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

July 30, 2010

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 (ONS) - REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING LICENSE AMENDMENT REQUEST, TRANSITION TO TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* (10 CFR), PART 50, SECTION 50.48(c), *NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NFPA 805* (TAC NOS. ME3844, ME3845, AND ME3846)

Dear Mr. Baxter:

By letter dated May 30, 2008, as supplemented by letters dated October 31, 2008, January 30, 2009, February 9, 2009, February 23, 2009, May 31, 2009, August 3, 2009, September 29, 2009, November 30, 2009, and April 14, 2010, Duke Energy Carolinas, LLC (the licensee) submitted a license amendment request (LAR) to transition the fire protection licensing basis at ONS from 10 CFR 50.48(b) to 10 CFR 50.48(c), *National Fire Protection Association Standard (NFPA) 805.* The letter dated April 14, 2010, resubmitted the LAR and superseded the content of the LAR submitted by letters dated May 30, 2008, and October 31, 2008. This resubmitted LAR, however, does not supersede previous responses to RAI questions submitted by letters dated October 31, 2008, January 30, 2009, February 9, 2009, February 23, 2009, May 31, 2009, August 3, 2009, September 29, 2009, and November 30, 2009.

To complete our review of the LAR, the U.S. Nuclear Regulatory Commission (NRC) staff needs additional information. The NRC staff's RAI is enclosed. Unless otherwise agree to, please submit all responses to these RAI questions within 30 days.

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:
RAI
cc w/encl: Distribution via Listserv

REQUEST FOR ADDITIONAL INFORMATION (RAI)

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3 (ONS) TRANSITION TO

TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* (10 CFR), PART 50, SECTION 50.48(c),

NATIONAL FIRE PROTECTION ASOCIATION STANDARD (NFPA) 805

By letter dated May 30, 2008 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML081650475), 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), August 3, 2009 (ADAMS Accession No. ML092190212), September 29, 2009 (ADAMS Accession No. ML092740624) November 30, 2009 (ADAMS Accession No. ML093410007), and April 14, 2010 (ADAMS Accession No. ML101121032), 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, Units 1, 2, and 3 (ONS) from 10 CFR 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:

1. Provide the following information relative to LAR programmatic elements:

ONS RAI 1-11

Closed per 6-28-10 clarification conference call.

ONS RAI 1-12

LAR, Attachment N, states that "an editorial error is also being corrected in Technical Specifications (TS) Bases 3.10.1, Standby Shutdown Facility." It is unclear from the description and the TS markup what editorial error is being corrected. Clarify.

ONS RAI 1-13

Attachments N and S of the LAR provide the implementation schedule for committed plant modifications being made to bring ONS into compliance with NFPA 805. The implementation schedule for upgrading modifications ranges from February 2012 to the fall of 2015. Provide additional information for modifications that extend more than 2 years after issuance of the NRC safety evaluation (SE).

Specifically provide:

- a discussion of the complexity of each modification and associated schedule drivers,

- a justification of why the modifications cannot be implemented by the second outage or within 2 years following issuance of the NRC SE, whichever is sooner,

- a discussion of, and justification for, the "appropriate compensatory measure" for those modifications extending beyond the 2 years following the NRC SE.

ONS RAI 1-14

Attachments N and S of the LAR provide the implementation schedule for committed plant modifications being made to bring ONS into compliance with NFPA 805. The attachments provide the discussion of the breaker coordination study and provide an end date for the study. Provide the details and schedule for the modifications required to resolve breaker coordination study issues.

2. Provide the following information regarding the fundamental fire protection program elements and minimum design requirements:

ONS RAI 2-16

The protected service water (PSW) fire area in Table B-3 of the LAR identifies that detection is not required and states that it will be installed with the PSW modification. The introduction to Table B-3 where the PSW modification is discussed (page C-5) makes no mention of fire detection as part of the modification. However, Table 4-4 (page 54) indicates for the PSW fire area that fire detection is required for defense-in-depth but does not identify that a modification is required. Clarify this discrepancy and describe any fire detection that is required and any modifications that are being performed.

ONS RAI 2-17

The PSW Modification is credited in the fire probabilistic risk assessment (PRA) for NFPA 805 transition. Describe the fire protection design features and modifications being implemented specifically to meet fire protection criteria. For example, describe the design constraints on cable routing, location of credited fire barrier installation/upgrades, and detection requirements. Include any credited detection and suppression system modifications/new construction being made to conform to the assumptions and limitations of the fire PRA and/ or to meet NFPA 805.

ONS RAI 2-18

Each of the approval requests identified in LAR, Attachment L, provides a very brief conclusion regarding maintaining safety margins and defense- in-depth. These conclusions need to be supported by a detailed evaluation that considers all aspects of fire protection defense-in-depth and maintaining safety margins, similar to the evaluation performed for the fire risk evaluations and per the guidance in regulatory guide (RG) 1.205, Rev. 1, and the Nuclear Energy Institute (NEI) 04-02, Rev. 2. For each Attachment L approval request provide an evaluation that considers all aspects of fire protection defense-in-depth and safety margins.

Similarly, a one-statement conclusion is often all that is provided regarding the impact on the radiological release criteria, which is generally that there is no impact. Provide an evaluation for each approval request that supports these conclusions.

ONS RAI 2-19

Approval Request #2 described in LAR, Attachment L, is requesting approval of the use of temporary portable fuel-fired heaters, which is not permitted by NFPA 805, Section 3.3.1.3.4. Provide further justification for this request by addressing the following:

- Provide justification for why portable electric heaters, as allowed by NFPA 805 Section 3.3.1.3.4, cannot be used at ONS in lieu of fuel-fired heaters.

- The Generic Treatments and the bounding Zone of Influence (ZOI) considered only the use of combustible liquids as a potential source of combustible loading and ZOI and did not construct a ZOI for gas (propane, natural, etc.) or oil-fired fuels. The introduction of materials that potentially have larger ZOIs could affect the fire PRA. Explain how the use of fuels not previously considered in the fire PRA will be reflected in the risk review conducted prior to the use of portable fuel-fired heaters.

- It is stated that "if equipment important to nuclear safety is in the area requiring a portable fuel-fired heater, restrictions on the location and an increase frequency of fire watches would be implemented." Describe the risk review process and criteria used to set restrictions on location and establish frequency of fire watches.

- The introduction of additional ignition sources, and ignition sources that may have larger ZOIs than previously considered in the fire PRA, clearly could impact the nuclear safety performance criteria. Clarify the conclusion that "there is no impact on the nuclear safety performance criteria" because compensatory measures are taken.

ONS RAI 2-20

Approval Request #3 described in LAR, Attachment L, is requesting approval of storage of bulk compressed or cryogenic flammable gas storage inside structures housing system, equipment, or components important to nuclear safety. It is stated that flammable gas cylinders are currently stored in locations that do not impact equipment important to safety, that these locations have been considered in the fire PRA and do not impact any targets, and that a fire hazard review is performed prior to installation in any new locations. Describe the fire hazard review process and the criteria used in the decision process, how risk information from the fire PRA is used in this review, and how the post-transition plant change evaluation process applies to this situation.

ONS RAI 2-21

Approval Request #5 described in LAR, Attachment L, is requesting approval of the use of video/communication/data cables that are not tested to the flame propagation tests specified by the NRC staff. The LAR states that the video/communication/data cables are not necessarily tested in accordance with the flame propagation tests outlined in the Frequently Asked Questions (FAQ) 06-0022 (ADAMS Accession No. ML091240278) as endorsed by the NRC. This implies

that ONS will not have any flame spread criteria at all for these types of cables in future installations. Provide further justification for this request. Additionally, clearly explain the cable qualification requirements for future cable installations at ONS. Be sure to justify any deviations from 10 CFR 50.48(c) requirements for cable installations.

ONS RAI 2-22

Approval Request #8 described in LAR, Attachment L, related to NFPA 805 Sections 3.5.3, 3.5.16, 3.6.1 and 3.6.2 (NFPA 14, Section 7.8.2.1 and NFPA 20), is requesting approval for use of the low-pressure service water (LPSW) system for the Reactor Building fire hose stations. Specific issues include the lack of an NFPA 20-approved fire pump and insufficient pressure at the hose station. Provide further justification for this request by addressing the following:

- Explain each of the elements of the table provided in the approval request. Clarify, for example, that the discharge pressure at the ONS, Unit 1, RB I-7 hose station provides 22 pounds per square inch (psi) at 75 gallons per minute (gpm).

- Identify the hydraulic points in the system where the pressures given in the approval request are located. Specifically, clarify if the reported ~22 psi is at the angle valve for hose stations on the 865'-6" elevation or at some other point upstream in the system.

- The justification for the use of the system identifies the availability of multiple low-pressure nozzles. The approval request states that "The low pressure nozzles are designed to flow larger quantities of water when pressures are less than ideally desired." Clarify the minimum design specified pressure (or pressure range) for which these low pressure nozzles are qualified and whether they are 'listed" or "approved" to function at ~22 psi.

- One of the bases for the approval request refers to a licensee commitment to the NRC staff to implement the in-place configuration, which was in response to NRC Inspection Report 85-34. NRC inspection reports do not represent NRC staff approval. Clarify whether the licensee considers that the in-place configuration has been previously approved by the NRC staff and, if so, provide documentation for the prior NRC staff approval as required for a B-1 Table element (i.e., submittal and approval excerpts, etc.).

- A discharge pressure of 22 psi at 75 gpm is very low with regard to the minimum residual pressure of 100 psi per NFPA 14. Furthermore, quick detection and suppression of a fire by the fire brigade is an inherent assumption in the fire PRA. Provide an evaluation that demonstrates that the in-place configuration provides adequate manual fire fighting capabilities and that reinforces the conclusion in the LAR that "there is no impact on nuclear safety performance criteria."

- Clarify the statement that " the limited pressure from LPSW system to the fire hose stations in the Reactor Buildings does not affect nuclear safety as the Reactor Buildings are not accessed during power operation unless in an emergency." Explain why a fire in the reactor building would not be an "emergency."

- Provide further justification for the conclusion that there "is no impact on the nuclear safety performance criteria" from the in-place configuration. Include in the response an assessment of the change in the core damage frequency (CDF) and large early release frequency (LERF) and whether the increased risk is acceptable.

ONS RAI 2-23

The note added to Table B-3 for fire areas AB, BH12, BH3, CT4, KEO (Keowee), PSW, RB1, and others indicates that "If the East Penetration Room is to become a separate fire area from the Auxiliary Building in the future, then the cork expansion joints in the floor and ceiling should be evaluated as an acceptable fire barrier seal." Clarify the meaning and intent for including this note in the LAR.

ONS RAI 2-24

Table 4-4 of the LAR indicates fire detection will be modified and/or installed in numerous areas of the plant for the performance-based approach utilizing the fire PRA. Provide the design, coverage, and code of record (i.e., installation fire code and year) that will be used as the basis for this engineering design change.

3. Provide the following information concerning meeting the nuclear safety performance criteria:

ONS RAI 3-36

LAR, Section 4.2.3 and Attachment K, identify that previous NRC staff "Approval of the Safe Shutdown System (SSS) Design" is being transitioned. Provide an evaluation of the continued validity of the bases for the previous NRC approval.

ONS RAI 3-37

LAR, Attachment D, Table F-1, identifies Problem Identification Program (PIP) "Corrective Action #TBD" for numerous variances from deterministic requirement (VFDRs) (i.e., OSC-9313-02, OSC-9313-03, and OSC-9313-07). Clarify the meaning of these entries.

ONS RAI 3-38

Section 3.5.1.3 of NEI 00-01, Rev. 1, states: "Assume that circuit failure types resulting in spurious operations exist until action has been taken to isolate the given circuit from the fire area, or other actions have been taken to negate the effects of circuit failure that is causing the spurious actuation. The fire is not assumed to eventually clear the circuit fault." With regard to this criterion, Section 3.5.1.3 [Duration of Circuit Failures] of Table B-2, Nuclear Safety Capability Assessment Methodology Review states that the ONS methodology "Does not Align, but has previous approval." The basis for this determination is stated to be "Previous design considerations did not assume spurious actuations or hot shorts due to a fire for the first 10 minutes of the event. This

was stated in the referenced safety evaluation report for the standby shutdown facility (SSF). Other spurious operations beyond this assumption were postulated to occur until mitigating actions are taken."

Safety evaluations issued by the NRC staff state that the SSF is expected to be manned and communications established with the main control room within 10 minutes after confirmation of an active fire. Specifically, upon confirmation of an active fire in a fire area where the SSF is credited for safe shutdown and where fire damage could potentially impact SSF operation (defined as an "SSF Risk Area"), an operator would be promptly dispatched to the SSF. As described in the ONS response to RAI 3-1, the shutdown procedure would not be entered until it is verified that an "active fire" in an SSF Risk Area has propagated into a "Challenging Active Fire" (defined as a fire that is burning cables which have the potential to affect additional equipment). Although the decision to shut down the facility may not occur for sometime after discovery and confirmation of a fire in an SSF Risk Area, transfer of control to the SSF would have already occurred. This is consistent with the ONS response to RAI 3-28 which states: "Upon confirmation of an active fire in those areas of the plant where the Standby Shutdown Facility is the credited method for safe shutdown and where a fire could adversely affect the safe shutdown capability of the SSF (i.e., SSF transfer control cables) an operator will be dispatched to transfer control to the SSF. This transfer will be completed within 10 minutes of confirmation of the fire."

It does not appear to be correct to state that the NRC staff approved a methodology that does not assume the occurrence of cable or equipment fire damage such as spurious actuations or hot shorts for the first 10 minutes of any fire event. The "10-minutes free of fire damage assumption" appears to be directed at achieving reasonable assurance that operation of the SSF will not be impacted by fire in areas where it is relied on to accomplish required shutdown functions rather than a generic assumption regarding the timing of circuit failures. Provide additional justification which clearly demonstrates NRC staff approval of the assumption that ONS does not need to consider spurious actuations or hot shorts due to a fire for the first 10 minutes of any fire event or, alternatively, clarify that the 10 minute assumption is only valid for SSF Risk Areas and has no relationship to the fires in areas where shutdown will be accomplished from the control room.

ONS RAI 3-39

Although the alignment statement may remain unchanged, the alignment bases of several sections have been modified in the licensee's letter dated April 14, 2010, to the extent that it does not address NEI 00-01 criteria as clearly as the submittal dated October 31, 2008. Specifically, the alignment basis of the submittal dated October 31, 2008, typically includes language which addresses each sub-criterion of a specific NEI 00-01 section. However, in several instances the information submitted by letter dated April 14, 2010, does not provide the level of detail necessary to readily conclude that each sub-criterion of the NEI 00-01 section has been satisfied. For example, NEI 00-01 Section 3.1.1.3 states that feedwater flow should be controlled. The submittal dated October 31, 2008, clearly states that feedwater flow rates are controlled. However, such clarity is not evident in Section 3.1.1.3 of the LAR information sent by letter dated April 14, 2010, and no justification is provided for a lack of alignment. As another example, NEI 00-01, Section 3.1.1.4, provides the basis for the use of an alternative shutdown capability for a specific fire area. The submittal dated October 31, 2008, identified the specific fire areas where shutdown is accomplished from the SSF. However, this information is not included in the

submittal dated April 14, 2010. Identify all Alignment Bases in the submittal dated April 14, 2010, that differ from the Alignment Bases provided in the submittal dated October 31, 2008, and, where necessary, provide additional information as necessary to readily conclude that each sub-criterion of the NEI 00-01 section has been satisfied.

ONS RAI 3-40

The submittal dated October 31, 2008, Section 3.1.1.7, states that offsite power has not been analyzed or demonstrated to be free of fire damage for redundant shutdown. The submittal dated April 14, 2010, Alignment Basis indicates that the availability of offsite power has, in fact, been analyzed. Provide additional information (including fire areas where offsite power is credited) to clarify this apparent difference in alignment.

ONS RAI 3-41

In the submittal dated October 31, 2008, the licensee stated that it meets NEI 00-01, [Section] 3.5.1.5[B], with the exception of inter-cable shorts between armored cables. However, from the alignment basis statement, it is not clear how the licensee aligns with the NEI 00-01 criteria with respect to concurrent faults in multi-conductor cables. The alignment basis for Section 3.5.1.5[B] states that the three types of circuit failures identified in NEI 00-01 were considered to occur on each conductor of each safe shutdown cable. This statement could be interpreted to mean that for each cable under evaluation only one of the three types of circuit failures was postulated to occur at any given time (e.g., considering "A" short to ground on conductor #1; then "A" open circuit on conductor #1; then "A" hot short on conductor #1...and repeating this process for each conductor). Inadequacies with this "one-at-a-time" evaluation technique have been identified at other facilities. For example, the application of this approach at a boiling-water reactor resulted in a failure to consider the potential for fire to cause all 16 safety relief valves to spuriously open because it would have required the occurrence of two concurrent circuit failures (i.e., concurrent shorts between conductors of two twisted pairs) within a single multi-conductor instrument cable. In addition, to not being consistent with the results of the cable fire tests sponsored by industry and NRC staff, the "one-at-a-time" methodology does not satisfy the following statements of Section 3.5.1.5 [B] of NEI 00-01:

(a) more than one conductor-to-conductor short will occur in a given cable and

(b) for any individual multiconductor cable (thermoset or thermoplastic), any and all potential spurious actuations that may result from intra-cable shorting, including any possible combination of conductors within the cable, may be postulated to occur concurrently regardless of number.

Other sections of the B-2 table, such as Section 3.5.2.3 A and B, state that multiple failures were considered. However, the B-2 Table does not specifically state that multiple faults were considered to occur concurrently. Confirm that the evaluation of potential fire damage to multi-conductor cables did not impose an a priori limit on the number of circuit failures that may occur concurrently and multiple concurrent circuit faults, involving all possible combination of conductors within the cable, were assumed to occur concurrently regardless of number.

ONS RAI 3-42

Closed per 6-28-10 clarification conference call.

ONS RAI 3-43

Section 3.4.2.3 (Determine Safe Shutdown Equipment Impacts) of NEI 00-01 states: "Using the circuit analysis and evaluation criteria contained in Section 3.5 of this document, determine the equipment that can impact safe shutdown and that can potentially be impacted by a fire in the fire area, and what those possible impacts are." Thus, alignment to this section would require the analyst to:

(a) identify equipment that can impact safe shutdown

(b) from this list of equipment, identify equipment that can potentially be impacted by a fire in the fire area under evaluation

(c) determine what those impacts are

The Alignment Basis provided in Section 3.4.2.3 of the submittal dated April 14, 2010, Table B-2, states, in part that: "based on the safe shutdown cables and components present in the fire area of concern... All postulated safe shutdown cable and component failures were identified and a resolution provided at the cable or component level for the credited train." From this statement, it appears that the licensee is in full alignment with Section 3.4.2.3 of NEI 00-01. However, the Alignment Basis Statement states that ONS "Aligns With Intent" rather than "Aligns." Provide additional information (with specific examples) to clarify the intent of the stated alignment.

ONS RAI 3-44

Section 3.4.2.3 of the submittal dated April 14, 2010, states: "The Safe Shutdown Equipment List (SSEL) and logics were developed based on potential spurious operations and other plant impacts by their selection from a functional basis." The meaning and intent of this statement is unclear. Provide additional clarifying information.

ONS RAI 3-45

Section 3.4.2.3 of NEI 00-01 states that the evaluation should determine equipment that can impact safe shutdown and that can potentially be impacted by a fire in each fire area. The corresponding sections of both the submittal dated April 14, 2010, and the submittal dated October 31, 2008, state that ONS "Aligns With Intent" of this guidance. The submittal dated April 14, 2010, Table B-2, Alignment Basis for NEI 00-01Section 3.4.2.3, is identical to the Alignment Basis stated in the submittal dated October 31, 2008, Table B-2, except the submittal dated April 14, 2010, does not include the following statement: "it is not possible to evaluate all the possible combinations of multiple spurious actions that could occur as a result of the fire and the overall effect of these combinations on safe shutdown." Provide the technical basis and rationale for deleting this statement from the Alignment Basis provided in the submittal dated October 31, 2008.

ONS RAI 3-46

The submittal dated April 14, 2010, Table B-2, Section 2.4.2.2, appears to repeat Sections 3.3.1.7 and 3.3.3.3 at the end of this section. Clarify the reason for these repeats.

ONS RAI 3-47

Closed per 6-28-10 clarification conference call.

ONS RAI 3-48

Because of the extremely high crest voltages that may occur if a current transformer (CT) secondary is open circuited when the primary circuit is energized, the secondary of a CT must either be short-circuited or connected to a burden (i.e., load). This concern is reiterated in product literature published by CT manufacturers, which typically include a CAUTION statement emphasizing that a CT secondary should never be open-circuited while the primary is energized.

The need to consider the potential for fire to cause an open secondary CT is described in Section 2.4.2 of *NFPA 805*, which requires consideration of fire-induced open circuit failure modes and specifies that circuits which share a common enclosure with circuits required to achieve nuclear safety performance criteria, be evaluated to ensure that such electrical faults will not cause the fire to extend beyond the immediate (i.e., initial) fire area. As discussed in Section B.3.4.2, the evaluation of common enclosure issues should include consideration of the following:

- *Current transformers that are constructed such that an open secondary circuit could cause ignition of the transformer should be considered.*

- *Current transformers that are susceptible to ignition due to open secondary windings and have secondary circuits extending outside the fire area that are not isolated by transducers should have their circuits included in the nuclear safety assessment.*

In addition, Section 3.5.2.1, Circuit Failures Due to an Open Circuit of NEI 00-01, Rev. 1, also describes the need to consider the potential for open secondary CT circuits and states "Open circuit on a high voltage (e.g., 4.16 kV) ammeter CT circuit may result in secondary damage." The Alignment Basis provided in Table B-2 of the submittal dated April 14, 2010, states:

1. The NRC disagreed with the conclusion formed by Brookhaven National Lab that this was a credible event. Based on Electric Power Research Institute (EPRI) data and documented in NRC internal correspondence, this was determined to be an "overly conservative" position and "lacked substantiation".

2. CT's are designed to maintain integrity upon a secondary open circuit and they are contained within metal-clad switchgear which should contain any damage should there be an energetic failure.

3. ONS has assumed that an open circuit on the secondary windings of a CT will not cause a fire.

4. This is an open item under section 3.3.3.3 and is to be considered within the scope of the Circuit Coordination Study update.

With regard to Item 1 above:

This statement is clearly not consistent with current NRC staff positions, NFPA 805 or industry guidance provided in NEI 00-01. Section 2.4.2.2.1 of NFPA 805 requires consideration of fire-induced open circuits. Section 2.4.2.2.2 of NFPA 805 states that circuits that share a 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, and Section B.3.3 describes current transformer open secondary concern as a special type of common enclosure issue and states that an opening in the secondary circuit causes excessively high voltages in the current transformer secondary circuit which can result in an ignition of the transformer materials.

Confirm that the referenced memorandum is part of the current ONS fire protection license basis or provide a technical justification to support your contention that consideration of fire-induced open circuits in CT secondary circuits is an "overly conservative" position and "lacked substantiation".

With regard to Item 2 above:

(a) As discussed in NFPA 805, one concern a fire-induced open secondary CT circuit is that excessively high voltages may be produced which could ignite the transformer materials. Thereby, extend the effects of a fire outside of the immediate fire area. For example, a control room fire that caused an open ammeter circuit could result in a secondary fire in a switchgear relied on to meet the nuclear safety objectives. Provide information such as manufacturer's data that substantiates the claim that CTs in use at ONS are designed to maintain their "integrity" upon a secondary open circuit.

(b) The metal-clad switchgear may or may not contain the fire damage resulting from an open-circuited CT. Provide information to confirm the validity of the licensee's stated assumption that the metal-clad switchgear should contain any damage should there be an energetic CT failure.

(c) In addition, an open circuit in a CT secondary winding may impact the operation of metering and relaying circuits and, thereby, cause equipment to maloperate. Based on the assumptions described in Section 3.5.2.1 of Table B-2, it appears that such failures may not have been considered. Provide information to confirm that metering and relaying circuits have been analyzed for the potentially adverse impact of fire damage, including, but not limited to, open CT secondary windings.

With regard to Item 3 above:

Provide a technical basis to support the validity of the licensee's statement that an open circuit on the secondary windings of a CT will not cause a fire.

With regard to Item 4 above:

(a) As discussed above, the potential impact of fire-induced open secondary CT circuits should be considered within the scope of the Common Enclosure analysis. Within the context of fire protection, a circuit coordination study is performed to demonstrate that fire-induced faults on non-essential cables (i.e., cables of equipment that is not required to assure the nuclear safety capability) will not impact the operation of required power supplies and is typically limited to ensuring adequate selectivity between feeder and load breakers of a selected bus. The concern for fire to cause open circuits in current transformer secondary windings is defined in Appendix B of NFPA 805 as a Common Enclosure issue and not a circuit coordination issue. Provide information to support the licensee's statement that fire-induced open CT secondary circuits will be bounded by the currently ongoing Circuit Coordination Study update.

(c) Based on the assumptions contained in the ONS Alignment Basis it is not clear how ONS intends to address the concern for open circuit CT secondary circuits. Provide a detailed description of the methodology that will be used to identify and resolve potential CT secondary circuits of concern.

In addition to the above, the Alignment Basis provided for Section 3.5.2.1 of the B-2 Table is not consistent with Section 3.2.4.3 and Section 3.2.4.3.1 of the licensee's fire protection Design Basis Document (DBD), "NRC Acceptance Criteria for Associated Circuits by Common Enclosure," Revision 8, which states:

- Current transformers (CTs) may induce secondary fires through the fire-induced opening of circuitry associated with the secondary side windings of the CT. Where such circuitry exits in a fire area or provides a common enclosure concern within a fire area, the impact of such secondary fires should be properly considered.

- The impact of the fire-induced opening of CT secondary-side circuits will be considered. Resolution will be provided through proper CT qualification or the performance of a fire hazards analysis to determine if a secondary fire ignition will be a concern.

Provide a justification for not meeting the criteria specified in the DBD and describe the interim compensatory measures that have been put in place until conformance with the DBD and NFPA 805 is achieved.

4. Provide the following information concerning meeting the radioactive release performance criteria:

ONS RAI 4-2

The LAR Section 4.4 states that, "radiological release examination is limited to that radiation release to unrestricted areas due to the direct affects of fire suppression activities and shall be as low as reasonably achievable and shall not exceed applicable 10 CFR, Part 20, limits. In the case of ONS, it is currently licensed to a liquid effluent release limit of 10 times that of 10 CFR 20 limits for specific discharge paths specified in the updated final safety analysis report (UFSAR) (License

Amendment dated January 6, 1993)." There is however no mention of the limits as they are applied to smoke or air effluent release. Clarify the radiation release criteria for smoke releases to be applied at ONS for NFPA 805 compliance.

5. Provide the following information concerning risk assessments and plant change evaluations:

ONS RAI 5-33.2

In the response to RAI 5-33.1, the licensee clarified that the thermoset rather than the thermoplastic ZOI was used, providing the following justification: "OSC-9375 points out that fully enclosed internal sensitive electronics would be protected by the enclosures in which they are located. The thermoplastic ZOIs would result in a larger damage distance, but it is believed that application of the larger ZOI to cabinets housing sensitive electronics would yield potentially unrealistic results." Note that App. H of NUREG/CR-6850 does not imply that solid-state components are exposed "bare" to the cited damaging heat flux or temperature, so it seems reasonable to presume that the cited lower damage thresholds, and, therefore, correspondingly larger ZOIs than even those for thermoplastic cables, would apply to solid-state components as typically "housed" inside cabinets, for which the licensee claims additional protection when applying the thermoset damage thresholds (330°C [625°F] and 11 $kW/m^2$ [1 $BTU/ft^2$]) and correspondingly smaller ZOIs. Specifically, App. H states: "If a scenario should arise involving solid-state control components as a thermal damage target, the failure criteria to be applied in screening are 3 $kW/m^2$ (0.25 $BTU/ft^2$) and 65°C (150°F). The criteria for ignition of the components will assume properties similar to thermoplastic cables (0.5 $BTU/ft^2$ and 400°F)." Thus, it is not clear that even the lower thermoplastic ignition thresholds, and correspondingly larger-than-thermoset ZOIs, adequately represent the damage thresholds and ZOIs for sensitive electronics.

Additional guidance in Appendix S of NUREG/CR-6850 states: "The following approach is recommended for the fire PRA: ...Assume no damage [to sensitive electronics present in] an adjacent cabinet if (1) there is a double wall with an air gap, and ...(2) the sensitive electronics have been 'qualified' above 82°C." This would seem to imply that damage to sensitive electronics inside a cabinet can be dismissed only if there is a double wall with air gap between the cabinet housing the electronics and the fire-exposing cabinet ("adjacent" cabinet) and the sensitive electronics have been qualified above 82°C (180°F), as opposed to "only" 65°C (150°F). Note that this is much more restrictive than even the thermoplastic threshold for "ignition" (205°C [400°F]) and would correspond to ZOIs even larger than those for thermoplastic cable fires. The licensee has not provided a technical basis for using the thermoset ignition thresholds, and correspondingly smaller ZOIs, as damage thresholds for sensitive electronics under the identified conditions. Provide a technical basis, including appropriate citations to the analytical, research, and testing results, for the use of thermoset ignition thresholds, and correspondingly smaller ZOIs, rather than significantly lower recommended damage thresholds, and correspondingly much larger ZOIs, under these conditions. Alternatively, provide a sensitivity analysis or scoping fire modeling calculation using appropriate damage (vs. ignition) thresholds (with appropriate ZOIs, if employed) for sensitive electronics.

ONS RAI 5-69

Provide a summary of the risk-informed change process that will be implemented as part of the self-approval process after transition to NFPA 805 has been completed (i.e., post-transition self-approval). This type of information was contained in Section 4.5.3 and Appendix X in the submittal dated October 31, 2008, but is not included in the submittal dated April 14, 2010.

ONS RAI 5-70

During the May 18 and 19, 2010, audit, the licensee clarified that the fault tree and basic event failure data that are used for the auxiliary service water (ASW) system hardware are a reasonable model of the PSW system's function to supply water to the steam generators. The licensee reported that the ASW system will be removed as part of the modification that installs the PSW system. Apparently, the risk decrease associated with the new PSW is included in all change in risk calculations by "toggling on" the PSW in the going forward model and "toggling off" the PSW in the current model. This method does not include the risk increase associated with removing the ASW system.

(a) Summarize the PRA models used to model each of the three functions that the PSW will provide. The summary should include a brief description of the system functions modeled, the basic events (both hardware and human actions) used in each functions' models, the values assigned to these events, and the reliability of the function.

(b) Provide change in risk estimates that include the risk increase associated with removing the existing ASW system.

ONS RAI 5-71

The risk decrease associated with the installation of the PSW system more than offsets the risk increases associated with retaining the VFDRs and results in a total risk decrease associated with the transition to NFPA-805. The reliability/availability of the PSW is therefore the major assumption relied upon to demonstrate that the proposed transition to NFPA-805 is acceptable. Describe the process to confirm that the final estimates developed for the as-built, as-operated, PSW are consistent with, or are bounded by, the initial estimates. The description should include the quantitative criteria that will be developed and the relation of these criteria to the functional reliability estimates in the response to RAI 5-70. The process should include the actions to be taken if the final estimates cause the acceptable change-in-risk guidelines to be exceeded.

ONS RAI 5-72a

LAR, Attachment U, identifies facts and observations (F&Os) for internal event supporting the human reliability (HR) requirements HR-A2, HR-A3, HR-D6, HR-G3, HR-G4, HR-G6, and HR-G9 which are related to the development and quantification of human actions. The F&Os have not yet been resolved either by changes to the PRA or by final clarification demonstrating the F&O reflected inadequate documentation instead of non-conforming methods. Human error probabilities (HEP) can have a major impact on PRA results and if inaccurate values were corrected, this might change the results of the change-in-risk analyses. Provide an evaluation

and discussion that demonstrates that resolution of the F&Os is not expected to result in the change-in-risk associated with transition becoming positive instead of negative as currently estimated.

The submittal dated February 9, 2009, described a sensitivity study where the median HEP estimates (identified in HR-G9) were converted to mean HEP estimates. Mean values should be used in PRA calculations. Converting the medians to the mean for the selected HEPs resulted in an increase in the fire CDF by 3E-05, an increase almost as large as the risk decrease due to addition of the PSW. Page 24 of the February 9, 2009 submittal described the sensitivity study as an "update." Subsequent inspection of Table B-1 in ONS calculation ONS-9377 on the share point site indicates that the HEP values used in the reported change-in-risk calculations are the median values. Provide a quantative evaluation that demonstrates that the impact of using mean values instead of median values will not cause the change-in-risk associated with transition to become positive instead of negative. In addition, provide a schedule for when the human reliability analyses and associated HEPs for the internal events and fire PRAs will be upgraded to use the mean values and meet the associated RG 1.200 endorsed standard supporting requirements.

ONS RAI 5-72b

Inspection of ONS-9377 also identified some apparent discrepancies. For example, event FEFEFW2DHE is labeled, "operator fails to align emergency feed water from another unit within 23 minutes." In the "Time Avail. For Action in min." column, however, 13 minutes is given. Similar differences appear in many HEPs. Please explain this apparent discrepancy.

ONS RAI 5-73

The evaluation for a fire in the Auxiliary Building fire area AB, Appendix G, Page G-5 states "Deployment and operation of the SSF Submersible Pump" is an action taken at a primary control station (PCS). The retrieval, assembly, and water body deployment of the portable submersible pump including necessary hose(s) and electrical power are not predominantly conducted in the SSF or deployed during the initial transfer of control from the control room. Furthermore, there are two manual valves (2CCWVA0026 and 2CCWVA0028) in fire area YARD that require repositioning to make the flow path functional. While control of the final deployed system is performed at the SSF, and therefore not a recovery action per Regulatory Position 2.4 of RG 1.205, Rev. 1, the NRC staff disagrees that the submersible pump deployment and activation process is an action performed at the PCS. Provide the change in risk for all submersible pump deployment and activation actions and provide justification why these actions should not be considered recovery actions not previously approved by the NRC.

ONS RAI 5-74

Clarify when the breaker coordination study for all three units will be completed. Describe how any lack-of-coordination between breakers will be incorporated into the fire PRA and reflected in the change in risk associated with transition to NFPA-805. If the breaker coordination study for all three units will not be completed in a timely fashion so that any lack-of-coordination can be incorporated into the estimate of the transition risk, describe the process the licensee will use to

confirm that the final transition risk estimates are consistent with, or are bounded by, the reported estimate. The process should include the actions to be taken if the final estimates cause the transition risk to become positive instead of negative as currently estimated.

ONS RAI 5-75

Table 4-4 in the April 14, 2010, submittal indicates (with an "R") that some fire zones require fire detectors to meet the risk criteria for the Performance-Based Approach based on the risk assessment. In some fire zones or areas, a reference to footnote 2 indicates that plant modifications will be required. Explain how fire detection and suppression are modeled in the risk assessment, how fire detectors are credited in this modeling, and why fire detectors are required to meet the risk criteria.

ONS RAI 5-76

LAR, Attachment K, states that the finding of a walkdown of the ONS, Unit 1, Reactor Building Pressurizer Level Instruments that "The transmitters' physical location within the Reactor Building is less than the 15 feet described in the exemption documentation" (Appendix R Exemption, "Reactor Building 20 feet separation w/o intervening combustibles," being transitioned) is being resolved under PIP O-08-03241. This deficiency should be classified as a VFDR. Provide the change-in-risk associated with this deficiency and the total change-in-risk for the ONS, Unit 1, Reactor Building. Describe the process the licensee will use to confirm that the final estimates developed for the actual VFDRs are consistent with, or are bounded by, the initial estimate. The process should include the actions to be taken if the final estimates cause the acceptable change-in-risk guidelines to be exceeded.

ONS RAI 5-77

LAR, Attachment C, Table B-3, has numerous entries of "TBD" for the table entry "FRE/Change Eva/Mod Reference." Clarify the meaning of these entries.

ONS RAI 5-78

The fire PRA is built upon the internal events PRA. Provide the CDF and LERF for the internal events PRA for each ONS unit.

ONS RAI 5-79

It has been shown that open CT circuits may cause secondary fires in locations away from the primary ignition source. What is the impact of these potential secondary fires on the change in risk estimates?

July 30, 2010

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 (ONS) - REQUEST FOR ADDITIONAL INFORMATION (RAI) REGARDING LICENSE AMENDMENT REQUEST, TRANSITION TO TITLE 10 OF THE *CODE OF FEDERAL REGULATIONS* (10 CFR), PART 50, SECTION 50.48(c), *NATIONAL FIRE PROTECTION ASSOCIATION STANDARD NFPA 805* (TAC NOS. ME3844, ME3845, AND ME3846)

Dear Mr. Baxter:

By letter dated May 30, 2008, as supplemented by letters dated October 31, 2008, January 30, 2009, February 9, 2009, February 23, 2009, May 31, 2009, August 3, 2009, September 29, 2009, November 30, 2009, and April 14, 2010, Duke Energy Carolinas, LLC (the licensee) submitted a license amendment request (LAR) to transition the fire protection licensing basis at ONS from 10 CFR 50.48(b) to 10 CFR 50.48(c), *National Fire Protection Association Standard (NFPA) 805.* The letter dated April 14, 2010, resubmitted the LAR and superseded the content of the LAR submitted by letters dated May 30, 2008, and October 31, 2008. This resubmitted LAR, however, does not supersede previous responses to RAI questions submitted by letters dated October 31, 2008, January 30, 2009, February 9, 2009, February 23, 2009, May 31, 2009, August 3, 2009, September 29, 2009, and November 30, 2009.

To complete our review of the LAR, the U.S. Nuclear Regulatory Commission (NRC) staff needs additional information. The NRC staff's RAI is enclosed. Unless otherwise agree to, please submit all responses to these RAI questions within 30 days.

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:
RAI
cc w/encl: Distribution via Listserv

DISTRIBUTION:
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PLain, NRR

**ADAMS Accession No. ML102110394*** concurrence by email **via memo dated 7/29/10 ML102080132

| OFFICE | NRR/LPL2-1/PM | NRR/LPL2-1/LA | AFPB/BC | NRR/LPL2-1/BC | NRR/LPL2-1/PM |
|---|---|---|---|---|---|
| NAME | JStang | MO'Brien* | AKlein** | GKulesa by (KCotton) | JStang |
| DATE | 7/30/10 | 7/29/10 | 07/29/2010 | 7/30/10 | 7/30/10 |

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