NEXTera ENERGY SEABROOK

September 25, 2021

Docket No. 50-443
SBK-L-21103

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20582

Seabrook Station
Request for Exercise of Enforcement Discretion

The purpose of this letter is to formally request approval for enforcement discretion, as discussed verbally between NextEra Energy Seabrook, LLC (NextEra), and NRC staff on September 23, 2021 at 1830 EST. During that call, NextEra verbally requested enforcement discretion pertaining to Technical Specification 3.7.4, "Service Water System / Ultimate Heat Sink." That request was to allow delaying taking actions specified in Seabrook Station Technical Specification 3.7.4, under circumstances as discussed and as further described in the Enclosure to this request. At approximately 1930 EST, on September 23, 2021, Mr. Russel Felts of the NRC notified NextEra, that the requested NOED was approved for issuance. The approval was effective immediately and would expire at 0456 EST on September 29, 2021. NextEra was requested to submit a written request for the NOED within 2 working days. As discussed during the teleconference by NextEra, the additional time is needed to prepare, submit, and allow enough time for the staff to process an Emergency License Amendment Request (LAR). The Emergency LAR is expected to provide the necessary time to restore the service water cooling tower 51B fan to an operable status.

As requested, NextEra hereby requests that the NRC exercise enforcement discretion set out in the NRC Enforcement Manual, Appendix F, "Notices of Enforcement Discretion.". The enforcement discretion requested by NextEra will authorize temporary non-compliance with Technical Specification 3.7.4. It is requested that this enforcement discretion be effective from 0456 on September 24, 2021 to 0456 on September 29, 2021.

NRC approval of this request will permit Seabrook Station to avoid an undesirable plant shutdown by allowing temporary noncompliance with Technical Specification 3.7.4, and will not have an unacceptable impact on safety as described within the Enclosure.

This request for enforcement discretion has been reviewed and approved by the station's Onsite Review Group.

Should you have any questions concerning this response, please contact Mr. Matthew Levander, Licensing Manager, at (603) 773-7631.

Sincerely,

NextEra Energy Seabrook, LLC

Brian Booth
Nuclear Site Vice President – Seabrook Nuclear Power Station

Enclosure

cc:

NRC Region I Administrator
NRC Project Manager
NRC Senior Resident Inspector

ENCLOSURE TO SBK-L-21103

Request for Enforcement Discretion
Technical Specification 3.7.4, "Service Water System / Ultimate Heat Sink

The following provides the information described in NRC Enforcement Manual, Part III, Appendix F, that must be considered in a request for enforcement discretion.

1. **Did the licensee explain why a formal licensing process is not appropriate to address the issue and why the need for a NOED could not reasonably have been avoided? If applicable, this explanation shall address previous instances of the issue and decisions to pursue licensing solutions in the past.**

Current Event
On September 17, 2021 at 0456, Seabrook Station entered a seven-day action statement after it received a Service Water Cooling Tower Fan "B" Low Oil Pressure alarm during surveillance testing. When this occurred, an Operator was sent to investigate locally and observed a broken drive shaft with oil leaking out of the associated gear box for service water cooling tower fan 51B (1-SW-FN-51B). Fan repairs were initiated, including replacement of the gearbox with one from onsite warehouse, with expected completion within the seven-day action statement. However, during the post-maintenance run on September 22, elevated vibrations were detected from the new gear box, thus rendering the fan inoperable. The new gearbox is being inspected and adjusted with inputs from the supplier, however, the current timeline exceeds the remaining action statement time. Without regulatory relief, Seabrook will be required to shutdown earlier than the planned refuel outage.

NextEra Energy Seabrook, LLC (NextEra) has evaluated shutdown in accordance with Technical Specifications (TS), however, that would result in premature entry into the planned refuel outage, which is scheduled to begin early October 2021. The refuel outage has been carefully planned with thousands of scheduled activities choreographed to maintain shutdown risk as low as possible for the duration. Many of the activities would not be able to begin at the planned times because of equipment or personnel who will not be available until the scheduled start date. This condition would require extensive adjustments to the refuel outage schedule with no time for additional scrutiny or pre-evaluations of shutdown risk. NextEra considers this option to represent an error likely condition, as the months of preplanning for multiple overlapping tasks will be subject to extensive adjustments with very little time to complete or validate. NextEra considers the importance of preserving the finely tuned outage schedule to be essential in the assurance of a safe and event free outage. NextEra considers the requirement to shutdown early in accordance with the TS requirement to result in undue increase in risk with no corresponding benefit to public health and safety.

Consequently, NextEra reviewed NRC Enforcement Manual, Appendix F, "Notices of Enforcement Discretion," and determined that this request satisfies Section 1.3 – Applicability, as the time to process an Exigent or Emergent License Amendment Request (LAR) is not feasible due to the remaining time of under 26 hours within the associated 7-day Allowed Outage Time (AOT) of this action statement. As soon as the failure on September 17, 2021 occurred, the station's Outage Control Center

(OCC) was staffed to support around the clock coverage to repair the impacted fan components, with the goal of restoring compliance prior to the expiration of the AOT. The Enforcement Manual Notice of Enforcement Discretion criterion applies to a plant in power operation to avoid Unnecessary Transients as a result of compliance with the Technical Specifications (TS) or a license condition, without a corresponding health and safety benefit. Initially, NextEra did not believe regulatory relief would be necessary to fully correct this condition, as the planned troubleshooting, corrective maintenance, and restoration of Operability could be completed within the bounds of the allotted AOT. However, after failing the post maintenance operability run due to high vibrations experienced on the new gear box, the remaining time on the original 7-day completion time was 26 hours, which provides the justification for enforcement discretion.

Seabrook will be submitting an Emergency License Amendment Request to extend the current 7-day AOT, but that submittal is estimated to take an additional two days to prepare and fully review. This request for Enforcement Discretion is intended to allow NextEra the time to prepare and submit an Emergency LAR.

Previous Occurrence
On January 07, 2021, the station entered TS 3.7.4, Action b, for an inoperable cooling tower cell. Compliance was restored within approximately 80 hours, prior to the expiration of the 7-day AOT. The cause of the event was determined to be unrelated to the current event.

2. Did the licensee provide a description of the TSs or other license conditions that will be violated? This description shall include the time the condition was entered and when the completion time will expire.

While in Modes 1 through 4, Technical Specification (TS) 3.7.4, "Service Water System / Ultimate Heat Sink" requires in Modes 1 through 4 that an Operable mechanical draft cooling tower and two cooling tower service water loops with one Operable cooling tower service water pump in each loop. On September 17, 2021, at 0456, Seabrook Station entered TS 3.7.4, Action b, which stipulates:

> "With one cooling tower service water loop or one cooling tower cell inoperable, return the affected loop or cell to OPERABLE status within 7 days, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours."

The Allowed Outage Time for TS 3.7.4, Action b will expire on September 24, 2021, at 0456.

3. Did the licensee provide sufficient information to demonstrate that the cause of the situation is well understood including extent of condition on other related SSCs (e.g., common cause)?

Cause

Initial trouble shooting efforts revealed that service water cooling tower fan 51B (1-SW-FN-51B) driveshaft had failed. The associated gear box was discovered with oil leaking externally. Approximately 15 minutes after the control room received the low oil pressure alarm gearcase temperatures were noted as high as 230 degrees Fahrenheit directly above the input shaft (pinion gear & bearings). During disassembly, Mechanical Maintenance reported that they removed approximately 11 gallons of oil from the gearcase. This indicated that oil remained in the gearcase during and after the event. During bench testing of the lube oil pressure switch by I&C, leakage was noted. The technician indicated that the pressure switch did not change state during the bench test.

Based on a review of plant process computer data and visual inspection of right angle gear reducer and internal components, the most likely cause of the initial event is failure of the high speed (pinion) shaft bearings due to a lack of lubrication and subsequent overheating. Visual inspection of the speed reducer indicates that significant heat was present in the high-speed pinion shaft. The inner and outer bearings are discolored, seized, and show significant damage to the rollers and cages. The gear teeth of the bevel pinion and bevel gear also show indication of overheating (bluing) as well as metal wear indicating lack of lubrication. This was likely the result of inadequate lubricating oil flow to the bevel pinion/bevel gear assembly as well as lack of lubricating oil flow to the high-speed pinion bearings. Metal shavings and pieces were found throughout the gearcase, bearings, and gears. The external portion of the high-speed pinion (input) shaft is misaligned and bent to one side. It is unclear if the input shaft became bent due to mechanical forces within the gearcase or if it was the result of the broken driveshaft hanging while the shaft was in an overheated state. The lack of lubrication to the high-speed pinion shaft was likely the result of particulate / debris in the lubricating oil causing obstructions in the system. Those obstructions created the conditions to deprive critical areas of lubrication as well as over-pressurizing the system, ultimately resulting in an external leak through the low lube oil pressure switch mounted on the gearcase.

Subsequent to gear box and fan shaft replacement, the new gear box exhibited elevated vibrations indicative of an unsatisfactory gear mesh tolerance within the gear box. Seabrook does not have another spare gear box in inventory, and a replacement is being sought while refurbishment of the two failed gear boxes is being pursued. The requested period of enforcement discretion will be necessary to complete an Emergency License Amendment Request.

Extent of Condition

Unit 2 Service Water Fan 51-B (2-SW-FN-51-B, identical to 1-SW-FN-51-B)
Evidence of oil leakage near the 2-SW-FN-51-B gearcase was identified. Operations and Engineering subsequently performed a walkdown of the gearcase. An oil leak from the input (pinion) shaft seal was quantified at less than 1 drop every 10 minutes with the fan shutdown. Based on observation of oil perpendicular to the shaft along the gearbox casing and concrete pedestal, it is likely that oil leakage from this location increases during fan operation.

Visual inspection of the oil pressure switch and area beneath the switch did not reveal any signs of oil leakage. There was no evidence of leaking or cracks at the pressure switch housing.

The most recent oil analysis sample was obtained on 7/30/2021. The analysis report dated 8/16/2021 reports high particle count indicating contaminated lubricant which can eventually lead to abnormal wear. Elevated iron levels are also reported. It is noted in the report that the sampling method listed may cause abnormal results if not flushed properly. The ISO PC readings are slightly above the upper alert limit but lower than the previous sample which was taken on 3/19/2020. The iron content is 15 ppm which is equal to the upper alert limit but falls between the previous two samples. Patch analysis results are reported for red oxides only.

By comparison, the most recent (7/30/2021) 1-SW-FN-51-B sample results indicated 42ppm Iron, elevated particulate, high concentrations of black/red oxides, corrosivity, and rubbing. The report indicates that the sample method (drain point) may be influencing the results. There was also reference to metal bearing wear. There is no reference to rubbing or metal bearing wear in the recent report for 2-SW-FN-51-B. A review of historic oil analysis reports on 2-SW-FN-51-B (back to 2009) indicate that elevated iron and particle counts for this unit are not unexpected.

1-SW-FN-51A
Surveillance testing on this fan was performed on 09/20/2021, with no abnormalities noted. No visual indications are present that would challenge the expectation that the A service water cooling tower fan would be able to perform its intended safety function, as needed.

Oil samples are taken quarterly, with all current analyzed values being below alert and action limits. Adverse constituents found in 1-SW-FN-51B have not been shown within recent oil analyses of 1-SW-FN-51A. The elemental analyses have not shown equipment degradation.

4. **Did the licensee provide an evaluation of all safety and security concerns associated with operating outside of the TS or license conditions that demonstrates that the noncompliance will not create undue risk to the public health and safety or involve adverse consequences to**

the environment? This should include, as appropriate, a description of the condition and operational status of the plant, equipment that is out of service, inoperable, or degraded that may have risk significance, may increase the probability of a plant transient, may complicate the recovery from a transient, or may be used to mitigate the condition. This evaluation shall include potential challenges to offsite and onsite power sources and forecasted weather conditions.

System Design and Operation

Ultimate Heat Sink (UHS)

The Atlantic Ocean serves as the normal ultimate heat sink for Seabrook Station. However, in the unlikely event that the normal supply of cooling water from the Atlantic Ocean is unavailable, the atmosphere serves as the ultimate heat sink using a mechanical draft evaporative cooling tower.

The Atlantic Ocean portion of the ultimate heat sink includes two tunnels. One tunnel from the submerged intake structure offshore to the pump house at the plant site normally serves as an inlet; a second tunnel discharges cooling water to the ocean. The intake tunnel is designed to supply seawater from the Atlantic Ocean to the SW system during all normal operating and accident conditions. Provision is made to ensure a sufficient flow of cooling water via the intake tunnel from the ultimate heat sink to the SW pump house during a loss-of-coolant accident occurring simultaneously with a loss of offsite power and any single active failure.

The Atlantic Ocean portion of the ultimate heat sink is designed to perform all safety functions during and following the most severe natural phenomena anticipated, e.g., the safe shutdown earthquake (SSE), tornado, hurricane, flood, or low water level resulting from storm surges with the exception of the tunnels and transition structure, which were not specifically designed for the SSE. In the unlikely event that an earthquake of sufficient intensity occurs, which blocks over 95 percent of the available large flow area of the intake tunnel, the cooling tower would be used as the ultimate heat sink to cool and maintain the plant in a safe shutdown condition.

Service Water (SW) System

The function of the station SW system is to transfer the heat loads from various sources in both the primary and secondary portions of the plant to the ultimate heat sink. The system has been designed to supply sufficient cooling water to its heat loads under all possible operating conditions. The ultimate heat sink for all operating and accident heat loads is normally the Atlantic Ocean.

Except for the event that seawater flow to the SW pump house is restricted (>95 percent blockage) due to seismically induced damage to the large seawater intake and discharge tunnels, the SW system using the Atlantic Ocean heat sink is fully capable of performing all safety functions during and following all other severe natural phenomena.

The ocean supplied SW system consists of two completely independent and redundant flow trains, each of which supplies cooling water to a primary component cooling water (PCCW) heat exchanger, a diesel generator jacket water cooler, the secondary component cooling water heat exchangers, the auxiliary secondary component cooling water heat exchangers, the condenser water box priming pump seal water heat exchangers, and, except during a LOCA, to the fire protection (FP) system during a fire. Flow in each redundant train is supplied by two redundant pumps with each pump capable of supplying 100 percent of the flow to dissipate plant heat loads during normal full power operation. Thus, for full power operation one pump per train is required. The four SW pumps take suction from a common bay in the SW pump house, which is supplied from the Atlantic Ocean via the intake tunnel due to the static head of the ocean.

Service Water Cooling Tower
In the unlikely event that the main circulating water tunnel is unavailable, a mechanical draft evaporative cooling tower serves as the ultimate heat sink. The cooling tower is designed to supply cooling water to the primary component cooling water and diesel heat exchangers while sustaining a loss of offsite power and any single active failure. The cooling tower and all its associated components are designed for the safe shutdown earthquake loads. Considering the ultimate heat sink in total as the Atlantic Ocean and the cooling tower, the heat sink safety function is assured following the most severe natural phenomena including the safe shutdown earthquake, tornado, hurricane, flood, or loss of water level.

Weather Considerations
Severe weather is not forecasted for the region within the proposed period of enforcement discretion. Low 70 degrees Fahrenheit will be the high temperatures throughout the days, with no chance of freezing predicted at this time. There are no weather events currently challenging the New England bulk electric system.

Safety Margins
The proposed period of enforcement discretion does not alter the design and operation of 1-SW-FN-51B, will not result in plant operation in a configuration outside the design basis, and will not impact any assumptions or consequences specified in applicable safety analyses. Safety margins will be maintained in accordance with Seabrook safety analyses acceptance criteria and no changes are proposed that affect any assumptions or inputs to applicable safety analyses. The availability of service water cooling tower fan 1-SW-FN-51A currently exists during the proposed period of enforcement discretion. The normal ultimate heat sink of the Atlantic Ocean is fully capable of performing its design function. As such, no safety margins are impacted by the proposed change.

Other Defense-in-Depth Considerations

A reasonable balance among prevention of core damage, and consequence mitigation will be preserved during the proposed period of enforcement discretion. The 1-SW-FN-51A service water cooling tower fan will be capable of performing its safety function during the proposed period of enforcement discretion of the 1-SW-FN-51B fan. No other SSCs will be affected by the proposed period of enforcement discretion and no limits will be imposed on any SSC performing its specified function. Elevated risk awareness and the protection of critical equipment will be executed (as shown in Compensatory Actions) during the proposed period of enforcement discretion in accordance with existing plant procedures. Additionally, these programmatic activities will be accompanied by pre-job and periodic (e.g. shift change) briefings, equipment walk downs, progress updates, and increased operational and managerial scrutiny. As such, there will be no over-reliance on programmatic activities as compensatory measures during the proposed period of enforcement discretion. The independence of the physical barriers to radiological releases will not be degraded as a result of the proposed period of enforcement discretion. The planned 1-SW-FN-51B maintenance will not impact fuel cladding, Reactor Coolant System (RCS) or Containment integrity. No other systems, structures and components (SSC) will be affected by the proposed period of enforcement discretion, and thereby no limits will be imposed on any SSC in performing its specified safety function.

Potentially risk significant plant configurations will not occur during the proposed period of enforcement discretion due to online risk assessment tools and increased operational and managerial scrutiny of plant operations. During the planned maintenance of the B service water cooling towner fan, no risk significant plant equipment will be removed from service and protective measures will be implemented to reduce the likelihood of challenges to risk significant equipment. As a result, the functional redundancy, independence and diversity currently described in the Seabrook Station Updated Final Safety Analysis Report (USFAR) will be maintained throughout the proposed period of enforcement discretion.

Defenses against potential common-cause failures (CCFs) will be maintained by limiting non-essential maintenance and operation of SSCs having mitigatory roles credited in accident analyses.

Human Performance

Prior to the start and during each shift of the proposed period of enforcement discretion, a pre-job briefing will be conducted to reinforce expected human performance behaviors and bolster defense-in-depth barriers to human errors. To minimize plant challenges, Operators and maintenance crews will be briefed on procedures for implementing and maintaining the equipment lineup necessary to perform the planned 1-SW-FN-51B maintenance. Risk aspects of the proposed period of enforcement discretion will be emphasized during these briefings.

Current Plant Status

There is no other equipment out of service, inoperable, or degraded with notable risk significance that could potentially increase the probability of a plant transient, complicate the recovery from a transient, or be used to mitigate the condition. No other operational challenges are currently being experienced. NextEra has not been made aware by ISO New England of any post contingency down powers that are anticipated during the proposed period of enforcement discretion.

5. **Did the licensee provide a description and timeline of the proposed course of action to resolve the situation (e.g., likely success of the repairs) and explain how the resolution will not result in a different or unnecessary transient? This shall include the time period for the requested discretion and demonstrate a high likelihood of completion within the requested period of enforcement discretion. If the proposed course of action necessitates enforcement discretion greater than 5 days, the licensee shall justify why a longer-term solution (e.g., emergency amendment) should not be processed within the duration of a 5 days NOED.**

The request is for five days to allow time for processing of the Emergency License Amendment Request, consistent with the outline included in the Enforcement Manual, Appendix F, Notice of Enforcement Discretion. The Emergency LAR will be submitted on or before September 25, 2021.

The repair duration is forecast to take longer than the time to reach Mode 5 during the upcoming refueling outage. The repair is being pursued in two parallel paths; one is to have vendor representatives onsite repairing the gearbox exhibiting elevated vibrations, and the other is to send the failed gearbox offsite for refurbishment. Neither of those repairs are anticipated to be completed prior to the expiration of the 7-day AOT. The plant is expected to be in Mode 5 around 1400 on October 2, 2021, where the Applicability of this Technical Specification is no longer required.

This request and the planned Emergency LAR will allow continued operation to complete final preparations and necessary repairs that will take place during the planned refueling outage, scheduled to start in the beginning of October 2021.

6. **Did the licensee detail and explain compensatory actions the plant has both taken and will take to reduce risk(s), focusing on both event mitigation and initiating event likelihood? This shall include how each compensatory measure achieves one or more of the following:**

   a. **Reduces the likelihood of initiating events;**

   b. **Reduces the likelihood of the unavailability of redundant trains, during the period of enforcement discretion; and**

   c. Increases the likelihood of successful operator actions in response to initiating events

During the proposed period of enforcement discretion, the following compensatory measures will be in effect to reduce the risk of initiating an event, and to reduce the risk of losing defense in depth:

(1) No testing or maintenance activities will be performed during the purposed period of enforcement discretion that could potentially cause a plant transient.

(2) No testing or surveillances will be performed on the Service Water system during the purposed period of enforcement discretion.

(3) Operations will guard the following equipment in accordance with NextEra procedure OP-AA-102-1003, Guarded Equipment:

i. 1-SW-FN-51A (redundant, service water cooling tower fan)
ii. Service Water Pumphouse
iii. Service Water Pumphouse Ventilation
iv. Intake and Discharge Transition Structures
v. Service Water Strainers
vi. Service Water Ocean and Cooling Tower Pump breakers

(4) Operations will monitor the weather for adverse conditions, and factor those conditions into the work, prior to implementing corrective maintenance on 1-SW-FN-51B.

(5) Operations will ensure grid conditions are stable utilizing normal communications with the regional system operator (ISO New England). There will be no intrusive work allowed in the station switchyard.

(6) Operations crews will review OS1216.01 – Degraded Ultimate Heat Sink Abnormal Operating Procedure (AOP).

7. **Did the licensee demonstrate that the NOED condition, including compensatory measures will not result in more than a minimal increase in radiological risk, either in quantitative assessment that the risk will be within the normal work control levels (ICCDP less than or equal to 5E-7 and/or ICLERP less than or equal to 5E-8) or in a defensible qualitative manner?**

Risk Insights

To determine the Incremental Conditional Core Damage Probability (ICCDP) and Incremental Conditional Large Early Release Probability (ICLERP) the base PRA model was revised to set all test and maintenance events to a probability of zero. This model was used to quantify the baseline Core Damage Frequency (CDF) and Large Early Release Frequency (LERF).

To determine the variant case, with 1-SW-FN-51B out of service, the PRA model was quantified with the basic events representing the 1-SW-FN-51B being set to a probability of 1.0. The following formula was then used to determine the ICCDP and ICLERP.

ICCDP/ICLERP = (Variant-Base) × (Hours/8760)
Table 1 presents a summary of the calculation with an assumed 5-day proposed period of enforcement discretion.

Metric	Baseline	Variant	ICCDP/ICLERP
CDF	5.46E-06	5.75E-06	3.97E-09
LERF	4.27E-08	4.28E-08	1.37E-12

Discussion of the Dominant Risk Contributors

The dominant risk contribution is from flooding events involving the A train of Service Water piping in the Primary Auxiliary Building (PAB). With the B train Service Water Cooling Tower fan unavailable any failures that occur on the A train result in a total loss of Service Water event. If the Reactor Coolant Pump (RCP) seal were to fail, or operators were to fail to trip the RCPs on loss of cooling then the resultant (RCP) seal LOCA could not be mitigated resulting in core damage due to loss of RCS inventory.

The key operator actions for these sequences are operators failing to trip the RCPs on a loss of Primary Component Cooling Water (PCCW) and operators failing to depressurize the RCS to address asymmetric seal cooling.

Discussion on External Events Risk

Fire

1-SW-FN-51B is not credited for fire safe shutdown in the Appendix R analysis. Only the Train A cooling tower pump and fan are credited. Therefore, the unavailability of 1-SW-FN-51B does not impact the overall fire risk.

Seismic

In the unlikely event that seawater flow to the Service Water Pumphouse is restricted (>95 percent blockage) due to seismically induced damage to the circulating water (seawater) intake and discharge tunnels, a mechanical draft evaporative cooling tower is provided to dissipate shutdown and accident heat loads. 1-SW-FN-51B being unavailable will only contribute to seismic risk when its corresponding opposite train component is out-of-service due to random failures, which are very low and bounded by the internal events analysis. As such, it can qualitatively be inferred that there would be no significant impact on seismic risk during the 5-day proposed period of enforcement discretion requested as part of the NOED.

8. **Did the licensee confirm that the facility organization that normally reviews safety issues has reviewed and approved this request and that a written NOED request will be submitted within 2 days of the NRC staff's decision regarding the NOED?**

This request for enforcement discretion was reviewed and approved by NextEra Seabrook's Onsight Review Group on September 23, 2021. This letter satisfies the requirement that a written Notice of Enforcement Discretion request be submitted 2 working days after the NRC's verbal decision.

9. **Was there agreement on the need for a follow-up LAR?**

Seabrook plans to submit an Emergency License Amendment Request by September 25, 2021 for a one-time AOT extension.