQ-C1-1, page V-2, Attachment V, to the LAR, the maximum human error probability (HEP) for initial solve is limited to 0.1,

Current NUREG/CR-6850 screening guidance for HEPs given fire conditions includes setting values at 1.0, and the proposed update to this approach by the pilot plants includes screening as high as 1.0, as does the proposed Research/Electric Power Research Institute Fire HRA methodology. Provide the basis for limiting the maximum HEP for initial solve to 0.1, as indicated in the response to SR FQ-C1-1. Discuss the possibility that some human errors may have been screened out prematurely.

**ONS RAI 5-59**

On pages W-2 through W-4, Attachment W, of the LAR, the collective fire CDF, fire CDF credit for non-fire-related modifications, total fire CDF decrease associated with transition, and total baseline fire CDF have been reported; the corresponding values for fire LERF have not. Also, results are reported for the top 50 percent of the fire CDF contributors; those for the corresponding contributors to fire LERF are not.

Provide the collective fire LERF, fire LERDF credit for non-fire-related modifications, total fire LERF decrease associated with transition, and total baseline fire LERF. Also provide the results for the top 50% of the fire LERF contributors, (NOTE: The February 9, 2009, response letter to the acceptance review provides the values for the top LERF contributors, but their corresponding fractional contributions to the LERF are not provided, as they were for the top CDF contributors.)

**ONS RAI 5-60**

With regard to the delta risk calculation, page 5, Section 2, Attachment 1, to the ONS, February 9, 2009, letter, states that "Baseline risk is generally associated with a compliant (vs. a non-compliant) configuration. Accordingly, another way to characterize the change in risk is the difference between the compliant case and the non-compliance. In most but not all cases, the non-compliant or variant case represents the in-situ (base case) condition." This is then followed by a table indicating that the delta-risk is always calculated as Case 2 minus Case 1, where Case 2 is always the variant and Case 1 the compliant, with one or the other being the base.

This seems to imply there are only two situations: (1) current configuration is compliant yet a variation is being proposed and (2) current case is non-compliant, and the non-compliant variation is being proposed for NFPA 805 and compared against what would have been compliant [first example]. Discuss whether or not there is a third case, where the current condition is non-compliant and not being proposed for NFPA 805, but rather it is a new variant that is being proposed, and this will be measured against what would have been compliant. There may be, in effect, a third example, where neither Case 1 nor Case 2 is base.

**ONS RAI 5-61**

With regard to the delta risk calculation, page 6, Section 2, in the ONS, February 9, 2009, letter, states that "most of the operator actions are not explicitly modeled in the FPRA."

Explain the apparent exclusion of "most of the operator actions." Even if they would typically be beneficial, is it possible that they increase risk if performed incorrectly, out of order, etc.? Provide the basis of this seemingly a priori dismissal from the FPRA.

**ONS RAI 5-62**

With regard to LERF considerations, page 14, Section 3.2, Attachment 1, to the ONS February 9, 2009, letter, states that "in the case of HP-21, there is the potential to lose power resulting in the failure of the active function to close even for a fire in containment. Therefore, neither of these paths represent[s] an MSO scenario (one is not real and the other is failure of the active function to close)."

Discuss why, if on the seal return line motor operated valve HP-20 fails open (i.e., is de-energized so it cannot close when it should) and air operator valve HP-21 fails to close (when it should do so) due to loss of power, this not an MSO scenario. Would there not be two valves failing to close when needed due to spurious de-energization (i.e., failure to energize so as to be able to close)?

**ONS RAI 5-63 (RHG)**

With regard to the PSW modification, pages 9 through 12, Section 3.4, in OSC-9377, ONS FPRA Model Development (NUREG/CR-6850 Task 5), May 2008, states that "the planned [plant service water] PSW modification was credited in the FPRA on a limited basis."

In the FPRA model, six basic events have been introduced to address failures related to the PSW system: (1) Three new human failures, UPSWSHRDHE, BSFAPWRDHE and BHP0ASWDHE, for human action failure to effect the PSW function for ASW, SSF and HPI, respectively, with final failures probabilities of 0.5, 0.15 and 0.059, respectively; (2) PSW-MOD for electrical hardware failures when the PSW function is supporting HPI or SSF (potentially a surrogate for failures that will be associated with the PSW supply and support equipment that will be installed in the PSW Blockhouse and between the Blockhouse and destination, with an aggregate failure probability of 0.00151; (3) Two 'house-like' events, PSW-HPI3B and PSW-OTSI, which assume values of zero or one based on the location of the fire to represent whether or not the PSW function is being credited (for a fire in the Auxiliary Building, PSW-HPI3B is set = 1, otherwise, it has a value of zero; for a fire in the SSF, PSW-OTS1 is set = 1, otherwise it has a value of zero). All but the basic events BSFAPWRDHE and BHP0ASWDHE are discussed. Discuss these two basic events as well. Is the characterization of the function of all six events within the FPRA correct? Discuss any other model effects to represent the impact of the PSW modification in the FPRA (e.g., changes in fire ignition frequencies or combustible loadings).

**ONS RAI 5-64**

With regard to control room abandonment scenarios, Scenarios E and F, page 15, Section 3.2.2, in OSC-9375, ONS FPRA Scenario Development (NUREG/CR-6850 Tasks 8 and 11), May 2008, both cite minimum abandonment times of 8.5 minutes and 12.4 minutes, respectively, less than the threshold assumed for the Control Room of 20 minutes. Severity factors are then estimated based on assuming that 20 minutes are available for suppression prior to abandonment.

Assuming these factors would be higher if only the minimum abandonment times were assumed available for suppression, provide the basis for crediting 20 minutes for suppression rather than the cited minimum abandonment times. Also the review of the control room abandonment times at the ONS, Unit 3, discuss why the abandonment times were chosen based on the assumption that both the ventilation supply and smoke purge fan were on, rather than one or both were off, which would have yielded shorter abandonment times.

**ONS RAI 5-65**

In OSC-9375, ONS FPRA Scenario Development (NUREG/CR-6850 Tasks 8 and 11), May 2008, these is an apparent omission. It appears that the analysis for main control room (MCR) abandonment addresses only degradation/loss of functions due to fire effects within the MCR. If so, discuss how degradation/loss of functions in the MCR due to fire outside the MCR (even if there are no resulting environmental fire effects within the MCR) has been addressed, including abandonment of the MCR under these condition. While it appears that a pre-existing ONS assumption that no spurious actuation occurs within 10 minutes of a fire has not been carried in the FPRA (and this is the correct approach), it may have implicitly been retained in the MCR abandonment study due to its continued retention in the plant operating procedures planned for NFPA-805 transition. Discuss whether this is the case and, if so, how the MCR abandonment analysis for the FPRA compensates for this. If enough spurious actuations occurred within the first 10 minutes to cause degradation/loss of functions within the MCR, would non-procedural MCR abandonment be considered?

**ONS RAI 5-66**

With regard to technical presentation, page 7, Section 6.0, in OSC-9313, NFPA-805, Transition Non-Power Fire Area Assessments (Pinch Point Analysis), October 30, 2008, states that "an 'Impact' upon a KSF success path is defined as a component or any of its associated cables being located within the fire zone such that, following a fire which conservatively assumes the total loss of all compartment contents, the component can no longer be assured of being functional ... In some cases where ...a redundant pump, valve, or instrument was ... not affected by the fire, the KSF success path was shown as not impacted."

This appears to imply that "impact" means only a complete loss of a key safety function (KSF), not a decrease in redundant pathways. Verify whether or not this is correct and, if so, discuss how the distinction affects the NPO assessment (e.g., as per Section 1.3.1, "Nuclear Safety Goal," of NFPA 805, "[t]he nuclear safety goal shall be to provide reasonable assurance that a fire during any operational mode and plant configuration will not prevent the plant from achieving and maintaining the fuel in a safe and stable condition").

**ONS RAI 5-67**

With regard to acceptance criteria assessment, DID, page 11, Section 2.5, OSC-9314, NFPA-805, Transition Risk-Informed, Performance-Based Change Evaluation Methodology, October 28, 2008, states that a scenario that does not lead to core damage, but has a CDF of 9E-08/yr would be treated differently from one that leads to core damage with the same frequency.

Discuss how a scenario that does not lead to core damage can have a non-zero CDF.

**ONS RAI 5-68**

For Open Items BOP-12-OP, BOP-28-OP, BOP-46-O and BOP-70-O, on pages 1 through 2 of Section 1.1 in *OSC-9321, ONS NFPA 805 Transition Change Evaluation – Fire Area BOP, October 28, 2008,* the VFDs are characterized as involving an "unallowed" operator manual action. For Open Item BOP-69-O, the VFD is characterized as involving a manual action that is "not feasible." Subsequently, in the disposition of each Open Item in Section 4.2, Table 4.2-1 (page 5), all these Open Items are characterized as involving "no feasible recovery actions."

Why is there no "required" fire protection feature among the five listed for the second DID element? (Note that this same question applies to Table 3.2-2, Section 3.2.3, Enclosure 3, and Table 3.2-2, Section 3.2.3, of Enclosure 4.)

**ONS RAI 7- 3 - Withdrawn**

**ONS RAI 7- 4**

Appendix C of NEI 04-02 states, "The existing fir protection quality program should be transitioned as-is into the new NFPA 805 fire protection program. Describe any changes being made to the fire protection quality program as part of the NFPA 805 transition.

November 18, 2009

Mr. Dave Baxter
Vice President, Oconee Site
Duke Energy Carolinas, LLC
7800 Rochester Highway
Seneca, SC 29672

SUBJECT: OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 - REQUEST FOR ADDITIONAL INFORMATION REGARDING LICENSE AMENDMENT REQUEST TRANSITION TO TITLE 10 OF THE *CODE OF FEDERAL REGULATION*, SECTION 50.48(c), NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NFPA 805 (TAC NOS. MD8822, MD8823, AND MD8824)

Dear Mr. Baxter:

By letter dated May 30, 2008 as supplemented October 31, 2008, January 30, 2009, February 9, 2009, February 23, 2009, May 31, 2009, August 3, 2009, and September 30,2009, Duke Energy Carolinas, LLC, submitted a license amendment request (LAR) to transition the fire protection licensing basis at Oconee Nuclear Station Units 1, 2, and 3 from Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.48(b) to 10 CFR 50.48(c), *National Fire Protection Association Standard NFPA 805.*

To complete our review of the LAR, the U.S. Nuclear Regulatory Commission (NRC) staff needs additional information. The NRC staff's request for additional information (RAI) is enclosed. On September 24, 2009, your staff stated that the response to all of the RAIs would be provided by November 30, 2009.

If you have any questions, please call me at 301-415-1345.

Sincerely,

***/RA/***

John Stang, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270, and 50-287

Enclosure:
As stated

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|---|---|---|---|---|---|
| NAME | JStang | SRoher for MO'Brien | AKlein* (PLain for) | GKulesa | JStang |
| DATE | 11/6/09 | 10/19/09 | 11/6/09 | 11/18/09 | 11/18/09 |

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