September 25, 2021
SBK-L-21104
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington DC 20555-0001

RE: Seabrook Station
Docket No. 50-443
Renewed Facility Operating License No. NPF-86

Emergency License Amendment Request 21-02, Service Water System / Ultimate Heat Sink One-Time Allowed Outage Time (AOT) Extension

Pursuant to 10 CFR 50.90 and 10 CFR 50.91(a)(5), NextEra Energy Seabrook, LLC (NextEra) hereby requests an emergency license amendment to Renewed Facility Operating License NPF-86 for Seabrook Nuclear Plant Unit 1 (Seabrook). The proposed emergency amendment would modify Technical Specification (TS) 3.7.4 ACTION b by extending the allowed outage time (AOT) on a one-time basis for a Service Water (SW) system cooling water cell from seven (7) days to (16) days to allow entry into Mode 5 during a planned refueling outage, which is scheduled to begin early October, 2021. The one-time license amendment is necessary to continue maintenance repair on SW Cooling Tower Fan 51B (1-SW-FN-51B). On September 17, 2021 at 0456, Seabrook Station entered a seven-day action statement upon discovery of a broken drive shaft with oil leaking out of the associated gear box on 1-SW-FN-51B. However, following repair, elevated vibrations detected from the replacement gear box during post-maintenance testing precluded a return to an operable state. The new gearbox is being adjusted with input from the supplier and may require offsite repair, however, the current timeline exceeds the remaining action statement time. Without regulatory relief, Seabrook will be required to shut down the unit earlier than the planned refueling outage, resulting in an increase in risk without a corresponding benefit to public health and safety.

The Enclosure to this letter provides an evaluation of the proposed change, including the circumstances warranting this emergency request. An emergency LAR is being submitted due to the time constraints of the allotted 5-days provided by the verbal approval for enforcement discretion concerning this condition. Attachment 1 to the enclosure provides a mark-up of the existing TS page to show the proposed change. The retyped (clean copy) TS page will be provided upon request. No change is proposed to the current TS Bases as a result of this emergency amendment request.

In accordance with paragraph (a)(5) of 10 CFR 50.91, NextEra requests NRC approval of the one-time AOT extension on an emergency basis by September 29, 2021. Once approved, this emergency amendment will be implemented prior to the expiration of enforcement discretion.

As discussed in the Enclosure, the proposed change does not involve a significant hazards consideration pursuant to 10 CFR 50.92, and there are no significant environmental impacts associated with the change. The Seabrook Station Onsite Review Group has reviewed this emergency license amendment request.

This letter contains no new regulatory commitments.

Should you have any questions regarding this submission, please contact Mr. Matthew Levander, Licensing Manager at 603-773-7631.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on the 25th day of September 2021.

Sincerely,

Brian Booth
Site Vice President (SVP) - Seabrook Nuclear Power Station
NextEra Energy

Enclosure
Attachments

cc: USNRC Region I Administrator
USNRC Project Manager
USNRC Senior Resident Inspector

Director Homeland Security and Emergency Management
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Evaluation of the Proposed Changes

Seabrook Station

Emergency License Amendment Request 21-02, Service Water System / Ultimate Heat Sink
One-Time Allowed Outage Time (AOT) Extension

ATTACHMENTS

1.0 SUMMARY DESCRIPTION

Pursuant to 10 CFR 50.90 and 10 CFR 50.91(a)(5), NextEra Energy Seabrook, LLC (NextEra) requests an emergency license amendment to Renewed Facility Operating License NPF-86 for Seabrook Nuclear Plant Unit 1 (Seabrook). The proposed emergency amendment would modify Technical Specification (TS) 3.7.4 ACTION b by extending the allowed outage time (AOT) on a one-time basis for a Service Water (SW) system cooling water cell from seven (7) days to (16) days, to allow entry into Mode 5 during a planned refueling outage, which is scheduled to begin early October 2021. The one-time license amendment is necessary to continue maintenance repair on SW Cooling Tower Fan 51B (1-SW-FN-51B). On September 17, 2021 at 0456, Seabrook Station entered a seven-day action statement upon discovery of a broken drive shaft with oil leaking out of the associated gear box on 1-SW-FN-51B. However, following repair, elevated vibrations detected from the replacement gear box during post-maintenance testing precluded a return to operability. The new gearbox is being adjusted with input from the supplier and may require offsite repair, however, the current timeline exceeds the remaining action statement time. Without regulatory relief, Seabrook will be required to shut down the unit earlier than the planned refueling outage, resulting in an increase in risk without a corresponding benefit to public health and safety.

2.0 DETAILED DESCRIPTION

2.1 Current Licensing Basis Requirements

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.

SW 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.

Technical Specifications (TS)

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.

2.2 Reason for the Proposed Change

On September 17, 2021 at 0456, Seabrook Station entered a 7-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 SW Cooling Tower Fan 51B (1-SW-FN-51B). There was no prior indication or evidence suggesting a pending failure. The 1-SW-FN-51B gear box and fan shaft were replaced. After replacement, the associated post maintenance run showed unsatisfactory results due to elevated vibrations. The remaining allotted time on the original seven-day AOT was not sufficient to continue maintenance without initiating a plant shutdown.

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 shut down early in accordance with the TS requirement would result in an undue increase in risk with no corresponding benefit to public health and safety.

2.3 Basis for the Emergency

As explained in Section 3.0 below, an emergency amendment is needed to preclude an unnecessary plant shutdown with no corresponding benefit to public health and safety. NextEra could not have reasonably avoided the situation nor could it have made any timelier application for an amendment that would support either a traditional license amendment request (LAR), or the reduced public commenting period for an Exigent LAR. The oil leak on the service water cooling tower fan gearbox was unexpected and unpredictable. Prior to submission of this emergency amendment request, NextEra systematically conducted troubleshooting and repaired potential causes of the 1-SW-FN-51B gearbox leak. NextEra did not initially believe regulatory relief would be necessary to correct the condition, as the planned troubleshooting and corrective maintenance were within the bounds of the allotted AOT. After detecting high vibration levels on the new gear box during the post maintenance test, the remaining allotted AOT time was not sufficient to restore the SW system to full operability and avoid a plant shutdown. As outlined within Reference 6.1, Seabrook Station requested enforcement discretion to allow adequate time to process an Emergency LAR. The station received verbal approval for enforcement discretion on 09/23/2021 and followed up with a written request on 09/25/2021.

2.4 Description of the Proposed Change

NextEra requests a one-time AOT extension to TS 3.7.4, ACTION b, from 7-days until entry into Mode 5 during a planned refueling outage, which is scheduled to begin early October 2021, in order to continue the necessary maintenance to 1-SW-FN-51B. Seabrook does not have another spare gear box in inventory and a replacement gear box is being sought while refurbishment of the two failed gear boxes is being pursued. The basis for the requested extension period is the estimate time to secure, install and conduct satisfactory post-maintenance testing on a replacement gearbox. 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 commencing unit shutdown and entering Mode 5 for the refueling outage. 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 will allow continued operation to complete final preparations and necessary repairs that will take place during the planned outage.

The proposed change adds a footnote to TS 3.7.4, ACTION b, authorizing the requested one-time AOT extension. The TS markup is provided in Attachment 1 of this Enclosure.

3.0 TECHNICAL EVALUATION

3.1 Cause

Initial trouble shooting efforts revealed that the SW 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 1-SW-MM-300-B and internal components, the most likely cause of the 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. Obstructions created the necessary conditions to deprive critical areas of lubrication as well as over-pressurizing the system, ultimately creating 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 one-time AOT extension is necessary to avoid an early unit shutdown, approximately one week prior to the planned refueling outage.

3.2 Extent of Condition

Unit 2 Service Water Fan 51-B (2-SW-FN-51-B, identical to 1-SW-FN-51-B)

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.

2-SW-FN-51-B is considered operable, and there are currently no indications of a potential common cause failure mode.

Service Water Fan 1-SW-FN-51A

Surveillance testing on this fan was performed on 9/20/21, with no abnormalities noted. No visual indications are present that would challenge the perception that SW Cooling Tower Fan 51A 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.

3.3 Risk Insights

Attachment 2 of this amendment request provides the evaluation of risk impact for the proposed AOT extension, including a discussion of PRA scope, technical adequacy, modeling and insights.

3.4 Safety Margin / Defense in Depth

Safety Margins

The proposed one-time AOT allowance 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 AOT extension. 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.

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 one-time AOT extension.

Weather Considerations

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

Human Performance

Prior to the start and during each shift of the proposed AOT extension, 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 AOT extension will be emphasized during these briefings.

Other Defense-in-Depth Considerations

A reasonable balance among prevention of core damage, and consequence mitigation will be preserved during the proposed AOT extension. The 1-SW-FN-51A service water cooling tower fan will be capable of performing its safety function during the proposed AOT extension of the 1-SW-FN-51B fan. No other SSCs will be affected by the proposed AOT extension 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 AOT extension 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 AOT extension. The independence of the physical barriers to radiological releases will not be degraded as a result of the proposed AOT extension. 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 AOT extension, and thereby no limits will be imposed on any SSC in performing its specified safety function.

Unnecessary risk significant plant configurations will not occur during the proposed one-time AOT extension 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, risk significant plant equipment that will be removed from service will be minimized, 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 Updated Final Safety Analysis Report (USFAR) will be maintained throughout the proposed AOT extension.

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.

3.5 Compensatory Measures

During the proposed AOT extension, the following compensatory measures will be in effect:

(1) Testing or maintenance activities that will be performed during the extended AOT that could potentially cause a plant transient will be minimized.

(2) Testing or surveillances that will be performed on the Service Water system during the extended AOT will be minimized.

(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
vii. Service Water Cooling Tower Pumps

(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).

3.6 Conclusion

Based on the foregoing, NextEra believes there is sufficient regulatory basis pursuant to 10 CFR 50.91(a)(5), to grant an emergency one-time AOT extension from 7-days to 16-days to allow entry into Mode 5 during the planned refueling outage, scheduled to begin early October 2021, in order to facilitate extended repair of SW Cooling Tower Fan "B 51B (1-SW-FN-51B) without an early unit shutdown.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

- 10 CFR 50.36(c)(2)(i) states that when a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.

- 10 CFR 50.91, Notice for public comment; State consultation - includes provisions for requesting exigent and emergency amendments.

4.2 No Significant Hazards Consideration

The proposed emergency amendment would modify Technical Specification (TS) 3.7.4 ACTION b by extending the allowed outage time (AOT) on a one-time basis for a Service Water (SW) system cooling water cell from seven (7) days to (16) days to allow entry into Mode 5 during a planned refueling outage, which is scheduled to begin early October 2021. The one-time license amendment is necessary to continue maintenance repair on SW Cooling Tower Fan 51B (1-SW-FN-51B) without shutting down the unit prior to the planned refueling outage, which is scheduled to begin early October 2021.

As required by 10 CFR 50.91(a), NextEra evaluated the proposed changes using the criteria in 10 CFR 50.92 and determined that the changes do not involve a significant hazards consideration. An analysis of the issue of no significant hazards consideration is presented below:

(1) Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

The proposed change neither involves any physical changes to plant equipment or systems nor does it alter the assumptions of any accident analyses. The proposed change

does not adversely affect accident initiators or precursors, and it does not alter design assumptions, plant configuration, or the manner in which the plant is operated and maintained. The proposed change does not adversely affect the ability of structures, systems, or components (SSCs) to perform their intended safety functions in mitigating the consequences of an initiating event within the assumed acceptance limits.

Therefore, the proposed license amendments would not involve a significant increase in the probability or consequences of an accident previously evaluated.

(2) Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

No new accident scenarios, failure mechanisms, or limiting single failures are introduced as a result of the proposed change. The change does not challenge the integrity or performance of any safety-related systems. No plant equipment is installed or removed, and the change does not alter the design, physical configuration, or method of operation of any plant SSC. No physical changes are made to the plant, so no new causal mechanisms are introduced.

Therefore, the proposed license amendments would not create the possibility of a new or different kind of accident from any previously evaluated.

(3) Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No

Margin of safety is associated with the ability of the fission product barriers (i.e., fuel cladding, reactor coolant system pressure boundary, and containment structure) to limit the level of radiation dose to the public. The proposed change does not affect operation of the plant and no accident analyses are affected by the proposed changes. The proposed change does not adversely affect systems that maintain the plant in a safe shutdown condition.

Therefore, the proposed license amendment would not involve a significant reduction in the margin of safety.

Based upon the above analysis, NextEra concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of no significant hazards consideration is justified.

4.3 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

The proposed license amendment modifies a regulatory requirement with respect to the installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or

changes an inspection or surveillance requirement. However, the proposed license amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed license amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed license amendment.

6.0 REFERENCES

6.1 Seabrook Letter SBK-L-21103, "Request to Exercise Enforcement Discretion," September 25, 2021.

ATTACHMENT 1

PROPOSED TECHNICAL SPECIFICATION PAGES (MARKUP)

(2 pages follows)

3/4.7.4 SERVICE WATER SYSTEM/ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.4 The Service Water System shall be OPERABLE with:

a. An OPERABLE service water pumphouse and two service water loops with one OPERABLE service water pump in each loop,

b. An OPERABLE mechanical draft cooling tower and two cooling tower service water loops with one OPERABLE cooling tower service water pump in each loop, and

c. A portable cooling tower makeup system stored in its design operational readiness state.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

----------NOTES----------

1. Enter applicable ACTIONS of LCO 3.8.1.1, "AC Sources- Operating," for diesel generator made inoperable by service water.

2. Enter applicable ACTIONS of LCO 3.4.1.3, "Reactor Coolant Loops and Coolant Circulation," for residual heat removal loops made inoperable by service water.

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a. With one service water loop inoperable, return the loop to OPERABLE status within 72 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

Add asterisk (*) for footnote.

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.

c. With two cooling tower service water loops or the mechanical draft cooling tower inoperable, return at least one loop and the mechanical draft cooling tower to OPERABLE status within 72 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With two loops (except as described in c) or the service water pumphouse inoperable, return at least one of the affected loops and the service water pumphouse to OPERABLE status within 24 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

Add foot note from next page

FOOTNOTE (with asterisk)

* A one-time AOT extension for an inoperable SW Cooling Tower Fan "B 51B (1-SW-FN-51B) provides an additional 9 days to this AOT. Compensatory measures within NextEra letter SBK-L-21104 dated September 25, 2021 shall remain in effect during the extended AOT period which expires on October 03, 2021 at 0456.

ATTACHMENT 2

RISK INFORMED INPUT TO SUPPORT ONE TIME AOT EXTENSION

(14 pages to follow)

1.0 Purpose

The purpose of this PRA evaluation is to document the risk assessment associated with the proposed one-time extension of Seabrook Technical Specifications Allowable Outage Time for the 1B Service Water Fan from seven (7) days to sixteen (16) days.

2.0 Assumptions

1) All Seabrook Core Damage Frequency and Large Early Release Frequency calculations were performed using the current approved baseline model.
2) No credit was taken for compensatory measures that may be taken to decrease operator or equipment failure rates
3) The plant will transition into a refueling outage fifteen (15) days from the initial Limiting Condition of Operation entry. However the request for extension is for sixteen (16) days until the station has transitioned out of the mode of applicability; thus this assessment evaluates an additional nine (9) days of unavailability beyond the initial 7-day AOT for a total of 16 days of unavailability.
4) The PRA model of record is only applicable in Modes 1 and 2 so while this evaluation provides a calculation of the change in risk for the entire sixteen (16) day duration of the AOT extension, shutdown safety risk will be managed in accordance with shutdown safety procedures.
5) The CDF and LERF calculations were run at a truncation of 5.00E-13.

3.0 PRA Quality

The Seabrook Level 1 and Level 2 PRA Models were initially developed in response to NRC Generic Letter 88-20 (Individual Plant Examination, or IPE). Since the original IPE submittal, the PRA has undergone several model revisions to incorporate improvements and maintain consistency with the as-built, as-operated plant. During that time, the SEA PRA has been the subject of two internal events peer reviews. Overall, the SEA PRA is reviewed and updated with a goal of increased fidelity for risk-informed applications, according to RG 1.200 requirements [1].

Sources of model uncertainty and related assumptions were revised for the internal events and flooding PRA models. The guidance contained in NUREG-1855, Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision Making, and EPRI TR-1016737, Treatment of Parameter and Model Uncertainty for Probabilistic Risk Assessment, were the bases for the revision [2]. Potential sources of generic and plant-specific uncertainty that represent possible impacts on risk-informed applications were reviewed thoroughly. No sources of uncertainty were identified as having a significant impact on the results of this evaluation.

3.1 Model Peer Reviews and Self-Assessments

The ASME / ANS PRA Standard (ASME/ANS RA-Sa-2009), has technical elements, high-level requirements (HLRs), and detailed supporting requirements (SRs) [3]. NRC Regulatory Guide 1.200 Rev 2 endorses Reference 4 with minor "clarifications." The EPRI ePSA database includes each supporting requirement from Reference 4 along with the clarifications from NRC Regulatory Guide 1.200 Rev 2 [1].

3.1.1 Self-Assessments

Self-assessments against the internal event SRs in the PRA standard were performed in 2005 (ASME RA-Sa-2003), 2007 (ASME RA-Sb-2005), 2010 (ASME/ANS RA-Sa-2009) and 2011 (ASME/ANS RA-Sa-2009). The first three self-assessments considered all internal events technical elements. The 2011 self-assessment addressed open findings only against specific SRs.

The 2010 Self-Assessment assessed the 2009 PRA against each of the 254 internal events supporting requirements in ASME/ANS RA-Sa-2009. That assessment reviewed the results of previous peer reviews and their observations along with the subsequent revisions to the PRA to address the observations.

3.1.2 Model Peer Reviews and Finding Closure Reviews per Appendix X to NEI 05-04

The Seabrook PRA has undergone peer review against ASME PRA Standard Parts 1 (configuration control), 2 (internal events) and 3 (internal flood events).

Peer reviews have been conducted against internal event supporting requirements as follows:

- In 1999, a review of all technical elements was performed using the industry PSA Certification process, the precursor to the PRA Standard.
- In 2005, a focused peer review was performed for the elements AS, SC and HR as well as configuration control. This review was done to PRA Standard ASME RA-Sa-2003.
- In 2009, a focused peer review was performed for all elements of Part 3, Internal Flooding. This review was done to PRA Standard ASME/ANS RA-Sa-2009.
- In 2012, a focused peer review was performed for the element LE. This review was done to PRA Standard ASME/ANS RA-Sa-2009.
- In 2019, a focused peer review was performed on all elements upgraded by the conversion from RISKMAN to CAFTA. This review was done to PRA Standard ASME/ANS RA-Sa-2009.

In October 2017, all resolved findings were reviewed to Appendix X to NEI 05-04, NEI 07-12, and NEI 12-13, "Close-out of Facts and Observations" (F&Os) as accepted by NRC in the staff memorandum dated May 3, 2017 [4].

Attachment 1 provides a summary of the open findings after the independent review and focused scope peer review. None of the open findings have an impact on the results and conclusions of this evaluation.

4.0 Methodology

4.1 Internal Events and Internal Flooding

The Seabrook baseline model, which includes both Internal Events and Internal Flooding, was used to quantify the Core Damage Frequency (CDF) and Large Early Release Frequency (LERF) for the proposed AOT extension for 1SW-FN-51B [5]. To determine the change in risk with 1SW-FN-51B out of service a flag file was created that set all the basic events in the model for the fan to a probability of 1.0 (true).

The calculated CDF and LERF results were used to evaluate the Incremental Conditional Core Damage Probability (ICCDP) and the Incremental Conditional Large Early Release Probability (ILERP) associated with the proposed AOT extension as shown below.

ICCDP = [(conditional CDF with the subject equipment out of service) - (baseline CDF with nominal expected equipment unavailabilities)] * (duration of AOT under consideration)

ICLERP = [(conditional LERF with the subject equipment out of service) – (baseline with nominal expected equipment unavailabilities)] * (duration of AOT under consideration)

Table 1 provides a summary of the calculated Internal Events and Internal Flooding ICCDP and ILERP.

Table 1 – Results for Internal Events and Internal Flooding

Metric	*Baseline*	*Variant*	*Delta*	*ICCDP/ICLERP*
CDF	6.15E-06	8.02E-06	1.87E-06	8.20E-08
LERF	4.32E-08	4.41E-08	9.00E-10	3.95E-11

4.2 Fire Events

1SW-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 1SW-FN-51B does not impact the overall fire risk.

4.3 Seismic Events

Seismic risk in the Individual Plant Examination of External Events (IPEEE) is based on an acceptable methodology identified in NUREG-1407. The IPEEE assessment incorporates quantification and model elements (such as system fault trees, event trees, random failure rates, common-cause failures, etc.) consistent with state of the practice in the 1990s. The assessment of Service Water Fan AOT extension is based on more recent seismic hazard evaluations for the Near-Term Task Force (NTTF) response and on the current Model of Record. If a component is not failed during a particular seismic event, it will then 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. EPRI report 3002020744 identifies that while seismic risk can be an important contributor to overall plant risk, its impact on delta-risk calculations is much less significant [6]. As such, it can qualitatively be inferred that there would be no significant impact on seismic risk due to extending the AOT for these components.

4.4 Other External Events

Apart from the Internal Fire and Seismic risk discussions above, all other external hazards were screened per IPEEE and updated for the NTTF for Fukushima. See Attachment 2 and Attachment 3 for details on the screening.

5.0 Results and Conclusions

Reg Guide 1.177 provides quantitative acceptance guidelines for risk impact related to AOT changes to be considered "small" as ICCDP of less than 1.0E-6 and ICLERP of 1.0E-7 or less [7]. Table 2 presents a summary of the calculated ICCDP and ICLERP values for the 1SW-FN-51B being unavailable. Both ICCDP and ICLERP are well below the threshold of acceptance outlined in Reg. Guide 1.177.

Table 2 – ICCDP and ICLERP Summary

Metric	*ICCDP*	*ICLERP*
Internal Events and Internal Flooding	8.20E-08	3.95E-11
Fire	0.00E+00	0.00E+00
Seismic	ε	ε
Total	8.20E-08	3.95E-11

6.0 Verification Summary

All comments provided were incorporated and resolved.

7.0 References

[1] U.S. Nuclear Regulatory Comission, *An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,* Revision 2: Reg Guide 1.200, March 2009.

[2] U.S. Nuclear Regulatory Comission, *Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decisionmaking,* Revision 1: NUREG-1855, March 2017.

[3] The American Society of Mechanical Engineers, *Addenda to ASME/ANS RA-S-2008 Standard for Level 1/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications,* New York, NY: ASME/ANS RA-Sa-2009, 2009.

[4] U.S. Nuclear Regulatory Commission, *MEMO: U.S. Nuclear Regulatory Commission Acceptance on Nuclear Energy Institute Appendix X to Guidance 05-04, 07-12, and 12-13, Close-Out of Facts and Observations (F&Os),* Washington D.C.: ML17079A427, May 2017.

[5] Florida Power and Light, *SBK Internal Events PRA Model,* Revision 0, SBK-1FJR-19-042.

[6] Electric Power Research Institute, *Investigation of Seismic Probabilistic RIsk Assessment (SPRA) Quantification to Simplify PRA Models Used to Assess Risk-Informed Completion Times,* 3002020744, June 2021.

[7] U.S. Nuclear Regulatory Commission, *An Approach for Plant-Specific, Risk-Informed Descisionmaking: Technical Specifications,* Revision 1: Regulatory Guide 1.177, May 2011.

Attachment 1 – Disposition and Resolution of Open Peer Review Findings and Self-Assessment Open Items.

Finding No.	Supporting Requirement	Capability Category (CC)	Description	Disposition for Inverter AOT Extension LAR
F&O LE-D6-01	LE-D6	Not Met	The analysis does not consider an increased probability of thermally-induced steam generator tube rupture due to depressurized steam generators that may occur due to secondary side conditions as mentioned in item (b) of the SR. In addition, because thermally-induced tube rupture follows hot leg integrity in the event tree, proper consideration of the conditional probabilities should be re-addressed to ensure that it is not receiving a lower probability than it should. As the plant ages, the analysis should also be cognizant that at some point the tubes should no longer be considered 'pristine.'	A change to XSGTI1 (1E-03 to 0.1) was needed to completely resolve this finding. The sensitivity case indicates that this change will increase the overall LERF by less than 1%, which is negligible. This finding has negligible impact on this risk-informed application. This change was implemented in the recent model SBK20.
F&O DA- 5-1	DA-D4	Met	The Seabrook PRA uses all operating experience when performing the Bayesian update. The use of all operating experience in the Bayesian update can provide non-conservative results for component failure probabilities. For example, if a component has been replaced, previous operating experience is no longer applicable for that component. (This F&O originated from SR DA-D4) Basis for Significance If a non-conservative distribution is used in the reasonableness check, it can skew the results of the check. Possible Resolution Ensure that the operating experience used in the data update is appropriate and applicable with current plant operations, and re-evaluate the Bayesian update. Otherwise, perform a sensitivity analysis with a shorter operating experience to assess the impacts of the current assumption.	The 2019 data update covers the period of July 1, 2013 through August 31, 2018, not all of Seabrook's operating experience. Considering the very small fraction of components in the database replaced during this time, the impact on failure rates is negligible.
F&O DA-5-3	DA-E1	Met	The following documentation issues were identified: 1) Table 13.6-1 of the Data Analysis shows the Bayesian validation of the Seabrook type codes. It is noted that the Bayesian update equations used for Beta distributions are incorrect. The equation used to update the beta parameter of the beta distribution should be B_prior + n_exposures - n_failures. The current equation used is B_prior + n_exposures. Note that the current equation used is not consistent with the CAFTA Bayesian update tool. 2) Section 13.6.2 of the Data Analysis discusses three conditions for checking the reasonableness of the Bayesian update. In the description of the conditions it should be stated '…5th percentile and less than the 95th percentile of the generic/posterior distribution.' 3) Section 13.6.2 states that the parameters of interest in the reasonableness check are the: mean values, 5th percentile value, and 95th percentile value. Table 13.6-1 does not provide the mean values. (This F&O originated from SR DA-E1) Basis for Significance These documentation issues need to be addressed to accurately describe the analysis. Possible Resolution 1) Update Table 13.6-1 to be consistent with the values and equations used in the CAFTA model. 2) Update the discussion in Section 13.6.2 to state 'distribution' instead of 'mean' when referring to the 5th and 95th percentile	Seabrook model was upgraded to CAFTA, including data analysis. Documentation did not clearly explain this process change. Issues are documentation issues only. No impact.

Finding No.	Supporting Requirement	Capability Category (CC)	Description	Disposition for Inverter AOT Extension LAR
			values. 3) Provide the mean values for the distributions in Table 13.6-1.	
F&O DA-5-5	DA-E2	Met	The following documentation issues were identified: 1) A review of the CAFTA .rr database shows that there are 6 common cause groups making use of the MGL method: BUSFX, BUSFL, LINES, LINES.YR, LINESMNT, and LINESMNT.YR. A search of the System Analysis notebook states that for BUS56FX 'Note that MGL CCF parameters are used in the 2019 update because the 2015 update to NUREG/CR-5497 did not have information on switchgear CCF failure data.' This statement does not provide a reference to the data source used, and the data notebook does not provide this information either. 2) There is no discussion regarding the selection of staggered or non-staggered testing schemes and the use of these calculation methods for the CCF groups. (This F&O originated from SR DA-E2) Basis for Significance These documentation issues need to be addressed to accurately capture the analysis. Possible Resolution The following resolutions are recommended: 1) Update the data notebook to discuss the data source used for the MGL parameters still used in the PRA model, or update the MGL parameters to the generic alpha factors from the 2015 update of NUREG/CR-5497. 2) Add a clarifying statement to the Data Analysis regarding the selection of staggered or non-staggered testing schemes for the CCF groups. Discussions with Seabrook states that all CCF groups make use of a staggered testing scheme.	Documentation. No impact
F&O DA-5-7	DA-E2	Met	The Bayesian reasonableness check does not discuss any criteria for when there are 0 failures in the plant-specific experience. For these cases, none of the checks will pass the specified criteria. (This F&O originated from SR DA-E2) Basis for Significance There are cases where there were no failures in the plant-specific operating experience so there needs to be documentation of treatment for those cases. Possible Resolution Document the reasonableness check performed for cases where there are 0 plant-specific failures, and the criteria for determining whether or not the plant-specific operating experience is consistent with the prior distribution selected.	Documentation. No impact

Finding No.	Supporting Requirement	Capability Category (CC)	Description	Disposition for Inverter AOT Extension LAR
F&O HR-6-1	HR-G7	Not Met	1)Self assessment identifies limitations with manpower requirements and there still appear to be gaps with HRAC specific inputs for manpower. Additionally, execution locations are also not identified for all actions. 2)Not being able to reproduce results. Recreating the dependency analysis using the same cutsets that were used, and creating a combination event recovery rule file resulted in 860 combinations versus the documented 505 combinations in the Section 11 HR document Section 11.8.1.3. 3)Manual combination and dependency overrides lacked sufficient justification for assigned dependency levels. For example, combination of HH.OFL0CW.FL and HH.OFL1CW.FA, the current justification taken is for larger timing separation between actions, however, the override taken is equivalent to intervening success. This isn't sufficient justification for the override taken. (This F&O originated from SR HR-G7) Basis for Significance Item 1 has direct impact on the dependency level on combinations of HFE's through the adequate resources decision tree node. The calculator requires the manpower fields or execution locations to be complete to work properly. Not having these filled out is not conservative, as the HRAC interprets the no locations as all dependent events as being in the same location thus inappropriately satisfying adequate resources requirement. Item 2 not being able to reproduce results brings the validity of the analysis into question. Item 3 The dependency overrides have a potentially large effect on model results. Possible Resolution Item 1 Fill out manpower or complete execution location fields for all post initiators. Item 2 Re-perform results and document more clearly so it can be reproduced for independent review. Item 3 Reassess any manual overrides, provide sufficient justification where applicable and readjust the overrides as needed.	The HRA for Seabrook has been redone. The dependency analysis is reproducible. Most of the dependency analysis overrides have been eliminated, and those that remain are justified. No impact to this application.
F&O HR-6-3	HR-I1	MET	Section 3.0 of Section 11, Human Actions Analysis, discusses methodology and references PRA-106 "PRA Model Guidelines", Section 106E Methodology for Human Reliability Analysis. PRA-106 is the modeling information for RISKMAN. No discussion could be found for dependency analysis methodology in the conversion report. Similar issue was found to exist in Systems Analysis, Data Analysis, HRA, and Accident Sequence. (This F&O originated from SR HR-I1) Basis for Significance Documentation does not apply to the current methods for listed technical elements. Possible Resolution Update to reflect correct reference for methodology.	The SBK MOR includes a new dependency analysis. Documentation is updated. No impact to this application,

Finding No.	Supporting Requirement	Capability Category (CC)	Description	Disposition for Inverter AOT Extension LAR
F&O HR-6-6	HR-E4	MET	There are instances where the information from Appendix 11.1A does not match the HRAC. See example below. HH.OHSB1.FA Tcog 5 minutes versus Appendix 11.A1 Tcog of 20-30 minutes. Also Operator interview Insights in HRAC for HH.OALT1.FL don't seem to match the interview documentation. This appears to be a systemic problem as there were other instances found. (This F&O originated from SR HR-E4) Basis for Significance Not entering timing from interviews affects the dependency analysis as well as not representing the as operated plant. Possible Resolution One possible resolution is to use the timing information from the interviews for input to the HRAC or justify an alternative such as current values.	HH.OHSB1.FA is not in the SBK model or in the HRA Calculator. Operator insights in HRAC for HH.OALT1.FL show that the Tsw could be longer, so the HRAC for this HFE is no impact on this application. HRA was updated and any possible systemic issues identified and addressed.
F&O QU-7-2	QU-B9	MET	Logic flags have not been set to TRUE or FALSE for all flags prior to the generation of cutsets. The current methodology sets logic flags to TRUE in the recovery rules which occurs after the generation of cutsets. Additional cutsets have been generated in the final results that should not exist as they are nonminimal. (This F&O originated from SR QU-B9) Basis for Significance Additional cutsets are being generated in the results due to flag events remaining in the model that are not set to TRUE or FALSE. For example, cutsets 358 and 405 are non-minimal with cutset 1977 (see CDF-POS123.CUT). Possible Resolution Set flags either to TRUE or FALSE prior to cutset generation (e.g., in the flag file), OR utilize a methodology whereby the quantifier can identify flag events.	Upon inspection, a minimum number of non-minimal cutsets were found in the latest quantification, resulting in a reduction in CDF of less than 0.3%. This will be remedied in the future by having the flags set to True and the cutsets subsumed at the beginning of the recovery rule file. No impact on this application
F&O QU-7-5	QU-A3	MET	SOKC is not accounted for in some type codes that use identical data sets. One example is for the type codes NICB1C and NICB1O. Both of these type codes use the same data set, but since they are different type codes UNCERT does not take the same sample for both distributions. This appears to be a common approach when the generic data doesn't delineate between the different failure modes of a component. (This F&O originated from SR QU-E3) Basis for Significance State of knowledge correlation can impact the distribution of the overall CDF/LERF. Possible Resolution One possible resolution could be to Bayesian update these type codes with plant specific data to delineate the data sets such that the type codes used in the model do not use identical data sets. Another approach could be to use a single type code for both failure mode basic events such that the SOKC is taken into account. The resolution should be applied to all occurrences where the SOKC was broken.	SBK20 was updated to resolve all issues. No impact to this application.

Finding No.	Supporting Requirement	Capability Category (CC)	Description	Disposition for Inverter AOT Extension LAR
F&O QU-7-7	QU-F2	MET	1) The FTREX.ini file was not documented. This is necessary to quantify the model and is significant because the default method is not used. 2) The criteria establishing convergence is based on <=5% change when compared to the next decade. The example in the standard uses a <5% final change. The final change is interpreted as calculating the percent change at the current truncation level with respect to the previous decade truncation level not the next. The criteria used is adequate, but there is no documentation of definition used to establish convergence. 3)There is no discussion of the top basic events and why they make logical sense. A general statement that notes that basic events importance's were reviewed to ensure they make logical sense is not sufficient evidence for the actual review taking place. 4) There is no documentation of how the circular logic is broken. A demonstration was performed that identified a couple examples of where in the model circular logic was broken. This identification and modeling technique needs to be documented. (This F&O originated from SR QU-F2) Basis for Significance 1) Without the .ini file it is difficult/impossible to reproduce the quantitative results. 2) Since the definition of convergence is not the same as the example in the standard, it needs to be defined in the documentation. 3) Without the discussion of the top basic events to ensure they make logical sense it is not clear that a detailed review was performed. After discussion with the Seabrook PRA staff, it was determined that the review was performed but not documented. 4) Without documentation it is difficult/impossible to review and determine that the circular logic was broken appropriately. Possible Resolution 1) Include in the documentation the .ini file or include enough information such that the .ini file could be recreated. For example mentioning that FTREX wrapper was used with WRAP method 3. 2) Update the documentation to include the definition of convergence used. 3)Update the review to include a discussion of the top basic events and why they make logical sense. 4) Document all occurrences of where circular logic was broken and how it was broken.	Documentation issues. The latest model shows acceptable convergence. No impact.
F&O QU-7-10	QU-D6	MET	Component importance measures were not identified. The supporting requirement specifically requires the identification of significant SSCs. (This F&O originated from SR QU-D6) Basis for Significance Not identifying component importance measures can result in the loss of insights for top risk contributors. Possible Resolution Identify and include component importance measures consistent with the definition of significant contributors.	This issue is resolved in the latest model of record. No impact to this application..

Attachment 2 – External Hazards Screening

External Hazard	Screening Result		
	Screened? (Y/N)	Screening Criterion (Note a)	Comment
Aircraft Impact	Y	PS4	Screened based on low probability of aircraft crash and small target size of SR structures.
Avalanche	Y	C3	Excluded due to site topography that would not support snow buildup that would lead to an avalanche.
Biological Event	Y	C1 C4 C5	Included implicitly in LOOP initiator (LOSPP, LOSPG). Slow developing with limited impact. Slow developing hazard, can be detected and managed. Plant programs are in place to periodically inspect and clean SW screen wash system.
Coastal Erosion	Y	C3	Excluded based on location of SW intake connections approx. 50 feet below sea level, not subject to erosion.
Drought	Y	C3	Excluded since the capacities of the two UHS options are not impacted by drought – Atlantic Ocean and Cooling Tower basin. Also excluded based on structures founded on bedrock and/or engineered fill.
External Flooding	Y	C1	The external flooding hazard at the Seabrook Station site was recently evaluated as a result of the post-Fukushima 50.54(f) Request for Information and the flood hazard reevaluation report (FHRR) was submitted to NRC for review on November 7, 2016 (Reference 16). The results indicate that flooding from all hazards, except local intense precipitation (LIP) and probable maximum storm surge (PMSS), are bounded by the current licensing basis (CLB) and do not pose a challenge to the plant. Flooding from local intense precipitation and probable maximum storm surge were subsequently evaluated in the Seabrook Station Flooding Focused Evaluation (FE). Seabrook's focused evaluation and Mitigating Strategies Assessment (MSA) for flooding conclude that the current station procedures for implementing the FLEX strategy provide an acceptable method of assuring safe shutdown.
Extreme Wind or Tornado	Y	PS1 PS2	High winds/tornados were screened out in the Seabrook IPEEE. All seismic Category 1 structures exposed to wind forces are designed to withstand wind velocity at 110 mph at 30 ft above nominal ground elevation. The tornado loadings are based on a 290 mph tangential wind velocity and a 70 mph translational wind velocity, with simultaneous atmospheric pressure drop of 3 psi at a rate of 2 psi per second. Safety-related systems at Seabrook are in general provided with positive tornado missile protection. No modifications have

External Hazard	Screening Result		
	Screened? (Y/N)	Screening Criterion (Note a)	Comment
			been made that would detract from Seabrook meeting the screening conclusions. Subsequent to the IPEEE, the Emergency Supplemental Power Supply (SEPS DG) was installed in a non-protected enclosure subsequent to IPEEE. Also, as part of IPEEE, was recognized that the design of the SW cooling tower is not completely missile protected and could be subject to high wind/missile hazards, e.g., fans. The high wind/missile hazard/consequence is judged not significant given that the EDGs and Ocean SW pumps/piping are protected from these hazards.
Fog	Y	C5	Fog and mist may increase the frequency of accidents involving aircraft, ship, or vehicle. This weather condition is included implicitly in the weather conditions and accident rate data for these transportation accidents.
Forest or Range Fire	Y	C1 C3 C4 C5	Included implicitly in LOOP initiator (LOSPP). Forest & grass are somewhat distant from the plant and smoke from a forest/grass fire is unlikely to impact both CR air intakes; no immediate impact on equipment. Forest & grass fire unlikely to propagate to the site because of the distance between surrounding forest and SR structures.
Frost	Y	C4	Included implicitly in weather-related LOOP. Can be considered covered by other events such as snow, cold, etc.).
Hail	Y	C4 C1	Included implicitly in weather-related LOOP. Impact to buildings/structures bounded by other more extreme events. Can be considered covered by other events such as snow, cold, etc.).
High Summer Temperature	Y	C1 C5	Plant AC ventilation is designed for extreme heat load. Backup SW Cooling Tower effectiveness may be limited due to high ambient temperature with high dew point. Slow developing hazard, can be detected and managed.
High Tide, Lake Level, or River Stage	Y	C4	Refer to External Flooding hazard.
Hurricane	Y	C4	Refer to External Flooding hazard and Extreme Wind hazard.
Ice Cover	Y	C4	Included implicitly in weather-related LOOP (LOSPW). Ocean intake is ~50 ft below surface, cannot freeze. Backup standby cooling tower has temperature monitoring and de-icing capabilities.

External Hazard	Screening Result		
	Screened? (Y/N)	Screening Criterion (Note a)	Comment
Industrial or Military Facility Accident	Y	C1 C2 C3 C5	There are no industrial or military facilities in the vicinity that would impact the plant. Therefore, hazard is screened. Design basis sufficient to screen.
Internal Flooding	N	None	PRA for this hazard is addressed in the Seabrook Station Internal Flooding PRA
Internal Fire	N	None	Internal fire risk consideration will conservatively use the SSEL. Refer to LAR Section 3.2.2
Landslide	Y	C3	Above ground landslide excluded due to site topography would not support landslide of any significance. Underwater landslide excluded based on location of SW intake connection elevation below sea level, not subject to undermining from underwater landside.
Lightning	Y	C4 C1	Included implicitly in LOOP initiator (LOSPW). Weather-related LOOP is used since it includes storms including lightning strikes. The plant grounding system provides protection to emergency AC power to reduce the likelihood of lightning-induced failures. Emergency AC power is designed to reduce the likelihood of lightning-induced failure. Physical and electrical train separation provides additional protection.
Low Lake Level or River Stage	Y	C3	Excluded since the capacities of the two UHS options are not impacted by low water level. The intake for the ocean SW is ~50 feet below sea level. The SW Cooling Tower basin contains a nominal volume of ~3 million gal, sufficient for 7 day supply.
Low Winter Temperature - Air	Y	C1 C5	Extreme temperatures are uncommon due proximity of Ocean. Building structures, ventilation and monitoring systems are designed to address low temperatures. Winter preparations are proceduralized to protect the station from low temperatures.
Low Winter Temperature - Water	Y	C3	Ocean intake is ~50 ft below surface, cannot freeze. Backup standby cooling tower has temperature monitoring and de-icing capabilities.
Meteorite or Satellite Impact	Y	PS4	Conservative bounding assessment shows that these events can be screened. Extremely unlikely for satellite debris of any significant size to hit the site. Any such strike would be localized and not expected to cause direct core damage.

External Hazard	Screening Result		
	Screened? (Y/N)	Screening Criterion (Note a)	Comment
Pipeline Accident	Y	C3	Pipelines are not close enough to significantly impact plant structures. UFSAR design basis is sufficient to screen this hazard.
Release of Chemicals in Onsite Storage	Y	C1	UFSAR design basis sufficient to screen this hazard - screened based on plant design.
River Diversion	Y	C3	Excluded since UHS does not depend on river or lake.
Sand or Dust Storm	Y	C1 C3	Plant equipment is protected from or designed to preclude foreign material (ventilation inlet filters, etc.) Also excluded due to lack of large quantities of loose sand on site or nearby (beach is 2 miles away).
Seiche	Y	C1	Refer to External Flooding hazard.
Seismic Activity	N	None	Seismic risk discussed in evaluation
Snow	Y	C1 C4 C5	Design includes snow loads and other bounding loads. DG air intakes are well above ground elevation. Plant procedure identifies the need to monitor ventilation air intakes that might be impacted by drifting snow or ice. Included implicitly in weather-related LOOP initiator (LOSPW).
Soil Shrink-Swell Consolidation	Y	C3	Excluded based on structures founded on bedrock and/or engineered fill.
Storm Surge	Y	C1	Refer to External Flooding hazard.
Toxic Gas	Y	C3	Toxic gas covered under release of chemicals in onsite storage, industrial or military facility accident, and transportation accident. UFSAR design basis is sufficient to screen this hazard.
Transportation Accident	Y	C4 C1	The potential impact on the site is enveloped by industrial hazards. Ship and vehicle transportation accidents considered the potential for explosive / hazardous releases. Based on these sources, these hazards are not significant challenges to the plant and can be screened.
Tsunami	Y	C1	Refer to External Flooding hazard.
Turbine-Generated Missiles	Y	PS4	Screened based on low probability of turbine blade failure and limited consequences in Turbine Bldg. Screened based on low probability of turbine wheel failure and low probability of impacting SR equipment due to turbine orientation.
Volcanic Activity	Y	C3	Excluded due to distance from nearest potentially active volcano.
Waves	Y	C1	Refer to External Flooding hazard.
Note a – See Attachment 3 for descriptions of the screening criteria.			

Attachment 3 – Progressive Screening Approach for Addressing External Hazards

Event Analysis	Criterion	Source	Comments
Initial Preliminary Screening	C1. Event damage potential is < events for which plant is designed.	NUREG/CR-2300 and ASME/ANS Standard RA-Sa-2009	
	C2. Event has lower mean frequency and no worse consequences than other events analyzed.	NUREG/CR-2300 and ASME/ANS Standard RA-Sa-2009	
	C3. Event cannot occur close enough to the plant to affect it.	NUREG/CR-2300 and ASME/ANS Standard RA-Sa-2009	
	C4. Event is included in the definition of another event.	NUREG/CR-2300 and ASME/ANS Standard RA-Sa-2009	Not used to screen. Used only to include within another event.
	C5. Event develops slowly, allowing adequate time to eliminate or mitigate the threat.	ASME/ANS Standard	
Progressive Screening	PS1. Design basis hazard cannot cause a core damage accident.	ASME/ANS Standard RA-Sa-2009	
	PS2. Design basis for the event meets the criteria in the NRC 1975 Standard Review Plan (SRP).	NUREG-1407 and ASME/ANS Standard RA-Sa-2009	
	PS3. Design basis event mean frequency is < 1E-5/y and the mean conditional core damage probability is < 0.1.	NUREG-1407 as modified in ASME/ANS Standard RA-Sa-2009	
	PS4. Bounding mean CDF is < 1E-6/y.	NUREG-1407 and ASME/ANS Standard RA-Sa-2009	
Detailed PRA	Screening not successful. PRA needs to meet requirements in the ASME/ANS PRA Standard.	NUREG-1407 and ASME/ANS Standard RA-Sa-2009	