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

January 21, 2011

Mr. Paul Freeman
Site Vice President
c/o Mr. Michael O'Keefe
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION RELATED TO THE REVIEW OF THE SEABROOK STATION LICENSE RENEWAL APPLICATION (TAC NO. ME4028)

Dear Mr. Freeman:

By letter dated May 25, 2010, NextEra Energy Seabrook, LLC, submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew Operating License NPF-86 for Seabrook Station, Unit 1, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review.

The request for additional information was discussed with Mr. Rick Cliche, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-1427 or by e-mail at richard.plasse@nrc.gov.

Sincerely,

Richard Plasse, Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure:
As stated

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Seabrook Station
License Renewal Application
Request for Additional Information Set 9

RAI B.2.1.21-2

Background:

The Selective Leaching of Materials Program description in license renewal application (LRA) Section B.2.1.21 states that the applicant's program is a new program that manages the aging effects of loss of material due to selective leaching in components made of gray cast iron and copper alloys (with greater than 15 percent zinc) that are exposed to raw water, brackish water, treated water (including closed cycle cooling), or ground water. LRA Tables 3.4.2-1 and 3.4.2-3 list filter housings and valve bodies made of gray cast iron and copper alloy (greater than 15 percent zinc) that are exposed to the steam (internal) environment and rely on the Selective Leaching of Materials Program to manage loss of material.

Issue:

The environment of steam (internal) is not listed in the program description of B.2.1.21, Selective Leaching of Materials Program. While the staff believes that the inspection methodologies of the aging management program (AMP) will detect selective leaching due to exposure to steam, it is not clear to the staff whether the aging management review (AMR) line items are correct or the AMP description is correct in regard to the steam environment.

Request:

State whether LRA Tables 3.4.2-1 and 3.4.2-3, where steam (internal) is identified as an environment for components made of gray cast iron and copper alloys, are correct, or whether LRA Section B.2.1.21, where steam is not included as an environment for the Selective Leaching of Materials Program, is correct, and revise the LRA accordingly.

RAI B.2.1.21-3

Background:

Exception 1 of LRA Section B.2.1.21, Selective Leaching of Materials Program, states, in part, that the applicant would deploy additional examination methods that become available to the nuclear industry to determine if selective leaching is occurring on the surfaces of components.

Issue:

The staff does not have sufficient details on how the applicant would evaluate any process that might become available. Specifically, how would the applicant establish limitations on use of the process, and how would the process be qualified in order to detect selective leaching of the components. This information is needed for the staff to determine the acceptability of the process.

Request:

State how the new process will be evaluated and qualified in order to be able to detect selective leaching of material on the surfaces in components made of gray cast iron and copper alloys (greater than 15 percent zinc) exposed to environments of interest.

RAI 3.3.1.61-1

Background:

LRA Table 3.3.1, item 3.3.1-61, addresses elastomer fire barrier penetration seals exposed to air-outdoor or air-indoor uncontrolled which are being managed for increased hardness, shrinkage, and loss of strength due to weathering. The GALL Report recommends AMP XI.M26, "Fire Protection Program," to ensure that these aging effects are adequately managed for fire barrier elastomer seals. The associated AMR line items cite generic note A when they are managed by the Fire Protection Program and generic note E when they are managed by the Structures Monitoring Program. The components which cite generic note E and do not have a corresponding line item being managed by the Fire Protection Program are not fire barriers, but other types of elastomer seals, such as pressure or flood barriers.

Issue:

The staff noted that non-fire barrier elastomer seals may be constructed of materials that are subject to hardening and loss of strength due to exposure to ultraviolet light, radiation, or ozone. The staff also noted that if these elastomer seals are subject to hardening and loss of strength and exposed to ultraviolet light, radiation, or ozone, tactile examination techniques, such as scratching, bending, folding, stretching or pressing, should be performed in conjunction with visual examinations to manage the effects of aging. The applicant's Structures Monitoring Program does not include tactile examination techniques.

Request:

1) State whether the non-fire barrier elastomer seals being managed for aging by the Structures Monitoring Program are subject to hardening and loss of strength due to exposure to ultraviolet light, radiation, or ozone; and

2) If the materials are subject to hardening and loss of strength and exposed to these aging effects, state how the Structures Monitoring Program is adequate to manage aging for these components.

RAI 3.3.2.2.1-1

Background:

LRA Sections 3.2.2.2.1 and 3.3.2.2.1 address the applicant's AMR for managing cumulative fatigue damage in engineered safety features (ESF) systems and auxiliary (AUX) systems, respectively. The staff noted that these systems were analyzed to applicable fatigue analysis criteria in the ASME Code Section III for ASME Code Class 2 or 3 components, or in the ANSI B31.1 Code for ANSI B31.1 components (non-ASME Code Class 1 components). The time-limited aging analysis (TLAA) for non-ASME Code Class 1 components is documented in LRA Section 4.3.7 and the TLAA for crane load cycle limits is documented in LRA Section 4.7.6.

The GALL Report includes the following AMR items on management of cumulative fatigue damage in PWR ESF and AUX subsystems.

- AMR item 1 in Table 2 of GALL Report, Volume 1, references GALL AMR item V.D1-27, for management of cumulative fatigue damage in the piping, piping components and piping elements of the emergency core cooling systems.
- AMR item 1 in Table 3 of GALL Report, Volume 1, references GALL AMR item VII.B-2, for management of cumulative fatigue damage in steel cranes structural girders.

Issue:

LRA Section 4.3.7 describes fatigue-related TLAAs arising within design analyses of the Non-Class 1 piping and components. The staff noted that the AMR items associated with LRA Table 3.2.1, item 3.2.1-1, and LRA Table 3.3.1, item 3.3.1-1, are included in the LRA, however the Non-Class 1 piping and components for residual heat removal (RHR) and safety injection (SI) systems are not listed in the LRA Tables 3.2.2-3 and 3.2.2-4, respectively. Furthermore, the staff noted that those AMR line items in LRA Tables 3.2.2-3 and 3.2.2-4 that identify cumulative fatigue damage and reference a TLAA, are Class 1 components.

Similarly, LRA Section 4.7.6 states that evaluation of load cycles over the design life of the polar gantry and cask-handling cranes is the basis of a safety determination and is, therefore, a TLAA. The staff noted that AMR line items associated with steel crane girders reference LRA Table 3.3.1, item 3.3.1-1. Furthermore, only LRA Table 3.5.2-3 discusses AMR line items for fuel handling and overhead cranes. However, LRA Table 3.5.2-3 does not include any AMR lines items that are associated with metal fatigue TLAA of steel cranes structural girders or specifically reference LRA Table 3.3.1, item 3.3.1-1. The staff noted that LRA Sections 3.2.2.2.1 and 3.3.2.2.1 state that fatigue TLAA are required to be evaluated in accordance with 10 CFR 54.21(c), but the LRA does not include any AMR items associated with LRA Table 3.2.1, item 3.2.1-1, and LRA Table 3.3.1, item 3.3.1-1, in LRA Tables 3.2.2-3, 3.2.2-4 and 3.5.2-3.

Request:

Include the following in the LRA:

1) In LRA Table 3.2.2-3 for RHR system and LRA Table 3.2.2-4 for SI system, all AMR items related to a TLAA for managing cumulative fatigue damage in non-Class 1 components in the RHR and SI systems.

2) In LRA Table 3.5.2-3 for Fuel Handling and Overhead Cranes, all AMR items related to a TLAA for managing cumulative fatigue damage in the steel cranes structural girders.

Or provide the basis for excluding these AMR line items from the LRA.

RAI 3.3.2.2.1-2

Background:

LRA Sections 3.2.2.2.1 and 3.3.2.2.1 address the applicant's AMR for managing cumulative fatigue damage in engineered safety features (ESF) systems and auxiliary (AUX) systems, respectively. The staff noted that these systems were analyzed to applicable fatigue analysis criteria in the ASME Code Section III for ASME Code Class 2 or 3 components or in the ANSI B31.1 Code for ANSI B31.1 components (non-ASME Code Class 1 components).

The GALL Report includes the following AMR items on management of cumulative fatigue damage in PWR ESF and AUX subsystems:

- AMR item 1 in Table 2 of GALL Report, Volume 1
- AMR item 1 and 2 in Table 3 of GALL Report, Volume 1

LRA Sections 3.2.2.2.1 and 3.3.2.2.1 state that fatigue TLAAs are required to be evaluated in accordance with 10 CFR 54.21(c), however as discussed in RAI 3.3.2.2.1-1, the LRA Section 3.x.2 tables do not include AMR line items associated with items 3.2.1-1 and 3.3.1-1 for management of cumulative fatigue damage in PWR ESF and AUX subsystems.

Issue:

LRA Table 3.2.2-3 includes three AMR line items and LRA Table 3.2.2-4 includes five AMR line items associated with LRA Table 3.1.1, item 3.1.1-8, associated with TLAAs of piping and fittings (Class 1, Class 1 including <4 inch), valve body (Class 1) and orifice (Class 1). Also, LRA Table 3.3.2-3 includes two AMR line items associated with LRA Table 3.1.1, item 3.1.1-8, associated with TLAAs of valve body (Class 1) and piping and fittings (Class 1 including <4 inches).

LRA Section 4.3.7 states that the chemical volume control system (CVCS), RHR, and SI system components were designed in accordance with ASME Section III Class 2 and 3 requirements. It is not clear to the staff which piping and piping components are represented in these rows in LRA Tables 3.2.2-3, 3.2.2-4, and 3.3.2-3.

The staff further noted that GALL Report Section V.D1, "Emergency Core Cooling System (PWR)," states that portions of the RHR, and high-pressure and low-pressure SI systems extending from the reactor coolant system up to and including the second containment isolation valve associated with the primary coolant pressure boundary are governed by Regulatory Guide 1.26 Group A Quality Standards and covered in Section IV.C2 of the GALL Report. The LRA does not clarify whether the AMR items (3.1.1-8) in LRA Tables 3.3.2-3, 3.2.2-3, and 3.2.2-4 represent the portions of the CVCS, RHR, and SI systems, respectively, that are located inside the reactor containment.

Request:

1) Clarify which portions of the CVCS, RHR, and SI systems are represented by AMR items 3.1.1-8 in LRA Table 3.3.2-3 for the CVCS and LRA Tables 3.2.2-3 and 3.3.2-4 for RHR and SI systems.

2) Since LRA Table 3.1.1, item 3.1.1-8, represents Class 1 components, and the CVCS, RHR, and SI system components were designed to Class 2 and 3 requirements as discussed in LRA Section 4.3.7, (i) clarify the inconsistency between these two sections in the LRA and (ii) identify the TLAA, in LRA Section 4, for the metal fatigue analysis for these Class 1 components represented by these AMR items.

RAI 3.4.2.2-2

Background:

In LRA Table 3.4.1, items 3.4.1-8 and 3.4.1-31, the applicant stated that fouling is not an aging mechanism leading to loss of material in steel piping, piping components, piping elements, and heat exchanger components exposed to raw water because the raw water is associated with potable water from the town of Seabrook. The staff noted that the water from the town of Seabrook is extracted from wells and is chlorinated with sodium hypochlorite or calcium hypochlorite and, in wells with high iron and manganese, treated with polyphosphate to reduce plumbing fixture staining (Seabrook Water Department, "2009 Annual Report to Consumers on Water Quality"). The GALL Report Section IX.F states that fouling can occur due to biological activity and the deposition of sediment, silt, dust, and corrosion products.

Issue:

The staff noted that the water from the town of Seabrook used in the auxiliary steam condensate and auxiliary steam heating systems is not chemistry controlled on-site to ensure that the levels of additives are sufficient to prevent biological activity and deposition of iron and manganese mineral deposits. The staff also noted that the town of Seabrook does not guarantee the levels of water constituents at the present or during the period of the applicant's extended operation. The staff further noted that fouling by the deposition of sediment, silt, dust, and corrosion products is not precluded by the use of potable water.

Request:

State why the use of potable water from the town of Seabrook excludes fouling as an aging mechanism.

RAI 3.5.2.2.1.7-1

Background:

LRA Section 3.5.2.2.1.7, which is associated with LRA Table 3.5.1, item 3.5.1-10, addresses cracking due to stress corrosion cracking in stainless steel penetration sleeves, penetration bellows, and dissimilar metal welds. The applicant stated that its AMR results concluded that cracking due to stress corrosion cracking is not an aging effect requiring management for these components because both high temperature (>140 °F) and an aggressive environment, which are needed for stress corrosion cracking to initiate, are not simultaneously present for any of the components. The applicant also stated that reviews of plant-specific operating experience did not identify any stress corrosion cracking of these components.

In contrast, LRA Table 3.5.2-2 for containment structures indicates that stainless steel penetration components and bellows (mechanical penetration flued heads, electrical penetration assembly, fuel transfer tube bellows, and stainless steel shielding) are exposed to air-indoor uncontrolled and are subject to cracking due to stress corrosion cracking. LRA Table 3.5.2-2 also indicates that the applicant proposes the ASME Section XI, Subsection IWE Program to manage the aging effect for these components. In comparison, GALL Report Vol. 2, item II.A3-2 recommends the ASME Section XI, Subsection IWE Program, 10 CFR Part 50, Appendix J Program and augmented inspection to detect and manage the aging effect. The staff further noted that LRA Table 3.5.2-2 contains line items indicating that air with borated water leakage is an applicable environment for the stainless steel components.

Issue:

The staff noted that the applicant's AMR results described in LRA Table 3.5.2-2 are in conflict with the applicant's claim described in LRA Section 3.5.2.2.1.7 and LRA Table 3.5.1, item 3.5.1-10, that cracking due to stress corrosion cracking is not applicable for the stainless steel penetration components and bellows. The staff also found a need to further clarify whether the plant-specific environment of air with borated water leakage is conducive to stress corrosion cracking and whether the applicant's proposed program is adequate to detect and manage the aging effect.

Request:

1) Provide the technical basis for claiming that an aggressive environment that could contribute to stress corrosion cracking is not present for the stainless steel penetration components and bellows. As part of the response, provide the plant-specific operating experience of the borated water leaks including the leakage source, time periods of the water leaks and corrective actions. In addition, clarify whether the air with borated water leakage environment is conducive to stress corrosion cracking of the components taking

into account the potential for leaked water contamination at the component surface as described in LRA Table 3.0-2.

2) Resolve the conflict between the AMR results described in LRA Section 3.5.2.2.1.7 and LRA Table 3.5.2-2 and clarify whether cracking due to stress corrosion cracking is applicable for the stainless steel penetration components and bellows.

3) If cracking due to stress corrosion cracking is applicable for the stainless steel penetration components or bellows as described in LRA Table 3.5.2-2, justify why the AMSE Section XI, Subsection IWE Program alone, without the 10 CFR Part 50, Appendix J Program and augmented inspection recommended in the GALL Report, is adequate to detect and manage the aging effect.

RAI 4.7.5-1

Background:

1) In LRA Section 4.7.5, the applicant stated that the fatigue analysis for the design of the 3 fuel transfer tube bellows is based on the consideration of 20 occurrences of the Operating Basis Earthquake (OBE).

   The applicant's UFSAR Section 3.8 states that the bellows were designed to withstand the following conditions:

   - 400 OBE cycles
   - 1 accident cycle (LOCA)
   - 160 pressure test cycles
   - 1000 temperature cycles

2) In LRA Appendix A, Section A.2.4.5.4, the applicant states that the fatigue analysis for each of the 3 bellows is based on the consideration of 20 occurrences of the OBE, each occurrence having 20 cycles of maximum response. The applicant further states that it is projected that 1 OBE would occur in 60 years of operation but further states that the number of occurrences projected for 60 years is below the design limit of 5 occurrences of 10 cycles.

Issue:

1) The staff compared the original design cycles listed in the UFSAR to the ones listed in the LRA Section 4.7.5 and is concerned that the LRA only includes fatigue analysis for OBE cycles and does not address the 1 accident cycle, 160 pressure test cycles, and 1000 temperature cycles that were included in the original fatigue design of the fuel transfer tube bellows.

2) The staff reviewed Appendix A of the LRA and is unclear as to the number of OBE design cycles included in the fuel transfer tube bellows design. LRA Appendix A states that the applicant included 20 occurrences of the OBE at 20 cycles each and then

subsequently states that the design limit of 5 occurrences of 10 cycles. The staff reviewed the applicant's UFSAR and could not find information to confirm that the applicant used a design limit of 5 OBE occurrences at 10 cycles.

Request:

In order to complete its review, the staff needs the following information:

1) Provide information to show that all considerations included in the original fatigue design are addressed for the period of extended operation.

2) Verify the number of OBE cycles used for the fatigue analysis of the fuel transfer tube bellows design and resolve discrepancy between the UFSAR and the LRA with regard to number of OBE occurrences used in the original fatigue analysis.

RAI 3.3.1.46-1

Background:

LRA Table 3.3.1, item 3.3.1-46, addresses stress corrosion cracking of stainless steel piping, piping components, piping elements, and heat exchangers exposed to closed-cycle cooling water at greater than 60 °C (140 °F). The LRA states that this line item is not used and LRA Table 3.3.2-29 does not show any other line item that addresses stress corrosion cracking for the stainless steel components in the primary component cooling water system. UFSAR Table 9.2-7 indicates that the stainless steel thermal barrier loop heat exchangers, which are included in the primary component cooling water system, have inlet temperatures of 80 °C (176.1 °F), creating the potential for stress corrosion cracking.

Issue:

Current licensing basis information indicates that stainless steel components in the primary component cooling water system, specifically in the thermal barrier loop, may be subjected to closed cycle cooling water at temperatures greater than 60 °C (140 °F). However, the LRA neither addresses the potential for stress corrosion cracking of stainless steel components in the above system, nor provides sufficient information to justify the lack of potential.

Request:

Provide information to demonstrate that stainless steel components in the primary cooling water system, including the thermal barrier cooling water system, are not exposed to closed cycle cooling water greater than 60 °C (140 °F), or provide information to demonstrate that there is no need to manage stress corrosion cracking of these components.

RAI B.2.1.12-7

Background:

The GALL AMP XI.M21 states that the Closed-Cycle Cooling Water System Program includes activities to minimize and monitor corrosion. In addition, SRP-LR item 3.3.1-49 addresses loss of material due to microbiologically influenced corrosion for stainless steel heat exchanger components exposed to closed cycle cooling water. LRA Section B.2.1.12 cites ERPI 1007820, which states, "Microbiologically Influenced or Induced Corrosion is one of the main problems in closed cooling water systems." LRA Section B.2.1.12 also describes the Closed Cycle Cooling Water System Program as managing loss of material due to general, crevice, pitting and galvanic corrosion, but does not include microbiologically influenced corrosion.

Issue:

It is not clear if the Closed-Cycle Cooling Water System Program manages aging from microbiologically influenced corrosion.

Request:

Clarify whether the Closed-Cycle Cooling Water System Program manages microbiologically influenced corrosion in the closed cycle cooling water systems, and either provide the bases for not needing to include this or the technical background on the 1) preventive actions, 2) parameters monitored, and 3) inspection techniques being conducted.

January 21, 2011

Mr. Paul Freeman
Site Vice President
c/o Mr. Michael O'Keefe
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

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Dear Mr. Freeman:

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Sincerely,
/RA/

Richard Plasse, Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure:
As stated

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Letter to Paul Freeman from Richard Plasse dated January 21, 2011

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