

**From:** Guzman, Richard  
**Sent:** Friday, November 22, 2013 1:49 PM  
**To:** Brown, Timothy D  
**Subject:** Oconee Nuclear Station Units 1, 2, and 3 - Request for Additional Information  
- Protected Service Water System

Tim,

As you're aware, draft RAIs were provided to your staff electronically, and we completed two conference calls (11/14 and 11/18) to cover any clarifications needed to ensure that the right level of detail is provided in the RAI responses. Below is the updated list of RAI questions. Note that RAI-188 and 189 were modified based on the clarifications discussed during our call on 11/18. Specifically, the request to provide manual actions was omitted since it is already covered in RAI-175-177. Also, the bullets on inspection/testing and maximum temperature were modified to focus more on design basis rather than the results. There were no other intended changes to the original draft that was sent to Rich Freudenberger on 11/8/13.

Please provide responses to these RAIs within 30 days of the date of this message. If you cannot respond within 30 days please provide the reason and a schedule of when you can provide the supplemental response. This message represents the staff's transmittal of the RAI questions which will be added to ADAMS as the official agency record.

If you have any questions, please call me at 301-415-1030.

Thanks,

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**NRR/DORL**  
**US NRC**  
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REQUEST FOR ADDITIONAL INFORMATION  
LICENSE AMENDMENT REQUEST FOR THE LICENSING BASIS  
FOR THE PROTECTED SERVICE WATER SYSTEM  
DUKE ENERGY CAROLINAS, LLC  
OCONEE NUCLEAR STATION (ONS), 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 on August 7, 2013 (ADAMS Accession No. ML13228A268), Duke Energy Carolinas, LLC (the

licensee), submitted a license amendment request (LAR) for ONS, proposing a 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-172 [EEEB1]**

In response to RAI dated June 28, 2013, page 3, the licensee stated that for the Auxiliary Building, a new Alternate Chilled Water (AWC) system will be installed using portable chillers and permanently installed piping to select air handling units (AHUs). The chillers, AHUs and exhaust fans will be capable of being powered from a new electrical distribution system fed from the PSW switchgear with appropriate distribution centers, motor control centers and transformers.

Provide a brief description including design ratings of all the electrical equipment that are part of the AWC system. Provide a summary of the analysis performed to conclude that electrical system for PSW and its support systems continue to provide adequate capacity and capability (voltage studies, short circuit studies, protective coordination, equipment and bus loadings, etc.) needed to establish and maintain a safe shutdown condition for postulated events. Also describe if adequate margins remain on the PSW electrical system. If revision is necessary to include the AWC system, provide updated figures which were included in the licensee letter dated August 7, 2013, (Figure 9-45, PSW AC Electrical Distribution and Figure 9-46, PSW DC Electrical Distribution).

#### **RAI-173 [EEEB2]**

During the public meeting on October 3, 2013, the licensee mentioned that about 7 components were identified inside the reactor building (components such as solenoid valves, limitorque valves, BIW cables etc.) which could not be analytically shown to operate for the entire 30 days following a loss of containment cooling. Please provide a brief description of the equipment which are part of the environmental qualification (EQ) program and clarify if any of this equipment need to remain qualified in accordance with 10 CFR 50.49. The licensee further stated that existing safety systems and components that interface with the PSW system will retain their qualification in accordance with 10 CFR 50.49. Provide a summary of the licensee's evaluation to demonstrate how this equipment will retain their environmental qualification.

#### **RAI-174 [EEEB3]**

Is the PSW system a safety system? If not, provide technical and regulatory basis to demonstrate that the existing Class 1E onsite power system independence and electrical separation are maintained by the proposed plant modification.

#### **RAI-175 [AHPB1]**

In its response to RAI 170 as provided in letter dated June 28, 2013, the licensee described the use of Air Handling Units as a part of the alternate cooling strategy for maintaining an acceptable temperature for the control complex and the auxiliary building. This strategy credits manual actions. For the identified credited manual actions associated with the operation of AHUs please provide the following information:

- Describe the cue that alerts the operator to take action in a timely manner,
- Describe the operator feedback about whether the action is complete and effective,
- Describe training content, method, and frequency,
- Describe the location and accessibility of required displays and controls,
- List the controlled procedures that guide the operator's actions
- Describe the time available and the time associated with these manual actions
- Describe the validation methods used to justify the manual actions
- Describe the evaluation of environmental considerations including loss of lighting, harsh temperatures, ventilation, path obstruction and occupational dose received

#### **RAI-176 [AHPB2]**

During the presentation given to the NRC staff on October 3, 2013, the licensee described the alternate cooling methods included in the analysis for providing alternative source of power feed from PSW to the a reactor building cooling unit. It was stated that all the electrical operations are manual operations. For the identified credited manual actions associated with these electrical operations please provide the following information:

- Describe the location and accessibility of required displays and controls,
- List the controlled procedures that guide the operator's actions
- Describe the time available and the time associated with these manual actions
- Describe the validation methods used to justify the manual actions

#### **RAI-177 [AHPB3]**

Please identify any remaining credited manual actions and provide detailed information concerning the validation process used to justify these actions and please discuss what, if any, task analysis was done to assess the cognitive load on individuals and crews which will be designated with performing the credited function.

#### **RAI-178 [EMCB1]**

Confirm that the PSW building and the underground electrical duct banks have been designed and constructed in accordance with nuclear safety related (QA Condition 1) requirements of the ONS quality assurance program.

#### **RAI-179 [EMCB2]**

Page 63 of licensee letter dated April 5, 2013, states the following:

All mechanical equipment was requalified for the appropriate in-structure response spectra in OSC-10764 Revision 1. In cases where the capacity did not completely envelope the new in-structure demand response spectra, either an appropriate engineering justification was made, or the equipment was requalified using the new in-structure response spectra.

Discuss and provide further information on seismic qualification of those mechanical components where the capacity of the component did not completely envelope the in-structure response spectra.

#### **RAI-180 [EMCB3]**

Page 65 of licensee letter dated April 5, 2013, states the following:

Seismic analysis of the attachment of electrical equipment uses a static coefficient factor of 1.5 for new designs.

Discuss and provide further information on the methodology used for the design of the PSW mechanical equipment anchorage.

#### **RAI-181 [EMCB4]**

Page 58 of licensee letter dated April 5, 2013, indicates the following:

Qualification by analysis was used for some of the equipment following the methods given in IEEE 344-1975. The 1.5 multimode factor was used as appropriate and justified. Therefore, RG 1.100, Revision 1 exception #1 has been addressed.

Page 65 and 70 of licensee letter dated April 5, 2013, indicates the following:

Seismic analysis of the attachment of electrical equipment uses a static coefficient factor of 1.5 for new designs.

Contrary to the above statements, Page 70 of licensee letter dated April 5, 2013, indicates that static coefficient of 1.0 was used in calculation OSC-9818. Confirm that static coefficient of 1.5 has been appropriately used in seismic qualification of the PSW components, including their anchorage design.

#### **RAI-182 [EMCB5]**

The last paragraph of Section 9.7.3.5.2 (Page 9.7-11) of the UFSAR change package included in the licensee letter dated April 7, 2013, states the following:

The anchorage of PSW related equipment in the ONS AB was designed in accordance with ACI 318-63 (Reference 9) and the AISC Manual of Steel Construction, 13<sup>th</sup> edition, 2006 (Reference 4).

Discuss and provide further information on the manner ACI 318-63 and AISC, 13<sup>th</sup> edition, were used for the anchorage design of the PSW related equipment in the ONS Auxiliary Building.

#### **RAI-183 [EMCB6]**

The UFSAR change package included in the licensee letter dated April 7, 2013, designates the PSW building as a Class 1 structure by adding it to Section 3.2.1.1.1 of the ONS UFSAR. As described in Section 3.2.1.1.1, Class 1 structures are those which prevent uncontrolled release of radioactivity and are designed to withstand all loadings without loss of function. Since the PSW building is not designed for the turbine missile loading, designation of the PSW building as a Class 1 structure appears to be inconsistent with the ONS UFSAR. Discuss this apparent inconsistency and provide further justification for designation of the PSW building as a Class 1 structure.

### **RAI-184 [EMCB7]**

The last paragraph of Section 9.7.3.5.1 (Page 9.7-10) of the UFSAR change package included in the licensee letter dated April 7, 2013, states the following:

The design response spectra for the new structures correspond to the May 1990 El Centro North-South earthquake normalized to a peak ground acceleration of 0.15g for structures founded on structural fill in accordance with the Oconee Nuclear Station current licensing basis.

In addition to a typographical error of 1990 instead of 1940, the above statement is not consistent with the response to RAI-141 in licensee letter dated April 5, 2013, where it is indicated that (1) Figure 2-55 of the ONS UFSAR was used in the design of the PSW building; and (2) for the generation of the in-structure response spectra the 1940 El Centro time history ground motion input normalized to 0.15g was used. Discuss this apparent inconsistency and provide further clarification.

### **RAI-185 [EMCB8]**

Licensee letter dated April 5, 2013, includes broadened in-structure response spectra (ISRS) for the PSW building. These ISRS exhibit sharp valleys and it does not appear they have been smoothed; thus, not satisfying the intent/guidance of Regulatory Guide 1.122. Discuss and provide further information relative to the effects of these non-smoothed ISRS on the design of the PSW components, subsystems and their anchorage.

### **RAI-186 [EMCB9]**

Calculation OSC-10824 has been referenced in the licensee letter dated April 5, 2013, for evaluation of the impact of the new ISRS on seismic qualification of the PSW components.

- a. As noted in the conclusion section of calculation OSC-10824, the NGR frame and the battery chargers required further analysis to demonstrate their seismic qualification. Discuss and provide further information regarding seismic qualification of these components.
- b. On Page 8 of calculation OSC-10824, it is noted that a fuse block was qualified separately. Discuss the method used for seismic qualification of the fuse block and provide further information on consideration of the in-cabinet amplification in the seismic qualification of the fuse block.
- c. On Page 18 of calculation OSC-10824, for evaluation of 13.8kV and 4160V Switchgear, on Page 28 for evaluation of manual disconnect switch, on Page 44 for evaluation of 600V load center, and on Page 49 for evaluation of 5MVA transformer, it is noted that related qualification calculations leverage the peak acceleration level and for all locations at Elevation 797', the peak accelerations have decreased. Discuss and provide further clarification on how the peak acceleration level was leveraged to demonstrate seismic qualification of these components.

### **RAI-187 [EMCB10]**

The licensee indicated that the use of response spectrum anchored at 0.15g (Maximum Hypothetical Earthquake for soil) for the design of the PSW Building is consistent with what was used for the design of the CT4 Block Houses, the only other ONS seismic Category 1 structures founded on the overburden. Discuss and provide further information regarding the variation of the subsurface soil condition at the CT4 Block Houses and the PSW building.

#### **RAI-188 [SBPB1]**

As stated in the LAR, the PSW system is designed as a backup system with capability to achieve and maintain a safe shutdown condition. In order to accomplish this, all components necessary to achieve and maintain safe shutdown via the PSW system must be capable of performing their intended function in the environment associated with their location. This capability should be ensured for the duration of the PSW system mission time.

The response to RAI 170 stated that the proposed Alternate Chilled Water system will provide cooling water and power to existing ventilation equipment, ensuring the auxiliary building environment supports extended operation of the PSW system.

Provide the following additional information regarding the Alternate Chilled Water system:

- Describe the water source for Alternate Chilled Water and the need for makeup during operation;
- Describe the power supply for Alternate Chilled Water;
- Will availability of the Alternate Chilled Water system be monitored under existing plant procedures;
- Describe the major inputs and assumptions for the analyses used to determine the auxiliary building temperature response with PSW and Alternate Chilled Water in service;
- Describe the process used to determine that PSW components are qualified for the expected auxiliary building environment.

#### **RAI-189 [SBPB2]**

The Alternate Chilled Water system is credited to ensure extended operation of the PSW system. Therefore, Alternate Chilled Water should remain functional during any event where the PSW system is credited for mitigation.

Describe how components of the Alternate Chilled Water system are routed or protected such that events crediting PSW for mitigation will not result in unavailability.