UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
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KING OF PRUSSIA, PENNSYLVANIA 19406-2713

October 7, 2021

Ms. Natalie H. Treat
Executive Director
C-10 Research and Education Foundation
11 Chestnut Street
Amesbury, MA 01913

Dear Ms. Treat:

On behalf of the U.S. Nuclear Regulatory Commission (NRC), I am responding to your memorandum and email to the Seabrook Senior Resident Inspector on August 26 and September 1, 2021, respectively, in which you requested responses to several questions and concerns regarding the second quarter 2021 integrated inspection report (ADAMS Accession Number ML21222A126) specific to our reviews of alkali-silica reaction (ASR) at Seabrook Station, Unit No. 1 (Seabrook). Responses to the specific questions are enclosed.

Sincerely,

Brice A. Bickett

Digitally signed by Brice A. Bickett
Date: 2021.10.07 14:04:29 -04'00'

Brice A. Bickett, Chief
Reactor Projects Branch 3
Division of Operating Reactor Safety

Enclosure:
As stated

Letter to N. Treat from B. Bickett dated October 7, 2021

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X SUNSI Review		X Non-Sensitive ☐ Sensitive		X Publicly Available ☐ Non-Publicly Available	
OFFICE	RI/ORA	RI/DORS	RI/DORS		
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U.S. Nuclear Regulatory Commission
Response to Questions in the August 26, 2021 memorandum and September 1, 2021 email

Q1: Why were neither the increased loads nor the impact on the affected structural elements determined for the current period ending June 30, 2021?

Q2A: Why did the NextEra staff fail to compute new limits reflecting sufficient margin to ensure the structures would remain capable of performing their intended safety functions through to the next inspection period of December 31, 2021?

In response to both questions, while the NRC inspectors have preliminary views on the organizational performance aspects, it is important NextEra fully understands the causes to enable appropriate corrective actions. Consistent with guidance in NRC Inspection Procedure 71152, "Problem Identification and Resolution (PIR)," the inspectors verified NextEra staff entered this problem into their corrective action process to determine the causes and correct the problem. The inspectors plan to review NextEra's performance, including their evaluation as to why this problem occurred and corrective actions in this area, under the Reactor Oversight Program (ROP) baseline inspection program.

Q2B: Was Form EN-AA-203-1001-F01, related to NextEra Procedure EN-AA-203-1001 "Operability Determinations/Functionality Assessments," as well as the guidance in Attachments 4 and 5 and Sections 6.C and 6.E, completed for this inspection period? What information did NextEra staff complete on this Form?

The NRC inspectors' review determined this form was completed including sections 6.C and 6.E for the structures affected by ASR; however, while the discussions described evaluation results, monitoring activities and modification plans, there were no conclusions based on trend data to support structural capability to the next planned examination. This was determined to be a performance deficiency and was assessed as a finding in this NRC inspection report.

Q3A: Since these structures remain out of design basis and ASR is progressive and irreversible, please provide the specific details of the existing and proposed long-term corrective action plans that will restore these structures so that they comply with the current license and design basis.

NextEra is required to restore conformance with their licensing basis in a timely manner and ensure that the affected structures remain capable of performing their safety function via their operability process. Our inspections determined that NextEra staff is developing plans to remediate the affected structures onsite and has initiated its work planning process to carry out such modifications. Due to the nature of the work, it is expected to take several years to fully plan and complete the modifications on the affected structures. NextEra is required to comply with compensatory measures identified in their operability determinations, including increased monitoring until the analysis and modifications are complete and the buildings conform with the licensing basis. The inspectors will review these modifications on a sampling basis under the ROP baseline inspection program.

Corrective actions such as reanalysis and structural modification have been successfully completed on other Seabrook structures as described in NRC inspection reports dated May 15, 2017 (ML17136A074), May 14, 2018 (ML18134A222), and August 11, 2021 (ML21222A126).

Q3B: When the "highest linear rate of expansion" was noted, did NextEra's staff consider inspecting other critical structures including Tier 2 structures? If not, why not?

NextEra staff entered this problem into its corrective action program. At the end of our inspection, NextEra was considering the appropriate corrective actions to take and the extent of those actions. As part of planned baseline inspection under the ROP, our inspectors will review the adequacy of NextEra's performance to resolve this problem, including the scope of corrective actions and extent of condition to address those structural elements addressed in their Prompt Operability Determination (POD).

Q3C: Specifically, which other critical structures at Seabrook continue to fall into the "out-of-design-basis" category?

As documented in the inspection report, there are seven structures evaluated in NextEra's POD under AR 02276197 with specific structural elements that will require additional analysis or physical modification to conform with the current licensing and design basis. These structures are the Primary Auxiliary Building, Mechanical Penetration Area, Control and Diesel Generator Building, Service Water Cooling Tower, Emergency Feedwater Pump Building, Residual Heat Removal (RHR) Vaults, and Containment Enclosure Building.

Q3D: Has the Containment Enclosure Building (CEB) been inspected and the related ASR load and margins calculated every 6 months, or more frequently, if required? Please provide the calculations.

The NRC inspectors did not select the Containment Enclosure Building for detailed review as part of NextEra's POD. The inspectors completed a maintenance effectiveness sample in accordance with NRC Inspection Procedure 71111.12, "Maintenance Effectiveness" that was documented in our inspection report regarding NextEra's performance to implement their structures monitoring program. We did not identify instances of missed examinations based on our plant walkdowns, review of monitoring program documents, or interviews with NextEra staff.

Since the calculations were not required to be formally submitted to the NRC, we do not maintain possession of them after the inspection. NextEra maintains its calculations and is required to make them available to NRC inspectors, if needed.

Q4A: Although samples of inspections were reviewed and inspectors found "no significant deficiencies with the implementation," what, if any deficiencies were noted in the sample inspection results?

Several observations were made during the review of NextEra's implementation of the license conditions imposed through the ASLB process. None of the identified discrepancies had an impact on the completion of actions required to show compliance with the license conditions. Examples included improvements to wording, grammatical issues, and inconsistencies between procedures.

Q4B: Based on inspectors' requirements, what date is scheduled for the monitoring, application of additional qualitative criteria and additional measurement techniques to be applied to the rebar in affected structures?

NextEra staff entered the NRC's observations into its corrective action program and planned to document its monitoring actions, some of which were already initiated or being conducted as part of the license condition. At the conclusion of the inspection, the NRC inspectors noted the dates for implementation of additional measurement techniques were not yet finalized. These observations and corrective action program entries are subject to future inspection via ROP baseline inspections.

Q4C: Please explain how the lack of documentation, application, and implementation by the licensee is not a performance deficiency.

The NRC inspectors did not identify performance issues related to the application and implementation of the ASR license conditions. The inspectors documented in the inspection report some observations that provide insight into NextEra's corrective action program performance. Specifically, for license condition (d) regarding structural elements subject to their POD, the inspectors determined that NextEra staff members were meeting this license condition for these elements through more frequent monitoring (typically two to three months) and additional qualitative criteria to observe adverse rebar conditions such as the formation of structural cracking. However, the NRC inspectors determined it was warranted to document this in their processes similar to the discussion in the methodology document for structures not subject to their POD. NextEra staff entered this observation into its corrective action program.

NextEra staff uses the corrective action program to capture both equipment issues and its self-identified performance deficiencies. In accordance with NRC Inspection Manual Chapter 0611, "Power Reactor Inspection Reports," the NRC does not routinely document minor licensee-identified performance deficiencies. However, this type of inspection sample, by process, permits the inspectors to document observations. In documenting those observations, the inspectors must annotate their associated safety significance.

Q5: Documentation Requested

- *Please provide the raw data and the related reports for the two locations noted above.*
- *Please include the gage length (i.e. the distance along which this expansion took place) and the strain for the 12 mils/month expansion.*
- *Please provide the raw data and the related reports for the locations noted above.*
- *Please provide the initial calculated results.*
- *Please provide the revised calculations.*
- *Please list and justify the objective impact these "conservatisms" had on the revised result in C.*

We do not generally maintain possession of documents once our inspection reviews are completed and documented. We recommend you contact NextEra to request this information.

Q6A: What is the "more significant safety concern" noted above?

In determining whether an NRC finding is of more than minor significance, inspectors use NRC Inspection Manual Chapter 0612, Appendix B, “Issue Screening Directions.” There are a series of questions that assist inspectors in determining the significance, one of which is the question, “If left uncorrected, would the performance deficiency have the potential to lead to a more significant safety concern?” Given that ASR is a time-based degradation, inspectors determined that if not properly trended, it could have affected assumptions regarding structural capabilities to perform safety-related functions in the future.

Q6B: Does this direct correlation by the inspectors to unfavorable margins point to willful negligence by NextEra relative to margin projections? If not, why not?

The NRC inspectors did not identify or develop information that would indicate careless disregard or deliberate misconduct during this inspection.

Q6C: Specifically, what different approaches were used to establish functionality or operability? Please supply detailed evidence of approaches and the date(s) the alternatives were applied to validate functionality?

As referenced in the inspection report, NextEra used identified conservatisms that included additional shear-friction capacity in the members, not accounting for realistic moment redistribution in the calculations, conservative damping, and conservative estimate of the groundwater elevation to determine external ground water level loads. NRC processes allow licensees to use engineering judgement and best estimates when demonstrating operability. For structures, this could include reduced conservatisms inherent in the concrete design code, such as those identified by NextEra. Inspectors determined that these conservatisms provided reasonable assurance the structures would remain functional until the next monitoring activity.

It should be noted that the non-conforming conditions evaluated in the POD applied to a small number of load combinations and were localized to specific elements (walls, beams, slabs, etc.) for the affected structures. The “service load” combinations (also referred to as normal loads or those conditions encountered during testing and normal operation) in the Seabrook licensing basis are the governing loads due to the higher load factors associated with each load. These load factors tend to be conservative even for those loads that can be accurately calculated such as dead loads and hydrostatic pressure. The controlling “unusual load” combinations (or extremely rare events) in the licensing basis involving the safe shutdown earthquake were satisfied (in some instances, as allowed, using less conservative damping) for the structures in the POD providing reasonable assurance that the plant can be brought to safe shutdown condition. The description of load conditions and associated references can be found in the Seabrook Updated Final Safety Analysis Report, Section 3.8, “Design of Category I Structures” (ML20323A152).

Q6D: Why is this failure to project sufficient margin only classified as a "green violation" considering the magnitude of this omission?

The finding screened to Green, or very low safety significance, because NextEra demonstrated that the structures maintained their functionality. The inspectors assessed the

significance of the finding documented in this inspection report using NRC Inspection Manual Chapter 0609, Appendix A, "The Significance Determination Process for Findings At-Power."

Q7A: When NextEra realized it did not assess loads and project margins, why did they establish a corrective action in lieu of immediately correcting these omissions as they claimed to have all of the relevant data?

The NRC inspectors determined that NextEra staff followed its processes and procedures to enter this issue into their corrective action program. The immediate action of entering the issue into their corrective action program is reasonable considering the inspection frequency. Further, it is expected that NextEra's corrective action program and work management processes will appropriately prioritize, assess, and identify corrective actions to address the issue. Those actions may consist of interim corrective and mitigating actions such as increased inspections or additional analysis in addition to long-term corrective actions such as a physical modification. In some cases, calculational corrective actions may not have been immediately required considering what NextEra staff may know regarding the bounding loads and available margin.

Q7B: Are corrective actions prioritized based on safety? For what length of time on average do the most critical corrective actions on ASR affected structures remain open? What process is in place to periodically review and close corrective actions?

NextEra has procedures that describe how to implement its corrective action program, including prioritization of their actions to address problems. The NRC ensures the licensee's corrective action program meets the regulatory requirements described in 10 CFR Part 50, Appendix B, Quality Assurance Program. NRC Inspection Procedure 71152 "Problem Identification and Resolution" focuses our inspections on those correction action program attributes important to safety. Regarding the timing of corrective action, we inspect to determine whether actions are being scheduled and completed commensurate with the potential safety significance of the problem. Regarding structures affected by ASR, we expect corrective actions to be planned and implemented in a timeframe to clearly maintain the safety function of the structures. NextEra's corrective action program at Seabrook is routinely reviewed and assessed by onsite resident inspectors and undergoes a detailed biennial inspection by a team of NRC inspectors.

Q7C: Please provide a list detailing all outstanding corrective actions—including inception date and current status— relative to ASR at Seabrook Station.

It is the licensee's responsibility to ensure the prompt identification and entry of adverse conditions in their corrective action program. While the NRC does not maintain a list of a plant's corrective actions, our inspectors maintain awareness of corrective actions and routinely review actions to ensure their timely closure consistent with licensee procedures.

Q7D: What legitimacy can be ascribed to the licensees' option to regularly use "corrective actions" when public safety is in increasing jeopardy?

NextEra is required by 10 CFR Part 50, Appendix B, Quality Assurance Program, to implement an effective corrective action program. The NRC inspectors found that NextEra staff were appropriately implementing the NRC-approved methodology related to ASR and its additional evaluations in the POD were technically adequate to demonstrate that concrete structures at Seabrook remained capable of performing their safety functions. The corrective action program is routinely inspected as part of the ROP. Specifically, corrective actions are an inherent part of every baseline ROP inspection called out as problem identification and resolution (PIR) efforts. Further, PIR is its own ROP baseline inspection that consists of daily, semi-annual, annual, and biennial inspections.

Q8: Given the newness of ASR to the nuclear industry and the severity of the problem at Seabrook Station, one question is, at what point might the Commissioners get more directly involved, or, at what point would the Advisory Committee on Reactor Safeguards take a look at the situation with fresh eyes?

Due to the first-of-a-kind nature of ASR in the U.S. nuclear fleet, the Advisory Committee on Reactor Safeguards (ACRS) reviewed the NRC staff's draft Safety Evaluation for NextEra's ASR-related license amendment request. Established by the Atomic Energy Act of 1954, as amended, ACRS is independent of the NRC staff and reports directly to the Commission, which appoints its expert members. The ACRS' Subcommittee on Plant License Renewal met with the NRC staff, and NextEra and its consultants, on October 31, 2018, to conduct a review of past, current, and future actions to address ASR at Seabrook.

On December 14, 2018, the ACRS issued a letter to the Commission (ML18348A951) stating that the NRC staff's evaluations of ASR at Seabrook provide thorough assessments and findings and that the ACRS agrees with the NRC staff's conclusions that NextEra's programs related to ASR are acceptable. On December 19, 2018, the ACRS issued a letter to the Commission (ML18353A954) stating that the Seabrook license renewal application should be approved.

Further, NRC Chairman Christopher Hanson's September 21, 2021, response to C-10's August letter also addresses this question (ML21235A104).

Q9: The other question I have is in regards to the timeline that you expect NRC inspectors / Region1 to place on the licensee as far as communicating their plans to address the seven structures that may need structural modifications. Given that inspection intervals will need to be shortened down to every few months in some cases, how much time do you anticipate will pass before NextEra's proposal will be delivered to NRC—and to the extent possible, made public?

NextEra staff discussed remediation plans for several of the affected structures during the recent NRC inspection; however, these plans were preliminary and under development by the NextEra engineering department. The NRC will continue to engage with NextEra staff during inspections to ensure that timely and appropriate modifications are performed. Observations and violations, if identified, will be documented in publicly available inspection reports in accordance with the NRC's processes and procedures.