UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
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February 10, 2022

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

Dear Ms. Treat:

I am responding to your email to the Seabrook Senior Resident Inspector on December 3, 2021, in which you requested responses to several questions and concerns regarding the third quarter 2021 integrated inspection report (ADAMS Accession Number ML21314A043). Responses to the specific questions are enclosed.

Sincerely,

Matthew R. Young

Digitally signed by Matthew R. Young
Date: 2022.02.10 09:09:36 -05'00'

Matt R. Young, Chief
Projects Branch 2
Division of Operating Reactor Safety

Enclosure:
As stated

Letter to N. Treat from M. Young dated February 10, 2022

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U.S. Nuclear Regulatory Commission
Response to Questions in the December 3, 2021, email

1. Alkali-Silica Reaction
Report Excerpt: "The inspectors reviewed the licensee's implementation of its corrective action program on the "Evaluation of the impacts of alkali-silica reaction (ASR) related bulk structural deformation of the spent fuel building on the spent fuel pool stainless steel liner".(p.9)

Q1a. What were the findings relative to the measurement of the bulk deformation itself?

The structural monitoring program measures bulk deformation through a complex finite element analysis model and applies the added structural strain/stress to the code equations to trend the impact of ASR related deformation on the affected structures. NextEra staff monitor seismic Category I structures at Seabrook, including the spent fuel building, in a number of different ways in accordance with their Structures Monitoring Program and the corrective action program. NRC review of NextEra's implementation of monitoring and corrective action for spent fuel building did not identify performance deficiencies.

Q1b. Monitoring the impacts of ASR is critically important to the residents living in this area. What was the universal number of inspections on critical structures at the Tier 2 and Tier 3 levels for the September 30, 2021 inspection period? Why was only a single sample item on this issue chosen for review by the NRC?

NextEra takes various measurements at specific periodicities depending on the specific structure and the conditions being monitored for that structure. The inspection points vary, but typically number in the dozens to hundreds per quarter. NextEra staff is required to enter any abnormal findings from the results of all structural monitoring program inspections into the corrective action program. Entries in the corrective action program are reviewed daily by the NRC resident inspector staff. While a specific NRC inspection sample is not performed for every structure on a set frequency, the inspectors are aware of the results of inspections and select samples for detailed inspection follow-up commensurate with the potential safety significance of the issue. For this specific inspection sample, the inspectors reviewed the licensee's actions related to the impact of licensee-identified ASR-related bulk structural deformation of the spent fuel building on the spent fuel pool liner and did not identify any performance deficiencies. NextEra staff is required to implement structural monitoring exams, evaluations, and corrective actions in accordance with the NRC approved process regardless of whether the NRC inspectors review specific activities.

2. Inadequate Preventative Maintenance Contributes to Failure of "F" Vital Inverter Static Transfer Switch.

Report Excerpt: "NextEra personnel failed to implement the requirements of MA-AA-201-1000, "Preventative Maintenance and Surveillance Procedure." "Specifically, adequate preventative maintenance activities were not developed and performed on the 'F' vital inverter static transfer switch, likely contributing to its failure and resultant loss of the 1F 120VAC vital bus and complex plant transient." (p. 2 and 10)

Maintenance failures have been all too frequent at Seabrook Station. Other examples include temperature control valve 1-CC-TK-2271 and its associated components, heat deformed resistors, and heat exchanger valve CC-V-145 limit switch. This report reveals that NextEra has been deficient in establishing critical, preventative maintenance plans."

Q2a. Other than "replacing all vital inverters and associated static transfer switches to newer models," what specifically has the NRC required of NextEra to assure the public that similar cascading events have been identified in all critical processes and that the related maintenance activities are documented and will be performed?

The regulations applicable to the specific issues associated with the failure of the “F” vital inverter static transfer switch would include 10 CFR 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants”, and 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Actions”. The regulations require that licensee’s perform maintenance to maintain risk significant systems capable of performing their design functions, and that when failures occur corrective actions are taken to restore equipment performance. The NRC inspects the licensee’s implementation of the processes used to comply with these requirements and, when violations are identified, the licensee must take action to correct the issues. Currently, NextEra’s performance at Seabrook, as assessed through the ROP, is in the licensee response column. This means that the site’s programs are capable of correcting problems and restoring compliance when violations occur, which maintains the health and safety of the public.

Q2b. How specifically has the prospect of similar events and their related risk in a plant that has been operating for more than 75% of its original life expectancy been incorporated into the NRC's inspection plans?

If the lack of maintenance only "likely contributed" to the "F" vital inverter failure, then the other factors postulated of "two heat deformed resistors as well as build ups of dust and dirt" and "a voltage spike" possibly caused by "age-related degradation" were most likely the other factors involved. This event points to numerous failures resulting in "a series of transients throughout the plant requiring control room operators to respond to a complex plant event and carry out a series of procedurally driven actions to maintain plant stability." (p. 11)

The effectiveness of licensee programs for monitoring and managing equipment performance, regardless of plant age, are reviewed and assessed within the scope of reactor oversight process on a continuous basis. The individual samples selected for inspection at all sites are biased toward activities or systems with the potential to initiate, mitigate, or increase the consequences of accidents. When a performance deficiency is identified during these inspections the impact on plant safety is assessed using the NRC’s significance determination process. Equipment issues with very low safety significance are expected to be addressed through the licensee’s corrective action program while issues assessed as low to moderate to very high significance will result in additional NRC inspection using supplemental inspection procedures to review licensee actions to address the equipment issue and associated causes.

NRC requirements require that conditions adverse to quality are identified and corrected. In the case of the “F” vital inverter static transfer switch failure, which was determined to be of very low safety significance by the SDP, NextEra’s corrective action program causal evaluation requires that the cause of the issue be corrected. The NRC’s biennial problem identification and resolution inspection reviews and assesses the implementation of a licensee’s corrective action program. During this inspection NRC resident and region-based inspectors review corrective actions on a sampling basis to ensure that the program is correcting these types of concerns.

Q2c. Please explain in detail how this multifaceted failure "which was a performance deficiency within Seabrook's ability to foresee and correct" of very low safety significance does "not cause a loss of a probabilistic risk assessment function for greater than 24 hours" yet required staff to scramble to "maintain plant stability" qualify as a Green violation? On what basis was the 24-hour standard determined? Is the NRC establishing more stringent criteria for similar incidents?

"Preventative maintenance on the 'F' vital inverter static transfer switch was established with a frequency of once every two refueling outages (~36 months). The inspectors noted that the visual inspection PM task was last performed in January 2014, approximately 7 years and 8 months prior to the failure. Additional investigation revealed that, in 2016, as part of an initiative by NextEra to reduce the number of PMs performed onsite ("PM Optimization Project"), the frequency of the PM task was changed from once every two outages to once every three outages (~54 months)." (p.12) The above reflects an arbitrary extension of visual inspection by NextEra staff from the required 36 months to a glaring 7-year, 8-month application. (p. 11)

The performance assessment section of the violation describes the basis for the GREEN significance determination. The performance assessment section can be found on page 12 of the Seabrook 2021 3rd Quarter Integrated Inspection Report. The process that NRC inspectors use to assess the significance of findings is briefly described here: https://www.nrc.gov/reactors/operating/oversight/rop-description.html#violations and discussed in detail in Inspection Manual Chapter 0609 here https://www.nrc.gov/reading-rm/doc-collections/insp-manual/manual-chapter/index.html

The basis for the 24 hours used in the screening process is described in Inspection Manual Chapter 0308, Attachment 3, Section 03.01, which may also be found at the link provided above for Inspection Manual Chapter 0609.

Q2d. What solution has the NRC required of NextEra to ensure that failure to perform such basic visual inspections will not occur? How could the schedule of 36-month inspections (before PM Optimization) have been ignored for almost eight years, and no one noticed? "Specifically, MA-AA-201-1000, Section 4.6 requires that a formal Preventative Maintenance Change Request (PMCR) process be followed for a PM frequency change for any component classified FID-1…" (p. 12) The above requirements for Section 4.6 for all applicable change requests were not met. (p.13).

NextEra's failure to adequately perform preventative maintenance on the 'F' vital inverter static transfer switch is the subject of the non-cited violation documented in the 3rd quarter inspection report. The sequence of events that led to the inadequate preventative maintenance are described in the description section of the non-cited violation. NRC regulations require that conditions adverse to quality are identified and corrected. In response to the non-cited violation, NextEra performed a cause evaluation which identified the cause of the issue and actions to correct the issue. The NRC's biennial problem identification and resolution inspection reviews and assesses the implementation of a licensee's corrective action program. During this inspection NRC resident and region-based inspectors review corrective actions on a sampling basis to ensure that the program is correcting identified issues.

Q2e. On what basis did NextEra reduce the number of PMs onsite in its 2016 "PM Optimization Project?" What action has the NRC taken to ensure future compliance with approvals of PMCR's on classified FID-1 components?

In 2016, as part of an effort to optimize station preventative maintenance tasks, the licensee used data obtained from previous maintenance, industry operating experience, and equipment vendor recommendations to assess and determine if the preventative maintenance frequency is still appropriate or if changes could be made to better utilize available station resources. The NRC, through sampling of risk significant equipment and evolutions, inspects preventative maintenance frequencies through our normal baseline inspections both by resident inspectors and regional based inspectors. As stated in the finding, NRC inspectors determined that the licensee had not provided an adequate justification for the PM change, and in accordance with 10 CFR Part 50, Appendix B, Criterion XVI, the licensee entered this issue into its corrective action process to correct the identified performance deficiency.

3. Inadequate Corrective Actions Result in the Failure of the Unit 1 'B' Service Water Cooling Tower Fan Report Excerpt: The service water cooling tower provides an alternate source of cooling water for the plant's primary and secondary related heat loads. "Both fans on the 'B' cell are required for design capacity." (p. 14) "NextEra personnel failed to implement adequate corrective actions following degraded oil samples for the Unit 1, 'B' emergency cooling tower fan. Specifically, a history of degraded oil conditions combined with inadequate or ineffective actions taken in response to the oil degradation led to the gearbox failure on September 17, 2021." (p. 14)

"Specifically, NextEra did not take timely action to address degraded conditions commensurate with their safety significance". (p. 16)

Q3a. Why was the issue of contaminated oil not investigated thoroughly the first time it appeared, and how is the gearbox failure being addressed?

The 3rd quarter 2021 NRC inspection report provides a detailed description of the deficient licensee performance that led to the failure of the gearbox and the corrective actions completed to address the failure (see page 14 of the report).

Q3b. Please explain why the NRC does not maintain its own prioritized list of NextEra's corrective actions in order to ensure they are reviewed and closed on a timely basis?

Each U.S. nuclear power plant is required to maintain a corrective action program to self-identify and resolve issues. This program is inspected by a team of NRC inspectors biennially during a multi-week "Problem Identification and Resolution" inspection. Additionally, the on-site resident inspectors generally review, daily, the initial corrective action reports generated by the licensee. Typically, thousands of these documents will be generated each year. The NRC, on a sampling basis informed by safety significance, reviews a subset of the corrective actions generated as a result of the reports to ensure that the licensee is implementing their program adequately. Performance issues identified with the licensee's corrective action program are documented in NRC inspection reports as applicable

Q3c. What regulations is the NRC proposing to make maintenance and inspections rise to a much higher safety standard?

The regulations applicable to the specific issues associated with the failure of the Unit 1 'B' service water cooling tower fan would include 10 CFR 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants”, and 10 CFR Part 50, Appendix B, Criterion XVI, “Corrective Actions”. Currently, the NRC is not considering any new regulations in this area.

4. Pressurizer Safety Valve Outside of Technical Specification
Report Excerpt: 'A self-revealed Severity Level IV non-cited violation of Technical Specification 3.4.2.2, “Reactor Coolant System Safety Valves” was identified when testing results of one of the three pressurizer safety valves did not meet the technical specification requirement of being within +/- 3 percent of design lift pressure.'

Q4a. In this example, “as the direct cause of the excessive set-point drift was not able to be determined” and “the planned corrective action is to replace the valve spring and perform testing of the affected valve to ensure that it is suitable to be placed back in-service” (p.17) What other safety-related valves would benefit from more rigorous inspection during scheduled shutdowns?

All safety-related valves are required to be tested in accordance with the ASME Code and applicable technical specifications. NRC inspections are performed to verify that the licensee has performed required testing in accordance with applicable standards. The ASME Code has specific thresholds that valves are tested to for ensuring compliance and function. The ASME Code’s tiered approach (“Alert” and “Action”) for acceptance criteria would increase the frequency of inspection based on the results of testing. Specifically, for this issue, the corrective action program drove the licensee to identify the cause and because it was not readily apparent, the licensee performed more rigorous testing to comply with 10 CFR Part 50, Appendix B, Criterion XVI.

10 CFR Part 50, Appendix B, Criterion XVI requires that licensee’s establish measures to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined, and corrective action taken to preclude repetition. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken must be documented by plant workers and reported to appropriate levels of management. In accordance with this requirement, as stated in the enforcement section of the report write-up, the licensee entered the issue into its corrective action process for resolution.

5. Observation: Evaluation of the Seabrook Main Generator Output Breaker Fault Current Interrupting Capability Report Excerpt: "The inspectors reviewed the design of Seabrook’s main generator output breaker, specifically the fault current interrupting capability. The inspectors also reviewed Seabrook’s compliance with 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 17, Electric Power Systems. The Seabrook main generator output breaker is non-safety related…” (p. 9-10)

"The inspectors reviewed Seabrook's UFSAR, breaker calculations and completed preventative maintenance work orders to determine the breaker capability and functionality." "The inspectors reviewed NextEra's short circuit assessment conducted in 2016 by Siemens and ISO-NE's study conducted in 2020 by RLC Engineering, LLC". (p.10)

"NRC Region I inspectors also requested an independent review of the technical aspects of the Seabrook main generator output breaker by NRC headquarters staff in the electrical division of Nuclear Reactor Regulation (NRR)." "Specifically, the inspectors have reasonable assurance that the Seabrook main generator output breaker can perform its intended function with the current margin available to the rated short circuit current capability of the breaker and that NextEra remains in compliance with GDC-17." (p. 10)

Q5a. Given that the above non-safety related output breaker was so carefully reviewed by internal and external resources and the "current margin available" was computed, were the scheduled Tier 3 structures at Seabrook inspected and the related ASR load and margins calculated? If so, what are the margins? If not, why not?

NextEra, in preparing for approval of an amendment to their structures monitoring program incorporating a methodology for evaluating the impacts of ASR, conducted detailed evaluations of almost every structure on site to account for potential added loads from ASR and related ASR building deformation impacts. A number of these evaluations were conducted using the techniques outlined for "Stage 3" structures. NRC inspectors from our headquarters and regional offices have reviewed these evaluations on a sampling basis, including the majority of the structures categorized as "Stage 3." One of these reviews is documented in inspection report 2021002 (ML21222A126), Section 71152 "Review of NextEra's Evaluation of Four Safety-Related Structures Affected by ASR." The output of the evaluation generates an additive structural load that can be integrated into structural design calculations and used for comparison with the structural code of record. These loads include a threshold factor (i.e., margin) to account for future expansion and are analyzed on a case-by-case basis for each member of a given structure. The threshold factor represents the reserve design margin in the structure for accommodating increasing ASR future demands. Once the threshold factor is established, the structure is monitored, and quantitative measurements and qualitative observations are compared to the specified limit. The specific "margin" varies for each structure on site.

6. Reactor Safety-Adverse Weather Protection
Report Excerpt: "The inspectors evaluated that flood protection barriers, mitigation plans, procedures, and equipment were consistent with the licensee's design requirements and risk analysis assumptions for coping with external flooding…" (p. 4)

Q6a.Has the NRC reviewed the "licensee's design requirements and risk analysis assumptions" for this issue? When? Are there any material omissions in the design requirements? Do the assumptions remain both complete and reasonable?

Q6b. Given the acknowledged risk of storm surge threatening Seabrook Station, has the NRC required any additional design revisions on NextEra beyond the licensee's own mitigation plans? What enhanced reactor safety recommendations (from the 2011 "Review of Insights from the Fukushima Dai-Ichi Accident" report) have been incorporated into NextEra's plans for storm surge? Are regulations being drafted by the NRC for this near-term threat?

The NRC conducted a thorough review of licensee programs for extreme adverse weather as part of the Fukushima orders. Additional detail regarding the results of NRC and licensee response to the Fukushima lessons learned can be found here: https://www.nrc.gov/reactors/operating/ops-experience/fukushima/seab1.html. Further, the NRC conducts routine adverse weather inspections as part of the ROP baseline program that now incorporates periodic reviews or actions taken to address Fukushima lessons learned. The results for the baseline inspections at Seabrook are documented in the Seabrook Integrated quarterly inspection reports that can be found here: https://www.nrc.gov/reactors/operating/oversight/listofrpts-body.html#seab.

No additional regulations are being pursued at this time, however, if new information that was not considered originally becomes known, the NRC will assess that information and consider whether further requirements would be necessary to ensure safety of the facility.