From: Scott Wall
Sent: Monday, May 1, 2023 4:54 PM
To: Schultz, Eric
Cc: Phillabaum, Jerry; Mack, Jarrett; Mack, Jarrett
Subject: FINAL RAI - Point Beach 1 & 2 - License Amendment Request Regarding Risk-Informed Approach to Address GSI-191 (EPID L-2022-LLA-0106)

Dear Mr. Schultz,

By letter dated July 29, 2022 (Agencywide Documents Access and Management System Accession No. ML22210A086), NextEra Energy Point Beach, LLC (NextEra, the licensee) submitted license amendment and exemption requests for Point Beach Nuclear Plant, Units 1 and 2 (Point Beach).

The amendment would revise the licensing basis described in the Point Beach Updated Final Safety Analysis Report (UFSAR) to include a risk-informed method of evaluating the effects of loss of cooling accident (LOCA) generated debris on long-term core cooling (LTCC). The requested exemption would allow the use of risk-informed methods to evaluate the LTCC effects of debris generation resulting from a postulated LOCA in order to address the safety issues described in Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors." The proposed license amendments and exemption requests are part of NextEra's final resolution to Generic Safety Issue (GSI-191), "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump and Performance," and for responding to GL 2004-02.

The NRC staff has reviewed the submittals and determined that additional information is needed to complete its review. The specific questions are found in the enclosed request for additional information (RAI). On April 28, 2023, the NextEra staff indicated that a response to the RAIs would be provided by June 16, 2023.

If you have questions, please contact me at 301-415-2855 or via e-mail at Scott.Wall@nrc.gov.

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Docket Nos. 50-266 and 50-301

Enclosure:
Request for Additional Information

cc: Listserv

RAI (GSI-191)

REQUEST FOR ADDITIONAL INFORMATION

LICENSE AMENDMENT REQUEST REGARDING RISK-INFORMED APPROACH

FOR CLOSURE OF GENERIC SAFETY ISSUE-191

NEXTERA ENERGY POINT BEACH, LLC

POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

DOCKET NOS. 50-266 AND 50-301

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The NRC staff determined that the following information is needed to complete its review.

Technical Specifications Branch (STSB) Questions

STSB-RAI-1 (Audit Question STSB-1)

Page E1-10 discusses the request for exemption. The reference to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.46(a)(2)(ii) may require additional explanation. The referenced regulation is required for the short-term analysis, but not the long-term analysis.

STSB-RAI-2 (Audit Question STSB-3)

Define what is meant by “first isolation valve” throughout the submittal.

STSB-RAI-3 (Audit Question STSB-4)

Figure 3.a.1-1 does not show any postulated breaks on the reactor nozzles or elsewhere on the main reactor coolant system (RCS) loops near the reactor. It is also not clear whether any breaks were postulated on the safety injection tank (SIT) or emergency core cooling system (ECCS) injection lines. Verify that all welds that are within the first isolation valve are considered as potential break locations.

STSB-RAI-4 (Audit Question STSB-13)

Discuss Table 3.e.6-26, “Definition of Debris Groups.” Describe the quantities included in the last 3 rows (include densities, volumes, and masses), and reasons for coating particulates to be aggregated with chips and latent particulates. Describe how the debris types are related and compared to debris types used in strainer testing (dirt, silica, chips, and pressure washed chips). Refer to Table 3.f.5-1 at the test scale, and Table A.8-1, “PBNP Sump Strainer Debris Limits.”

STSB-RAI-5 (Audit Question STSB-18)

Discuss how temperature scaling is implemented for the headlosses applied in NARWHAL.

STSB-RAI-6 (Audit Question STSB-19)

Discuss how the scaling factors discussed starting on page E3-97 are developed and implemented.

- What temperature is used to determine the viscosity and density in the equation?
- Were all of the data in Table 3.f.10-3 corrected to the same temperature for the analysis?
- How are data points like the first and last used when developing the correlation? The first point is a higher headloss than the last, but its flow is lower and temperature higher than the last point. This is not expected. The value just above Table 3.f.10-4 is listed at 2.59 ft, but the value is actually 2.64 ft in Table 3.f.10-1.
- The sentence just above Table 3.f.10-4 refers to Table 3.f.10-10. Should it refer to Table 3.f.10-4 instead?

STSB-RAI-7 (Audit Question STSB-21)

Confirm that the minimum SI curve is conservative compared to the maximum safety injection (SI) curve for the purpose of determining margin to flashing and crediting some containment accident pressure (CAP) to suppress flashing (page E3-102). On page E3-107 it is stated that the minimum SI curve results in a higher temperature, so it is conservative. However, there is time dependency with respect to sump temperature and containment pressure for various containment response cases that should be considered. For example, the maximum SI curve should reduce containment pressure faster than a minimum SI case. The sump temperature generally lags the containment pressure, so there may be times that the maximum case has less subcooling.

STSB-RAI-8 (Audit Question STSB-22)

For the flashing evaluation discussed in section 3.f.14, discuss whether clean strainer headloss included in the differential pressure.

STSB-RAI-9 (Audit Question STSB-26)

Clarify whether the strainers consist of 11 or 14 strainer modules. See pages E3-129 and 131 as well as the layout drawings.

STSB-RAI-10 (Audit Question STSB-27)

For Item 7 on page E3-168, explain the statement that the fiber transported by the RHR pump reaches the reactor. The staff is under the impression that the RHR pump also feeds the containment spray (CS) pump so that some of the fiber transported by the RHR pump would be returned to the sump. For a zero CSS case, which is shown to be limiting in Table 3.n.1-2, the statement would be true.

STSB-RAI-11 (Audit Question STSB-30 rev 1)

Table 1-1 on page E4-66 provides strainer debris limits for various debris types. Discuss whether these limits are for single or dual train operation. It appears that the particulate debris types are based on single train operation. This is not clear for the fibrous debris types. Should limits for chemical precipitates be included in the table? Discuss the basis for the acceptability of these values if they are not all for single train operation.

Describe how the quantity of other chemical contributors (especially aluminum) in containment are tracked. Describe what actions would be taken if previously unidentified material is discovered or the quantity of material exceeds that assumed in the risk-informed analysis.

STSB-RAI-12 (Audit Question STSB-31)

Similar to the question regarding single and dual train operation for table 1-1, discuss the assumption for Tables 1-2 and 1-3 on page E4-67.

STSB-RAI-13 (Audit Question STSB-34)

Provide details on the empirical fiber penetration and shedding model so that the NRC staff can perform confirmatory calculations for the in-vessel fiber analysis. Include equations for fiber penetration and shedding, parameters, water flow rates, pool volume initial fiber amounts, and information on dependence of results on time stepping. Provide a description of how the bounding input fiber mass used in the calculations was determined.

<u>Probabilistic Risk Assessment Licensing Branch B (APLB) Audit Questions</u>

APLB-RAI-1 (Audit Question APLB-3 rev 1)

On page E4-38 the submittal states that the risk contribution of primary LOCAs and SSBIs are not aggregated because it does not provide a realistic picture of risk. Provide an argument to conclude that the risk of SSBIs is significantly smaller than the risk of primary side breaks. The argument could be quantitative and/or qualitative and use information from previous Generic Letter 2004-02 submittals.

APLB-RAI-2 (Audit Question APLB-4 rev 1)

Provide a traceable reference of the LOCA break frequencies in Table 3-1 of Enclosure 4.

Structural, Civil, Geotech Engineering Branch (ESEB) Audit Questions

ESEB-RAI-1 (Audit Question ESEB-2)

On page E3-134, the total debris load per module is stated to be 100 lbm per module. The NRC staff takes this to imply that the assumed total strainer debris amount for the structural analysis is 1400 lbm since each strainer train has 14 modules. On page E3-67 and 68 (Tables 3.e.6-28 and 30) the worst debris quantities that don't fail any acceptance criteria are tabulated. It appears that these debris amounts would result in a total debris load of more than 1400 lb.

Clarify if 1400 lbm is the limiting debris load on the strainer. If it is not the limiting debris load, update the structural analysis to account for the limiting debris load, or explain why it is unnecessary to update the analysis. Update the associated response in item 3.k to address any changes in the structural analysis. Update any other responses or evaluations that may be impacted by the change in the structural analysis.

Corrosion and Steam Generator Branch (NCSG) Audit Questions

NCSG-RAI-1 (Audit Question NCSG-2 rev 1)

Page E3-171 states that plant specific inputs, including containment spray times, were selected to maximize the generated amount of precipitates. The maximum spray pH (10.5) was used to determine the aluminum release.

(a) Discuss the spray duration used in the aluminum generation NARWHAL calculations relative to the operating procedures for securing containment spray.

(b) Discuss the spray pH as a function of time relative to the 10.5 pH value assumed in the base case calculation.

On February 14, 2023, a teleconference call was held between the NRC staff and NextEra staff as part of a regulatory audit. Items (c) and (d) below, pertain to discussions conducted during this call:

(c) The response to Item (a) states that parametric uncertainty cases were performed with maximum refueling water storage tank (RWST) injection, safety injection (SI), residual heat removal (RHR), and containment spray (CS) pump flow rates for injection from the RWST, with minimum and maximum initial RWST mass. Please evaluate the effects of a CS pump trip relative to the duration of CS injection phase, spray pH, and if there are any additional scenarios or pump configurations affecting precipitate amounts that would change the risk quantification.

(d) The response to Item (b) states that an error to the inputs to the NARWHAL analysis was discovered. The CS injection phase pH (10.5) was applied up to 23.8 minutes after the start of the accident, when the RHR pumps switch to recirculation. The base case holds the pH constant at 10.5 for 64.1 minutes, until the CS recirculation begins. Please provide the results from a sensitivity case to evaluate the effect of longer periods of higher pH injection to precipitate amounts and to the total risk.

NCSG-RAI-2 (Audit Question NCSG-3)

Table 3.o.2.3-1 provides the sump and recirculation spray pH (9.5) used to determine aluminum release rates and the sump pH (8.25) used to determine aluminum solubility. Page E3-173 states that the impact by sump pH was shown in two parametric sensitivity cases using a lower pH range (8.25 decreasing to 7) and a higher pH range (10 decreasing to 8.75). These sensitivity cases showed insignificant effect on the risk quantification results.

a. Describe how the pH is lowered as a function of time to account for acids generated by radiolysis, as applied in the solubility equation. Is the pH adjustment for radiolysis treated the same way for all breaks?
b. Table 3.o.2.7.ii-2 provides a summary of precipitate quantities and precipitation temperatures from bounding hand calculations. This table shows the precipitation temperatures for the lower pH scenario (8.25 decreasing to 7) are approximately 40-50°F higher than for the NARWHAL base case pH (9.5 decreasing to 8.25). Please discuss why (e.g., sufficient NPSH margin) the higher precipitation temperatures have no significant effect on the risk quantification.

c. Was Equation 3.o.2.9-1 used for the parametric sensitivity using the higher pH range (10 decreasing to 8.75)? The NRC staff notes that the WCAP-17788-P Volume 5 precipitation boundary function was determined to be more appropriate for determining aluminum solubility at higher pH values. This is shown in proprietary Figure RAI-5.12-12 in Attachment 1 to LTR-SEE-17-62 dated May 23, 2017 (ML17293A220).

NCSG-RAI-3 (Audit Question NCSG-4 rev 1)

(a) Describe the aluminum release rate (relative to metallic aluminum) from aluminum-based coatings, including breaks in the reactor compartment.

On February 14, 2023, a teleconference call was held between the NRC staff and NextEra staff as part of a regulatory audit. Item (b) below, pertains to discussions conducted during this call:

(b) The response to Item (a) states that the aluminum coating debris surface area is calculated by NARWHAL for each break using a surface to mass ratio of 120 ft^2/lbm (feet squared per pound mass). Provide the results of a sensitivity study for the effects of aluminum coating debris surface area on the risk quantification.

<u>Piping and Head Penetrations Branch (NPHP) Audit Questions</u>

NPHP-RAI-1 (Audit Question NPHP-1)

The submittal stated that a program plan was developed to manage the risk of Primary Water Stress Corrosion Cracking (PWSCC) degradation in Alloy 600 components and Alloy 82/182 welds. Clarify whether any of the welds/components been mitigated with Alloy 52/152 inlays/onlays. If mitigation used another technique, identify the technique. Provide a list of the components and welds that have been mitigated with 52/152 welds. Provide a list of components that have been manufactured/fabricated with Alloy 600 base material, and piping that is welded with Alloy 82/182 welds. In addition, provide the ASME Examination category of the welds (i.e., Section XI Examination Category B-F, etc.).

NPHP-RAI-2 (Audit Question NPHP-2)

The submittal states that the RCS leak detection program is capable of early identification of RCS leakage to allow time for appropriate operator action to identify and address RCS leakage. Provide a description of how the leak detection system complies with Regulatory Guide 1.45, Revision 1, “Guidance on Monitoring and Responding to Reactor Coolant System Leakage” (ML073200271).

NPHP-RAI-3 (Audit Question NPHP-3)

The LAR states that the ISI program plan addresses examination and tests required by ASME Section XI and licensee augmented ISI commitments. Identify other inspections (i.e., walkdowns etc.) that are performed outside of the requirements of Section XI.

NPHP-RAI-4 (Audit Question NPHP-4)

The LAR states that a program plan was developed to manage the risk of PWSCC degradation in Alloy 600 components and Alloy 82/182 welds. The submittal further states that the plan is in accordance with ASME Code Cases N-722-2 and N-770-2 and identifies all Alloy 600/82/182 locations and ranks the locations based on their risks of developing PWSCC. Additionally, the plan provides inspection requirements, and presents mitigation/replacement options. Provide the program plan for NRC review.

Document Requests

Request the following documents that were reviewed by the NRC staff, during the regulatory audit, be provided on the docket:

- NP 7.7.31 “Alloy 600 Management Program”
- OI-55, “Primary Leak Rate Calculation”
- NP 7.7.22 “Service Water Inspection Program”

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