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

June 11, 2012

Mr. Preston Gillespie
Site Vice President
Oconee Nuclear Station
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 THE LICENSE AMENDMENT REQUESTS (LARs) FOR THE LICENSING BASIS FOR THE PROTECTED SERVICE WATER SYSTEM (TAC NOS. ME7737, ME7738, ME7739, ME7746, ME7747, AND ME7748)

Dear Mr. Gillespie:

By letter dated December 16, 2011, as supplemented January 20, March 1, and March 16, 2012, Duke Energy Carolinas, LLC (the licensee), resubmitted LARs for ONS, which propose a licensing basis for the new protected service water system.

The U.S. Nuclear Regulatory Commission (NRC) staff is in the process of reviewing the LARs and has determined that additional information is required in order to complete the review. The RAI is enclosed. Draft RAIs were provided to your staff electronically, and telephone calls between your staff and the NRC staff have occurred to ensure that the right level of detail is provided in the RAI responses. Please provide responses to the RAIs within 30 days of the date of this letter. If you cannot respond within 30 days please provide the reason and a schedule of when you can respond to the RAIs.

If you have any questions, please contact me at 301-415-2901.

Sincerely,

John P. Boska

John P. Boska, 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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REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUESTS

REGARDING THE LICENSING BASIS FOR THE PROTECTED SERVICE WATER SYSTEM

DUKE ENERGY CAROLINAS, LLC

OCONEE NUCLEAR STATION, UNITS 1, 2, AND 3

DOCKET NOS. 50-269, 50-270, AND 50-287

By letter dated December 16, 2011 (ADAMS Accession No. ML12003A070), as supplemented January 20, 2012 (ADAMS Accession No. ML12025A124), March 1, 2012 (ADAMS Accession No. ML120800429) and March 16, 2012 (ADAMS Accession No. ML12081A126), the licensee submitted a License Amendment Request (LAR) and supplemental information regarding the licensing basis for the new protected service water (PSW) system.

The NRC staff is in the process of reviewing the LAR, and has determined that the following Request for Additional Information (RAI) is required in order to complete the review.

RAI 110 [EEEB1]

The staff's review of letters dated December 16, 2011, and March 16, 2012, found that the licensee did not include all the PSW System electrical system design basis information in proposed Updated Final Safety Analysis Report (UFSAR) Section 9.7.1.2.2, specifically, the design basis information for the PSW System electrical equipment included in proposed Technical Specification (TS) Section 3.7. Provide a copy of the revised UFSAR pages reflecting the design basis information related to TS 3.7 for the PSW System electrical equipment as discussed above.

RAI 111 [EEEB2]

The staff's review of the Oconee Nuclear Station (ONS) TS Section 3.7.10 amendment request indicated that it included TS Surveillance Requirements (SR) for the service tests or modified performance tests on the PSW batteries. Provide a summary of the load profiles for the PSW batteries based on which the TS required service tests will be performed.

RAI 112 [EEEB3]

In its letter dated January 20, 2012, related to the ONS TS Amendment Request for TS SR 3.7.10 acceptance criterion, the licensee stated that the PSW battery terminal voltage is ≥ 125 V DC on float charge. Provide the technical basis for the proposed PSW battery terminal voltage acceptance criterion.

Enclosure

RAI 113 [EEEB4]

In its letter dated January 20, 2012, related to the ONS TS Amendment Request for the TS Limiting Condition of Operation (LCO) 3.7.10a, ACTIONS, Condition B, the licensee is required to verify one battery on one train with float current limit of > 2 ampere (amp). Provide the technical basis for the proposed PSW battery float current limit of > 2 amp.

RAI 114 [EEEB5]

In its letter dated January 20, 2012, related to the ONS TS Amendment Request for TS SR 3.7.10a.2, the licensee is required to verify the battery pilot cell voltage limit of ≥ - 2.07 V which appears to have a typographical error (i.e. negative sign). Provide the technical basis for voltage limit above and a corrected TS mark up with corrected value as discussed above.

RAI 115 [EEEB6]

Confirm that the rated voltage of all DC equipment and components in the PSW system exceed the battery equalizing voltage.

RAI 116 [EEEB7]

In its letter dated January 20, 2012, related to the ONS TS Amendment Request for the proposed TS SR 3.7.10.2 NOTE, the licensee is required to verify the "KHU underground alignment" which appears to be an incomplete sentence or missing words. Provide a corrected markup of the TS SR 3.7.10.2 NOTE.

RAI 117 [EEEB8]

Confirm that a failure of the electrical components identified as non QA-1, due to the postulated environmental conditions of the PSW System, would not adversely affect the safety functions of the PSW QA-1 safety-related components.

RAI 118 [EEEB9]

The staff's review of ONS UFSAR Section 9.7.1.2.2 did not find a licensee evaluation demonstrating that all PSW electrical equipment and components are rated for the worst-case temperature and moisture of the PSW building to ensure that the equipment and components will be able to perform their expected design functions when subjected to the worst-case temperature and or moisture of the PSW building. Provide a summary of the analysis confirming that all electrical equipment and components are rated for the worst-case temperatures and moisture in the PSW building.

RAI 119 [EEEB10]

In its response dated December 16, 2011, to the staff's RAI 62, the licensee stated that the PSW heating, ventilation, and air-conditioning (HVAC) system is designed to maintain the PSW transformer space (main equipment area) and the battery rooms within their design temperature ratings. However, the licensee did not discuss the design details such as temperature ranges

and how the PSW HVAC system will maintain the main equipment area and the battery rooms within their design temperature ratings. Provide a summary of the design basis information such as the PSW main equipment area and the battery rooms equipment temperature ranges, equipment ratings, and the PSW HVAC temperature controls to demonstrate that all equipment will operate within their design temperature ranges.

RAI 120 [EEEB11]

In a letter dated December 16, 2011, Enclosure 3, Tab 2, in response to the staff's RAI 48, the licensee referenced its submittal dated August 31, 2010. In its August letter, the licensee stated that each 13.8 kilovolt (kV) underground cable will be routed in a combination of precast concrete trench boxes, duct banks and manholes. The Keowee underground path to the PSW switchgear will be designed to preclude water entry that could wet the cable. The concrete trenches will have drains. The new duct bank conduits will be sloped towards manhole drains. Periodic inspections will be performed on the Keowee to PSW underground path to evaluate the condition of the trenches, duct banks, manholes, and drainage system. However, the staff did not find any Regulatory Commitment for the periodic inspections on the Keowee to PSW underground path to evaluate the condition of the trenches, duct banks, manholes, and drainage system in enclosure 2, "Updated Tornado and HELB Regulatory Commitments," in the LAR dated December 16, 2011. Provide a Regulatory Commitment for the periodic inspections of the Keowee to PSW underground path to evaluate the condition of the trenches, duct banks, manholes, cables and the drainage system.

RAI 121 [EEEB12]

In a letter dated December 16, 2011, Enclosure 3, Tab 2, in response to RAI 43, the licensee referenced its submittal dated August 31, 2010. In its August letter, the licensee provided a summary of the ONS calculation OSC-9370, Revision 0, "PSW AC Power System Voltage and Short Circuit Analyses." However, the staff's review did not find any discussion regarding disposition of open items in the calculation. Provide a summary of the open items identified in the above calculation and how they were resolved.

RAI 122 [EEEB13]

In a letter dated December 16, 2011, enclosure 3, tab 2, in response to RAI 43, the licensee referenced its submittal dated August 31, 2010. In its August letter, the licensee stated that the 4.16 kV AC switchgear is rated at 4.16 kV AC maximum voltage. However, Page A10 in Appendix A of the licensee's calculation OSC-9370, Revision 0, shows an overvoltage rating of 114.4% (4.76 kV). Provide detailed justification for the 4.16 kV AC switchgear's ability to withstand the overvoltage.

RAI 123 [EEEB14]

In a letter dated December 16, 2011, Enclosure 3, Tab 2, in response to RAI 43, the licensee referenced its submittal dated August 31, 2010, and a previous RAI 2-34. In its August letter, the licensee provided a summary of ONS Calculation OSC-9832, "PSW AC Power System – ETAP Model Base File." However, the staff's review did not find any discussion regarding the

conclusion, critical assumptions used and disposition of open items in the calculation. Provide a summary of open items and how they were resolved, the conclusion, and critical assumptions.

RAI 124 [EEEB15]

In its March 16, 2012, letter, the licensee provided an updated version of UFSAR Section 9.7.1.2.2 for the PSW System electrical equipment design basis. In UFSAR Section 9.7.1.2.2, the licensee states, "Additionally, the AC and DC power systems and equipment required for the PSW essential functions have been designed and installed consistent with the ONS QA program for Class 1E equipment." In a letter dated December 16, 2011, enclosure 3, tab 2, in response to RAI 25, the licensee indicated that the PSW electrical equipment are QA-1 and not Class 1E. The staff understands that the PSW System is a single train system and does not have redundancy as required for Class 1E equipment. Explain how the QA-1 AC and DC equipment were designed and installed consistent with the ONS QA-1 for Class 1E equipment as described in the above UFSAR Section 9.7.1.2.2.

RAI 125 [EEEB16]

In a letter dated December 16, 2011, enclosure 3, tab 2, in response to RAI 43, the licensee referenced its submittal dated August 31, 2010, and a previous RAI 2-27. In its August letter, the licensee stated that the loading on the PSW transformer, switchgears, and load centers will be answered in a future RAI response submittal. However, the staff's review of the licensee's responses dated December 7, 2010, December 16, 2011, and January 20, 2012, did not find any discussion regarding equipment loading. Provide a table showing the PSW system worst-case electrical loadings at 13.9 kV, 4.16 kV, and 600 V buses, and all equipment, bus, and breaker design ratings demonstrating that the worst-case loadings are within the design rating of the associated equipment/bus/breaker.

RAI 126 [EEEB17]

In its response to the staff's RAI 2-28 by letter dated August 31, 2010, the licensee states, "The analysis used for selecting the PSW battery size was performed by analysis using The Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 485-1997 (R2003) methodology." Provide clarification regarding which revision of the IEEE Std. 485 was used for the sizing the PSW battery.

RAI 127 [EEEB18]

In its letter dated December 16, 2011, in response to the staff's RAI 72, the licensee stated that the electrical equipment for the PSW system is designed, installed, and tested in accordance with the Duke Energy Topical Report which is contained in Chapter 17 of the ONS UFSAR. However, the staff's review of ONS UFSAR Chapter 17 did not find the Duke Energy Topical Report related to the design, installation, and testing of the PSW electrical equipment. Provide a copy of the applicable pages of Duke Energy Topical Report and Chapter 17 of the ONS UFSAR related to the design, installation and testing of the PSW electrical equipment for the staff's review.

RAI 128 [EEEB19]

In its letter dated December 16, 2011, in response to the staff's RAI 63, the licensee referenced calculation OSC-9190, Revision 0, "PSW 125 V DC Power System Analysis." Provide a summary table showing all DC loads, required minimum voltage, maximum rated voltage, and the calculated available voltages at the equipment terminal demonstrating that in all cases, the calculated voltages are bounded by the minimum and maximum rated voltage.

RAI 129 [EEEB20]

In its letter dated December 16, 2011, in response to the staff's RAIs 67 and 68, the licensee discussed the relay protection and coordination conclusion in its Calculation OSC-9831, "Protective Relay Settings Associated with PSW Switchgear." Provide an executive summary of the calculation. Discuss the following:

- Types of downstream loads (motors, panels etc.) supplied by the 600 V AC Load Center (LC) LXPX13.

- Provide relay/breaker protection curves for the 600 V AC loads (200 ampere (A) and 225 A) on the PSW LC LXPX13 demonstrating these loads are adequately protected from the upstream breakers/relays.

- In its response to the staff's RAI 67, the licensee states, "In other cases at the 600 V level, in order to coordinate with the pickup of the largest load breaker in an MCC, the feeder can't be set to protect the cable for overload. The maximum loading of these MCCs are reviewed to ensure the cable will not be overloaded." However, if the load (such as a motor or motor operated valve) experiences unexpected overloads (such as motor bearing malfunctions etc.) during its operation, the associated cable may not be protected from overloads. Provide justification for not providing overload protection for the cables at the 600 V level.

- Discuss in detail the overcurrent relay and breaker coordination for the PSW 600 V AC MCC 1XKMCC demonstrating adequate coordination between the upstream and the downstream relay and breakers.

RAI 130 [EEEB21]

In its letter dated March 1, 2012, in response to the staff's RAI 76, the licensee stated that it identified certain equipment failures in its calculations OSC-10008, Revision 1, "Failure Modes and Effects Analysis, Protected Service Water (PSW) System – Electrical and Mechanical Equipment," and OSC-9510, Revision 1, "Failure Modes and Effects Analysis, Standby Shutdown Facility (SSF) System," that are important to PSW operation. Provide the following:

1. ONS Calculation OSC-10008, Revision 1, has identified several potential weaknesses, equipment failures, and recommendations for the PSW System. Provide an evaluation of the identified potential failures, weaknesses, and recommendations in the calculation and provide a Regulatory Commitment to address and resolve all deficiencies.

2. ONS Calculation OSC-9510, Revision 1, Section 7.0, Conclusion has identified potential equipment failures and recommendations for the Standby SSF System. Provide an evaluation of the identified potential failures and recommendations in the above calculation and provide a Regulatory Commitment to address and resolve all deficiencies.

RAI 131 [EEEB22]

In its letter dated December 16, 2011, in response to the staff's RAI 65 related to the PSW battery room ventilation, the licensee stated that the HVAC systems shall maintain Battery Room temperatures between 60 °F and 120 °F with a nominal temperature of 70 °F. It further states the battery room fans are sized to maintain the Battery Rooms at or below a maximum of 120 °F by ventilating the rooms with outside air. However, the IEEE Std. 450-2002 Figure H.1 shows that a battery operating at elevated temperatures (higher than 77 °F) for long periods will have a significant reduction in the battery expected design life (typically 20 years). Discuss in detail the measures that will be implemented to control the PSW Battery Room temperature to ensure no adverse impact on the battery expected design life.

RAI 132 [EEEB23]

In its letter dated December 16, 2011, in response to staff RAI 68, the licensee stated, "At the dropout point of the degraded grid voltage relays, the OTS1 voltage is 99% of the rated bus voltage, which is required for the SSF pressurizer heaters. This is the most limiting equipment considered for the degraded grid relay setting." This SSF supply to the pressurizer heaters may be needed to maintain required reactor coolant system (RCS) pressure during safe shutdown conditions. Explain how minimum required voltage will be ensured at the SSF pressurizer heater terminals when supplied from the PSW System alternate power supply to achieve and maintain required RCS pressure during safe shutdown.

RAI 133 [EEEB24]

In its letter dated December 16, 2011, in response to staff RAI 66, the licensee stated, "Calculation OSC-9370 (U1/2/3 PSW AC Power Systems Voltage and Short Circuit Analyses) performs evaluations to demonstrate the capability of the PSW electrical system to function under postulated scenarios by comparing the analysis results with the equipment ratings for undervoltage, overvoltage, short circuit and cable ampacity." The licensee's RAI response did not include the results of its evaluation of Calculation OSC-9370 based on comparison of the analysis results with the equipment ratings for undervoltage, overvoltage, short circuit, and cable ampacity. Provide a table showing analyzed values of under voltage, overvoltage, short circuit, cable ampacity and design ratings of the PSW System electrical equipment demonstrating that the design ratings bound the analyzed values and a summary of evaluation of the Calculation OSC-9370. The following tables in the calculation have items of interest:
Tables on Appendix C, Pages 1, C6.
Tables D1, D2, D3, D4, D5.
Section 3.4 Table on page E7.
Table F1, Pages F10 through F25.
Table F2, Pages F28 through F37.

RAI 134 [EEEB25]

In its letter dated January 20, 2012, the licensee referenced the Institute of Electrical and Electronics Engineers (IEEE) Standard (Std.) 323-1974 and 323-1983, "Standards for Qualifying Class 1E equipment for Nuclear Power Generating Stations," and noted that these standards were used in the design of electrical equipment for the PSW System. The staff review noted that the design of some of the PSW System electrical equipment are based on the IEEE Std. 323-1974 while others are based on the IEEE Std. 323-1983. The NRC has not endorsed the IEEE Std. 323-1983 for satisfying the EQ requirements of 10 CFR 50.49. Explain how and why the IEEE Std. 323-1983 was applied, in lieu of the IEEE Std. 323-1974, in the design of the PSW System electrical equipment.

RAI 135 [EEEB26]

In its analysis of HELBs outside of containment provided in the ONDS-351, Revision 2, the licensee stated that some of the breaks in the high energy systems may affect cabling associated with the emergency power distribution system. The bounding postulated HELB interaction would be the loss of ONS 230 kilovolt (kV) Switchyard, as well as the loss of both Standby Buses. The result would be a loss of all alternating current (AC) power to Units 1, 2, and 3 (i.e., station blackout (SBO)). Due to the postulation of HELBs in the common TB for Units 1, 2, and 3 resulting in an SBO (i.e., loss of all AC power including loss of both Keowee Hydro Units (KHUs)), the KHU power supply may not be available to supply power to the proposed PSW system. The staff understands that in such a case the proposed power supply from the 100 kV Central Substation is aligned to power the PSW system.

1. Demonstrate that the HELB induced loss of all AC power (i.e., loss of all three generators and KHU units) resulting in SBO will not adversely impact the stability of the transmission grid.

2. Confirm that a loss of all three generators as a result of a HELB induced SBO will not result in adverse voltages on the PSW System Safe Shutdown equipment when powered from the power supply from the 100 kV Central Substation.

RAI 136 [EMCB1]

Please confirm that drawings and all structural calculations/analyses for systems, structures and components (SSCs), including piping, credited to and/or affected by the proposed PSW system are approved and final; and controlled documentation exists which finds the applicable SSCs structurally adequate to perform their intended design functions. This confirmation is only required for safety-related and/or seismically qualified or seismic category two over one SSCs.

RAI 137 [EMCB2]

Please verify that the structural design of piping and piping modifications is in accordance with the 1967 Edition of USAS B31.1, which is specified in the current licensing basis (CLB) of the Oconee Nuclear Station (ONS). Also verify that the structural design of pipe supports is in accordance with the AISC Manual of Steel Construction, 6th edition, which is also specified in the CLB of the ONS.

RAI 138 [EMCB3]

Please identify the codes and code edition utilized for the structural design of the heating, ventilation and air-conditioning (HVAC) system components and component supports, ducts and duct supports and whether these codes are in the ONS CLB or current design basis (CDB). If these codes are not in the ONS CLB or CDB, please provide the basis for justifying use of these codes.

RAI 139 [EMCB4]

In addition to the seismic analysis discussion included in Section 9.7.1.2.5.2 of the March 16, 2012 letter, for the proposed PSW system credited piping and pipe supports; HVAC system components and component supports, ducts and duct supports; which are important to safety and/or need to be seismically qualified, please provide technical evaluation discussions which address the structural analyses or evaluations performed and include, but not limited to, the following.

a) Structural analysis methodology, validated assumptions and criteria.

b) Structural design inputs which as minimum include loads and load combinations utilized in the structural analyses.

   The response to RAI EMCB-4(b) should include guidance and criteria utilized such as whether the design response spectra is developed in accordance with RG 1.6 and RG 1.92 for combining modal responses; whether RG 1.61 is used for damping ratios; other regulatory guidance, FSAR or SRP sections.

   In addition, please discuss guidance and criteria for monitoring of piping vibration levels during startup testing mentioned in UFSAR Section 9.7.1.2.5.3 of the March 16, 2012 letter and whether it is in accordance with ASME OM-SG Part 3, UFSAR or other approved guidance. Also discuss monitoring of piping thermal motion to verify adequate clearance and restriction of movements.

c) Discussion of the results of the structural analyses and evaluations. Please include quantitative summaries of maximum stresses with a comparison to code of record allowable stresses. Include only maximum stresses and data at critical locations (i.e. pipe anchors, equipment nozzles, penetrations, component connections, tie-ins to existing piping, etc). For penetrations and equipment nozzles provide a summary of loads compared to specific allowable values for the penetrations and nozzles.

d) Describe the method and criteria used for the interface between piping which is required to be seismically qualified and non-seismically qualified piping.

e) Describe how the interaction between seismic and non-seismic PSW SSCs (including piping) has been considered.

RAI 140 [EMCB5]

Section 3.2.1.1.1 of the Oconee Nuclear Station (ONS) Updated Final Safety Analysis Report (UFSAR) describes Class 1 structures as those structures, systems and components (SSCs) which prevent uncontrolled release of radioactivity and are designed to withstand all loadings without loss of function. According to the ONS UFSAR mark-up included in the licensee's letter dated March 16, 2012, the protected service water (PSW) building has a seismic classification of Category 1 and it is designated as a Class 1 structure.

a) Provide a detailed description of the design criteria and load combinations for structural design and stability analysis of the PSW building and demonstrate compliance with Section 3.1.2 of the ONS UFSAR;

b) Provide a detailed description of the type of foundation(s) and supporting rock/soil/backfill strata, as applicable, used in the design of the PSW building;

c) Provide further information relative to the design features and mitigative measures that have been incorporated in the design and construction of the PSW building to control groundwater infiltration;

d) Provide a detailed explanation of the load path from the PSW building superstructure to the foundation elements and to the subgrade;

e) Provide the factor of safety against overturning, sliding and floatation and associated acceptance criteria for all applicable design loading conditions; and

f) Provide the maximum soil bearing pressure and the associated allowable limits for all applicable design loading conditions.

RAI 141 [EMCB6]

According to the licensee's letter dated March 16, 2012, the ONS UFSAR mark-up included Section 9.7.1.2.5.1 which states the following:

> "The design response spectra for the new structures correspond to the expected maximum bedrock acceleration of 0.1g (MHE). The design response spectra were developed in accordance with Regulatory Guide 1.122 (Reference 15). The dynamic analysis is made using the STAAD-PRO computer program. The structure is built on structural fill. A ground motion time history was developed based on the soil properties and amplified response spectra generated at elevations of significant nodal mass."

Provide the following:

a) Considering that the PSW building is described as founded on the structural fill, provide a detailed description of rock motion, anchoring point for the input motion, and material properties of soil profile(s) overlaying bedrock (thickness, shear wave velocity, and other relevant material properties.) Also, discuss the response amplification calculation process that was used to determine the free-field horizontal and vertical ground motion at the PSW building.

b) Provide a detailed description of the procedures used for the seismic analysis of the PSW building and to develop the in-structure response spectra (floor design response spectra). If different from the methods and acceptance criteria outlined in the NRC standard review plan (SRP) 3.7.1 and 3.7.2, identify those differences and provide justification that the PSW building is adequately designed, using these alternative methods, to withstand the effects of earthquake loads.

c) Confirm and provide further information that STAAD-PRO and all features of this software related to the dynamic response analysis and static analysis have been verified and validated by its provider in compliance with 10 CFR Part 50, Appendix B and 10 CFR Part 21. Also, provide documentation which demonstrates that the software provider has been audited and approved as an Appendix B supplier.

d) Describe the method of combination of modal responses and spatial components used in the PSW building seismic response analysis. If different from the methods outlined in the NRC Regulatory Guide (RG) 1.92, identify those differences and discuss how these alternative methods provide assurance that the PSW building is adequately designed to withstand the effects of earthquake loads.

RAI 142 [EMCB7]

The ONS UFSAR mark-up, included in the licensee's letter dated March 16, 2012, includes American National Standard Institute (ANSI)/ American Institute of Steel Construction (AISC) N690-1984 and American Concrete Institute (ACI) 349-97 as the design codes for the PSW building structural steel and reinforced concrete elements, respectively.

The current RG 1.142 (revision 2) endorses ACI 349-97 with exceptions. The SRP 3.8.4 references the 1994 edition of ANSI/AISC N690 including Supplement 2 (2004) for the design of safety-related steel structures. Provide discussion and further information relative to the following:

a) Demonstrate compliance with the provisions of the 1994 edition of ANSI/AISC N690 including Supplement 2 (2004) or identify the differences between two editions and provide a reconciliation to demonstrate the acceptability of using ANSI/AISC N690-1984.

b) Confirm that ACI 349-97 have been followed in its entirety, where applicable, and all applicable regulatory positions in RG 1.142 have been incorporated in the design and construction of the PSW building.

RAI 143 [EMCB8]

The ONS UFSAR mark-up, included in the licensee's letter dated March 16, 2012, references AISC Manual of Steel Construction, 13th edition and ANSI/AISC N690 among those codes that were used for the design of the PSW building.

As ANSI/AISC N690 covers the design provisions for safety-related steel structures, provide further information to clarify the extent of the use of AISC 13th edition in the design of the PSW building.

RAI 144 [EMCB9]

The ONS UFSAR mark-up, included in the licensee's letter dated March 16, 2012, describes the underground conduit duct banks associated with the PSW building. It specifically states that a second reinforced concrete duct bank/elevated raceway connects the PSW building to the Unit 3 auxiliary building. It also states that these structures are seismically qualified to the maximum hypothetical earthquake and designed to withstand missiles, wind and differential pressure associated with a tornado event.

Provide further information relative to the following:

a) The structural design criteria used for the design of the reinforced concrete duct banks and demonstrate compliance with Section 3.1.2 of the ONS UFSAR;

b) The procedures used for the analysis and design of the reinforced concrete duct banks for seismic and tornado missile load conditions and confirm that these duct banks have been designed for the relative movement at the locations where they enter and exit the respective structures; and

c) The method of protection against tornado wind and tornado missiles for the elevated (above ground) electrical raceway connecting the PSW building to the Unit 3 auxiliary building.

RAI 145 [EMCB10]

Provide further information relative to the evaluation of the existing underground commodities (if any) for the additional loads exerted by the PSW building foundation footprint to demonstrate that there will be no adverse effects on the existing underground utilities for all applicable design loading conditions.

RAI 146 [EMCB11]

Provide a detailed explanation of how settlement (including static or dynamic differential settlement) was considered in the design of the PSW building and the commodities at the entry points into this structure that could be adversely affected by the settlement of the PSW building.

RAI 147 [EMCB12]

Provide further information relative to the procedures used in calculating the dynamic lateral soil pressure for the design of below grade walls of the PSW building.

RAI 148 [EMCB13]

Provide further information whether there are any existing SSCs, in the vicinity of the PSW building, that could have an adverse interaction with the PSW building.

RAI 149 [EMCB14]

As noted in Section 3.2.1.1 of the ONS UFSAR:

> "From the license renewal review, it was determined that Class 1 civil structures are included in the scope for license renewal."

Furthermore, the ONS UFSAR mark-up, included in the licensee's letter dated March 16, 2012, does not include a revision to Section 18.3.13 "Inspection Program for Civil Engineering Structures and Components" for the PSW building.

Provide further information and confirm that the PSW building will be incorporated into Oconee Nuclear Station's aging management program.

RAI 150 [SBPB1]

In the response to RAI 107, the licensee provided the proposed technical specifications for the Protected Service Water (PSW) system. The completion time of Condition C would allow 30 days to recover operability when the PSW and Standby Shutdown Facility (SSF) were inoperable concurrently for maintenance.

Provide a list of maintenance activities that would be expected to result in concurrent inoperability or unavailability of the PSW and SSF systems. For previous instances when these maintenances were performed, dating back to the installation of the SSF, provide the duration of each maintenance performance. In addition, provide the total time that the SSF was inoperable or unavailable during each maintenance performance.

RAI 151 [SBPB2]

During periods of concurrent PSW and SSF inoperability as a result of maintenance there may still be a demand for these systems. Provide a description of Oconee's capability for backing out of the maintenance activities and the time frame for restoring the PSW and SSF to operability.

RAI 152 [SRXB1]

Please list the design basis high energy line breaks that establish the performance requirements for the PSW system.

RAI 153 [SRXB2]

For the events, the analyses for which are discussed in Sections 7.1.1.2 and 7.2.1 of ONDS-351, Revision 2, please provide the following information:

Describe the acceptance criteria, the model used for the analysis, the initial and boundary conditions used for the analysis, summarize the core kinetics, and provide a detailed discussion of the results. Please also include transient plots of the key reactor coolant and main steam system thermal-hydraulic parameters.

RAI 154 [SRXB3]

If the initial conditions for the events discussed above are not conservatively bounding of instrumentation uncertainties of system and operating parameters, please justify the use of the more realistic analytic treatment.

RAI 155 [SRXB4]

For the events described above, please clarify the analytic treatment of plant and reactor protection systems. If a trip is assumed at the event initiation, for example, please justify this assumption.

RAI 156 [SRXB5]

If a particular acceptance criterion is dispositioned by comparison to a more limiting event that was explicitly analyzed, please provide a summary of the limiting event and plots of key parameters for the more limiting event.

RAI 157 [SRXB6]

If the analyses for these events are obtained from living calculation files, please provide reference information and revision numbers for the calculation files.

RAI 158 [SRXB7]

Please justify not including the PSW design basis events in UFSAR Chapter 15 as postulated accidents or anticipated operational occurrences.

RAI 159 [EPTB]

10 CFR 50.55a(f), "Inservice Testing (IST) Requirements," requires, in part, that ASME Class 1, 2, and 3 components must meet the requirements of the ASME OM Code and applicable addenda. The applicable ASME OM Code for Oconee is the 1995 Edition through 1996 Addenda. Section ISTB 1.1, "Scope," of the OM Code covers pumps that are required in shutting down a reactor to the cold shutdown condition, maintaining the cold shutdown condition, or mitigating the consequences of an accident. The PSW portable pump, on loss of CCW siphon flow, is used to refill the CCW pipe which is the suction source for the PSW booster pump. Therefore, the PSW portable pump may be required to maintain the reactor in a cold shutdown condition following postulated accidents and per Section ISTB 1.1 the PSW

portable pump should be included in the IST program and tested in accordance with ASME OM Code requirements.

Surveillance Requirement (SR) 3.7.10.3 requires that PSW primary and booster pumps be tested in accordance with the IST program, and therefore is in compliance with ASME OM Code requirements. However, SR 3.7.10.9 only requires that the PSW portable pump be tested on a 24 months frequency. The licensee notes that the portable pump will not be tested in accordance with the IST program and the specified frequency is based on the PSW portable pump not being designated QA-1 (safety-related) equipment by the licensee. Also, the licensee stated that operating experience has shown it usually passes the SR when performed at the 24-month frequency. Based on the above discussion, the following information is requested for the review of the proposed technical specification 3.7.10, "PSW System":

a) If the PSW portable pump performs certain safety-related functions as addressed above, the licensee is requested to provide additional discussion or substantiation for why the PSW portable pump is not required to be a QA-1 (safety-related) grade and tested in accordance with IST program. If the PSW portable pump is not required to be a QA-1 grade and not required to perform any safety-related functions, the licensee needs to explain why the PSW portable pump is required to be tested by SR 3.7.10.9.

b) Is the PSW portable pump an ASME Code Class component? If not, why not.

c) Provide the methods, related historical data and operating experiences that are used to demonstrate the adequacy of the 24-month test frequency for the type of PSW portable pump being installed at Oconee.

RAI 160 [EMCB15]

In response to RAI-62, the licensee included, in its letter dated January 20, 2012, IEEE 344-1975 as one of the industry standards that is being used for the PSW system design. Discuss the seismic qualification method(s) used for electrical and mechanical equipment credited for the PSW system. Provide a summary of the seismic qualification results to demonstrate that all equipment credited for the PSW system including their subcomponents (relays, contacts, breakers etc.) are capable to perform their intended design function in the event of a safe shutdown earthquake (SSE) after a number of postulated occurrences of the operating basis earthquake (OBE). The response to this RAI, as a minimum, should include the test response spectra (if applicable), the required response spectra, the method of mounting of equipment to the shake table, and the equipment mounting configuration in service condition. Also, discuss the methodology, the industry codes and standards, the level of earthquake, and the acceptance criteria used for the structural design of the PSW equipment mounting.

RAI 161 [EMCB16]

Discuss the method of seismic qualification of DC batteries associated with the PSW system and the supporting battery rack structure(s). Describe the procedures used to account for possible amplification of vibratory motion through the battery rack structure.

RAI 162 [EMCB17]

Discuss the methodology, the industry codes and standards, the level of earthquake, and the acceptance criteria used for the structural design of the battery rack structure and its anchorages.

June 11, 2012

Mr. Preston Gillespie
Site Vice President
Oconee Nuclear Station
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 THE LICENSE AMENDMENT REQUESTS (LARs) FOR THE LICENSING BASIS FOR THE PROTECTED SERVICE WATER SYSTEM (TAC NOS. ME7737, ME7738, ME7739, ME7746, ME7747, AND ME7748)

Dear Mr. Gillespie:

By letter dated December 16, 2011, as supplemented January 20, March 1, and March 16, 2012, Duke Energy Carolinas, LLC (the licensee), resubmitted LARs for ONS, which propose a licensing basis for the new protected service water system.

The U.S. Nuclear Regulatory Commission (NRC) staff is in the process of reviewing the LARs and has determined that additional information is required in order to complete the review. The RAI is enclosed. Draft RAIs were provided to your staff electronically, and telephone calls between your staff and the NRC staff have occurred to ensure that the right level of detail is provided in the RAI responses. Please provide responses to the RAIs within 30 days of the date of this letter. If you cannot respond within 30 days please provide the reason and a schedule of when you can respond to the RAIs.

If you have any questions, please contact me at 301-415-2901.

Sincerely,

John P. Boska, 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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