UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PENNSYLVANIA 19406-2713

November 10, 2021

Mr. Robert Coffey
Executive Vice President, Nuclear Division
and Chief Nuclear Officer
Florida Power & Light Company
700 Universe Blvd.
Mail Stop: EX/JB
Juno Beach, FL 33408

SUBJECT: SEABROOK STATION, UNIT NO. 1 – INTEGRATED INSPECTION REPORT 05000443/2021003

Dear Mr. Coffey:

On September 30, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Seabrook Station, Unit No. 1. On November 9, 2021, the NRC inspectors discussed the results of this inspection with Mr. Brian Booth, Site Vice President and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. One Severity Level IV violation without an associated finding is documented in this report. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Seabrook Station, Unit No. 1.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; and the NRC Resident Inspector at Seabrook Station, Unit No. 1.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

Matthew R. Young

Digitally signed by Matthew R. Young
Date: 2021.11.10 09:02:27 -05'00'

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

Docket No. 05000443
License No. NPF-86

Enclosure:
As stated

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SUBJECT: SEABROOK STATION, UNIT NO. 1 – INTEGRATED INSPECTION REPORT 05000443/2021003 DATED NOVEMBER 10, 2021

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Number:	05000443
License Number:	NPF-86
Report Number:	05000443/2021003
Enterprise Identifier:	I-2021-003-0003
Licensee:	NextEra Energy Seabrook, LLC
Facility:	Seabrook Station, Unit No. 1
Location:	Seabrook, New Hampshire
Inspection Dates:	July 01, 2021 to September 30, 2021
Inspectors:	C. Newport, Senior Resident Inspector T. Daun, Resident Inspector P. Cataldo, Senior Reactor Inspector S. Wilson, Senior Health Physicist
Approved By:	Matt Young, Chief Projects Branch 2 Division of Operating Reactor Safety

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Seabrook Station, Unit No. 1, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information.

List of Findings and Violations

Inadequate Preventative Maintenance Contributes to Failure of 'F' Vital Inverter Static Transfer Switch			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000443/2021003-01 Open/Closed	[H.13] - Consistent Process	71111.19
A self-revealed Green non-cited violation of Seabrook Technical Specification 6.7 "Procedures and Programs" was identified when NextEra personnel failed to implement the requirements of MA-AA-201-1000, "Preventative Maintenance and Surveillance Procedure." Specifically, adequate preventative maintenance activities were not developed and performed on the 'F' vital inverter static transfer switch, likely contributing to its failure and resultant loss of the 1F 120VAC vital bus and complex plant transient.			

Inadequate Corrective Actions Result in the Failure of the Unit 1 'B' Service Water Cooling Tower Fan			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000443/2021003-02 Open/Closed	[H.14] - Conservative Bias	71153
A self-revealed Green non-cited violation of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified when NextEra personnel failed to implement adequate corrective actions following degraded oil samples for the Unit 1, 'B' emergency cooling tower fan. Specifically, a history of degraded oil conditions combined with inadequate or ineffective actions taken in response to the oil degradation led to the gearbox failure on September 17, 2021.			

Pressurizer Safety Valve Outside of Technical Specification Limits Discovered During As-Found Set Point Testing			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000443/2021003-03 Open/Closed	Not Applicable	71153
A self-revealed Severity Level IV non-cited violation of Technical Specification 3.4.2.2, "Reactor Coolant System Safety Valves" was identified when testing results of one of the three pressurizer safety valves did not meet the technical specification requirement of being within +/- 3 percent of design lift pressure.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000443/2021-001-00	LER 05000443/2021-001-00 for Seabrook Station, Pressurizer Safety Valve Outside of Technical Specification Limits Discovered During As-Found Set Point Testing	71153	Closed

PLANT STATUS

Seabrook Station began the inspection period operating at 100 percent rated thermal power and remained at or near full power for the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident and regional inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time, the resident inspectors performed periodic site visits each week, increasing the amount of time on-site as local COVID-19 conditions permitted. As part of their on-site activities, resident inspectors conducted plant status activities as described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records; observed risk significant activities; and completed on-site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on-site. The inspections documented below met the objectives and requirements for completion of the IP.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

External Flooding Sample (IP Section 03.03) (1 Sample)

(1) The inspectors evaluated that flood protection barriers, mitigation plans, procedures, and equipment were consistent with the licensee's design requirements and risk analysis assumptions for coping with external flooding on September 7

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

(1) 'A' residual heat removal after maintenance and testing on July 14
(2) 'D' vital battery and associated direct current distribution system during 'B' vital battery service test on July 28

(3) 'A' containment building spray during 'B' containment building spray maintenance outage on August 31
(4) 'A' service water cooling tower during 'B' service water cooling tower fan failure on September 17

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

(1) Primary auxiliary building piping penetration area (PP-F-1A,B,2A,B) on August 31
(2) Control building mechanical room (CB-F-3B-A) on September 7
(3) Service water cooling tower Unit 1 switchgear rooms (CT-F-1C-A/CT-F-1D-A) on September 20
(4) Service water cooling tower Unit 1 HVAC and pump room (CT-F-2B-A) on September 24
(5) Service water cooling tower roof (CT-F-3-0) on September 24

71111.06 - Flood Protection Measures

Inspection Activities - Internal Flooding (IP Section 03.01) (1 Sample)

The inspectors evaluated internal flooding mitigation protections in the:

(1) Fuel storage building on September 23

71111.07T - Heat Sink Performance

Heat Exchanger (Service Water Cooled) (IP Section 03.02) (2 Samples)

The inspectors evaluated heat exchanger/sink performance on the following:

(1) 'B' emergency diesel generator jacket water heat exchanger (1-DG-E-42B)
(2) 'B' primary component cooling water heat exchanger (1-CC-E-17B)

Ultimate Heat Sink (IP Section 03.04) (1 Sample)

The inspectors evaluated the performance of the following ultimate heat sink structures:

(1) Intake transition structure, discharge transition structure, service water cooling tower, and service water pumphouse/intake

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01) (1 Sample)

(1) The inspectors observed and evaluated licensed operator performance of the following activities in the control room:
- Loss of 120 VAC power panel PP-1F on August 22
- Valve timing, instrument calibrations, and fire panel testing on September 15

Licensed Operator Requalification Training/Examinations (IP Section 03.02) (1 Sample)

(1) The inspectors observed and evaluated licensed operator requalification training conducted in the plant-reference simulator on September 9

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components remain capable of performing their intended function:

(1) Inspection of primary component cooling water isolation from residual heat removal heat exchanger valve CC-V-145 limit switch failure on August 17

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (5 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

(1) Emergent risk during keypad replacement for inverter ED-I-11 on July 7
(2) Elevated risk during ‘B’ vital battery maintenance outage on July 29
(3) Elevated risk during 'B' emergency feedwater engineered safety features actuation system testing and switchyard work on August 3
(4) Elevated risk during supplemental emergency power system annual maintenance on August 18
(5) Elevated risk during maintenance on the steam supply to the emergency feedwater pump turbine (MS-395) on September 14

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (5 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

(1) Breaker stab failures (ARs 02364081, 02393934, 02396124) on July 1

(2) Main control board annunciator for reactor trip and engineered safety features actuation system alarms (AR 02398689) on July 20
(3) Video alarm system functionality with alarm reset delays (AR 02400569) on August 9
(4) Unit 2 ‘B’ service water cooling tower fan (AR 02404429) on September 22
(5) Evaluation of the Seabrook main generator output breaker fault current interrupting capability on September 28

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

(1) Temporary repair of service water discharge piping degraded condition per ASME Code Case N-513-4 and Code Case N-789-2 on August 23

71111.19 - Post-Maintenance Testing

Post-Maintenance Test Sample (IP Section 03.01) (7 Samples)

The inspectors evaluated the following post-maintenance test activities to verify system operability and functionality:

(1) Bus 5 27B2 relay replacement on July 6
(2) 'A' residual heat removal pump bypass flow control valve RH-FCV-610 thermal overload relay replacement on July 13
(3) 'C' primary component cooling water following check valve internal inspections and maintenance on July 20
(4) Supplemental emergency power system annual maintenance on August 18
(5) ‘F’ vital inverter static transfer switch failure and driver card replacement on August 22
(6) Service water cooling tower pump discharge isolation valve SW-V-25 following repairs on August 26
(7) Service water cooling tower fan 1-SW-FN-51B motor, drive shaft, and gearbox replacement on September 22

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Surveillance Tests (other) (IP Section 03.01) (3 Samples)

(1) Start-up feed pump quarterly functionality surveillance on July 21
(2) 'A' vital battery 18 month service test on September 2
(3) Containment personnel air lock door seal air flow rate test on September 29

In-service Testing (IP Section 03.01) (1 Sample)

(1) Emergency feedwater main steam supply valve MS-V-395 in-service stroke time testing on September 14

RADIATION SAFETY

71124.02 - Occupational As Low As Reasonably Achievable Planning and Controls

Radiological Work Planning (IP Section 03.01) (5 Samples)

The inspectors evaluated the licensee's radiological work planning including the following activities:

(1) Reactor vessel disassembly and reassembly as low as reasonably achievable (ALARA) package 20-01
(2) Steam generator eddy current testing and tube plugging ALARA package 20-120
(3) As low as reasonably achievable Review Board meeting minutes for ALARA package 20-01
(4) Miscellaneous and bulk work not associated with refuel outage number 20 category 2, 3 and 4 ALARA reviews 20-14 and 20-15
(5) Diving operations to repair the fuel transfer system emergency pull cable under radiation work permit number 21-0080, Revision 01

Verification of Dose Estimates and Exposure Tracking Systems (IP Section 03.02) (4 Samples)

The inspectors evaluated dose estimates and exposure tracking for the following:

(1) Refuel outage dose totals analysis
(2) Refueling operations ALARA planning package 20-07
(3) Refuel outage dose totals analysis
(4) Refueling operations post-activity ALARA outcome

Implementation of ALARA and Radiological Work Controls (IP Section 03.03) (3 Samples)

The inspectors reviewed ALARA practices and radiological work controls including the following:

(1) ALARA job in progress review for ALARA review No: 20-01: Reactor vessel disassembly and reassembly 75% complete review
(2) ALARA job in progress review for ALARA review No. 20-120: Steam generator eddy current testing and tube plugging 25% complete review
(3) ALARA job in progress review for ALARA review number 20-140: Outage scaffolding 50% complete review

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

MS08: Heat Removal Systems (IP Section 02.07) (1 Sample)

(1) For the period July 1, 2020 through June 30, 2021

MS09: Residual Heat Removal Systems (IP Section 02.08) (1 Sample)

(1) For the period July 1, 2020 through June 30, 2021

MS10: Cooling Water Support Systems (IP Section 02.09) (1 Sample)

(1) For the period July 1, 2020 through June 30, 2021

71152 - Problem Identification and Resolution

Annual Follow up of Selected Issues (IP Section 02.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

(1) Evaluation of the impacts of alkali-silica reaction (ASR) related bulk structural deformation of the spent fuel building on the spent fuel pool stainless steel liner

71153 - Follow Up of Events and Notices of Enforcement Discretion

Event Follow up (IP Section 03.01) (1 Sample)

(1) The inspectors evaluated a loss of power to the 'F' 120VAC vital instrumentation bus due to the failure of the 'F' vital inverter static transfer switch and the licensee's response on August 22

Event Report (IP Section 03.02) (1 Sample)

The inspectors evaluated the following licensee event reports (LERs):

(1) LER 05000443/2021-001-00, Pressurizer Safety Valve Outside of Technical Specification Limits Discovered During As-Found Setpoint Testing (ADAMS accession: ML21140A411). The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER therefore no performance deficiency was identified. The technical specification violation is dispositioned in the inspection results section of this report.

Notice of Enforcement Discretion (NOED) (IP Section 03.04) (1 Sample)

(1) The inspectors evaluated the licensee's actions surrounding Notice of Enforcement Discretion EA-21-138, which can be accessed at http://www.nrc.gov/reading-rm/doc-collections/enforcement/notices/noedreactor.html, on September 23, 2021.

INSPECTION RESULTS

Observation: Evaluation of the Seabrook Main Generator Output Breaker Fault Current Interrupting Capability	71111.15
The inspectors reviewed the design of Seabrook's main generator output breaker, specifically the fault current interrupting capability. The inspectors also reviewed Seabrook's compliance with 10 CFR Part 50, Appendix A, General Design Criteria (GDC) 17, Electric Power Systems. The Seabrook main generator output breaker is non-safety related, rated at 25kV,	

35kA rated continuous current, and 165kA rated short circuit current. During normal operating conditions, the main generator supplies electrical power to the transmission network (Grid) through the generator step-up transformers (GSU) and to the plant through the unit auxiliary transformers (UAT). The main generator is connected to the GSUs and UATs through the main generator output breaker. When the breaker is tripped (open), the UATs remain energized from the switchyard via the GSUs.

The inspectors reviewed Seabrook's UFSAR, breaker calculations, and completed preventative maintenance work orders to determine the breaker capability and functionality. The inspectors reviewed changes made by the original equipment manufacturer to uprate the breaker via calculations. The original rated short circuit current was 150kA and was uprated via calculation to 160kA in 2006 and then subsequently uprated via calculation to 165kA in 2016. Also, the inspectors reviewed a sampling of preventative maintenance work orders completed by NextEra every 18 months. The work orders included various inspections such as insertion resistor checks and leak checks. The inspectors also noted that the breaker is opened every 18 months when Seabrook enters a refueling outage. The inspectors reviewed the calculations and determined the methodology and results were reasonable to uprate the breaker to 160kA and subsequently to 165kA.

The inspectors reviewed NextEra's short circuit assessment conducted in 2016 by Siemens and ISO-NE's study conducted in 2020 by RLC Engineering, LLC, for the Seabrook breaker. The inspectors noted that the calculation used to conduct the short circuit assessment was based on ANSI/IEEE C37.010-1999, "IEEE Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis," using the ASPEN and ETAP software tools. The maximum short circuit current was determined to be 164,611 amps and 164,415 amps by Siemens and RLC Engineering, LLC, respectively. The inspectors reviewed the short circuit assessments and determined the methodology and results were reasonable. As a result, consistent with ANSI/IEEE standards stated above, the rated short circuit current of the breaker (165kA) is greater than the maximum short circuit current (~164.6kA and 164.4kA) that can be expected due to a fault condition.

NRC Region I inspectors also requested an independent review of the technical aspects of the Seabrook main generator output breaker by NRC headquarters technical staff in the electrical division of Nuclear Reactor Regulation (NRR). NRR's staff review independently validated NRC Region I inspectors' technical conclusions. Specifically, the inspectors have reasonable assurance that the Seabrook main generator output breaker can perform its intended function with the current margin available to the rated short circuit current capability of the breaker and that NextEra remains in compliance with GDC-17. No performance issues were identified during the conduct of this review and inspection.

Inadequate Preventative Maintenance Contributes to Failure of 'F' Vital Inverter Static Transfer Switch			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000443/2021003-01 Open/Closed	[H.13] - Consistent Process	71111.19
A self-revealed Green non-cited violation of Seabrook Technical Specification 6.7 "Procedures and Programs" was identified when NextEra personnel failed to implement the requirements of MA-AA-201-1000, "Preventative Maintenance and Surveillance Procedure."			

Specifically, adequate preventative maintenance activities were not developed and performed on the 'F' vital inverter static transfer switch, likely contributing to its failure and resultant loss of the 1F 120VAC vital bus and complex plant transient.

Description: Seabrook Station utilizes a safety related 120VAC power distribution system to provide uninterruptible power to 120VAC instrumentation and control loads essential to the operation of the plant during normal operations and postulated accident conditions. This power is provided from six vital main distribution panels, I-EDE-PP-1A through -1F. Each of these six main distribution panels are provided with an associated uninterrupted power supply via six vital inverters. These inverters supply power via vital station alternating current power during normal plant operation and can provide power from the station vital batteries during a station blackout event. The transition from vital alternating current power to vital direct current power during such an event is, in part, facilitated by a static transfer switch. The static transfer switch can also provide an alternate maintenance supply of power without a loss of bus loads in the event of a failure of the associated inverter.

On August 22, 2021, Seabrook Station unexpectedly lost 120VAC power to vital power panel 1F. The loss of power resulted in a series of transients throughout the plant requiring control room operators to respond to a complex plant event and carry out a series of procedurally driven actions to maintain plant stability. Operators responded, in part, to the isolation of both trains of primary component cooling water supply to containment (providing cooling water flow to the four operating reactor coolant pumps and containment fan cooling units), a loss of automatic primary component cooling water temperature control, loss of reactor coolant system letdown flow, loss of jacket coolant and air cooler temperature control to the 'B' emergency diesel generator, as well as the loss of multiple additional control and indication capabilities. Operators stabilized the plant and manually supplied power to the 1F power panel approximately 30 minutes after initiation of the transient.

Investigation by NextEra revealed that the loss of power to the 1F 120VAC power panel was due to a failure of the 1F vital inverter static transfer switch. Two heat deformed resistors as well as build ups of dust and dirt were observed on the silicon controlled rectified driver card located within the static transfer switch cabinet. Additional forensic examination determined that a voltage spike on the card likely resulted in its failure and a failure of the 1F static transfer switch to provide power to the 1F 120VAC vital bus. The station determined that age-related degradation could have caused the voltage spike and that a routinely performed preventative maintenance activity of cleaning and inspecting the static transfer switch could have identified signs of the age-related degradation and prevented the failure. This was documented in NextEra's maintenance rule functional failure evaluation as well as the equipment failure investigation performed as a result of the failure.

NextEra procedure ER-AA-204-2006, "Management of Critical Components and Single Point Vulnerabilities," Revision 11, states that "a single failure is unacceptable" for FID-1 components and provides guidance for establishment of a preventative maintenance strategy to prevent failures of any FID-1 component. NextEra procedure MA-AA-201-1000, "Preventative Maintenance and Surveillance Procedure," Revision 10, provides instructions on the implementation of the Preventative Maintenance (PM) and Surveillance Program, in part, for FID-1 components. Specifically, MA-AA-201-1000, Section 4.6 requires that a formal Preventative Maintenance Change Request (PMCR) process be followed for a PM frequency change for any component classified FID-1, which includes the 'F' vital inverter static transfer switch. A PM task was established for the 'F' vital inverter static transfer switch to perform a visual inspection and cleaning of the transfer switch cabinet, based in part on recommendations by the vendor of the static transfer switch. This task was initially

established with a frequency of once every two refueling outages (~36 months). The inspectors noted that the visual inspection PM task was last performed in January 2014, approximately 7 years and 8 months prior to the failure. Additional investigation revealed that, in 2016, as part of an initiative by NextEra to reduce the number of PMs performed on-site ("PM Optimization Project"), the frequency of the PM task was changed from once every two outages to once every three outages (~54 months) and scheduled for the OR20 outage occurring in the spring of 2020. Prior to the OR20 outage, the PM task was descoped and reassigned to OR21, scheduled to occur in the fall of 2021. A review by the inspectors of the PMCR form submitted for the 2016 frequency change determined that the justifications for the change were inadequate. A single PMCR form was generated as a cover sheet for a large number of proposed PM changes as part of the PM Optimization Project. The justification for the frequency change of the static transfer switch was contained in a single cell in a spreadsheet and did not provide an adequate technical evaluation and justification for the change as required by the PMCR process. The inspectors also noted that NextEra on-site engineering did not certify the 120VAC system for operation for the next operating cycle at the end of the OR20 refueling outage, due in part, to the descoping of PM maintenance items such as the visual inspection for the 'F' static transfer switch. This lack of certification was reviewed and accepted by station senior management. The inspectors determined that a more frequent visual inspection and cleaning of the 'F' vital inverter static transfer switch could have identified and/or prevented the age-related degradation of the silicon controlled rectified card that led to the loss of power to the vital 'F' power panel.

Corrective Actions: The licensee replaced the 'F' static transfer switch silicon controlled rectifier card, conducted a forensics analysis of the failed card, and initiated an equipment failure investigation to identify the causal factors and associated corrective actions for the event. As part of the investigation, the licensee conducted extent of condition inspections of other similar static transfer switches as well as restored visual PM inspections of the static transfer switch to its original frequency of once every two refueling outages. Additionally, the licensee is in the process of replacing all vital inverters and associated static transfer switches to newer models.

Corrective Action References: AR 02401831

Performance Assessment:

Performance Deficiency: The inspectors determined that NextEra's failure to appropriately assign and schedule PM activities for the 1F vital inverter static transfer switch was a performance deficiency within Seabrook's ability to foresee and correct.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to perform adequate preventative maintenance activities on the 1F vital inverter static transfer switch led to the loss of 120VAC power panel 1F and subsequent plant transient.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power." The inspectors determined the finding was of very low safety significance (Green) since the failure of the 1F vital inverter static transfer switch did not cause a loss of a probabilistic risk assessment system function for greater than 24 hours.

Cross-Cutting Aspect: H.13 - Consistent Process: Individuals use a consistent, systematic approach to make decisions. Risk insights are incorporated as appropriate. Specifically, inadequate preventative maintenance activities were developed and performed on the 'F' vital inverter static transfer switch, contributing to its failure and resultant loss of the 1F 120VAC vital bus and complex plant transient.

Enforcement:

Violation: Seabrook Technical Specification 6.7 “Procedures and Programs,” Section 6.7.1.a requires that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Regulatory Guide 1.33, Revision 2, Section 9.b. requires, in part, that preventative maintenance schedules should be developed to specify inspection or replacement or parts that have a specific lifetime. NextEra procedure MA-AA-201-1000, “Preventative Maintenance and Surveillance Procedure,” Revision 10, a safety related procedure, provides instructions on the implementation of the PM and Surveillance Program. Specifically, MA-AA-201-1000, Section 4.6 requires that a formal PMCR process be followed for a PM frequency change for any component classified “FID-1,” which includes the safety related 'F' vital inverter static transfer switch. Contrary to the above, NextEra failed to follow the guidance and instructions of MA-AA-201-1000. Specifically, NextEra inappropriately changed the frequency and descoped PM activities for the FID-1 categorized 'F' vital inverter static transfer switch such that a visual inspection and cleaning had not been performed in over 7 years and 8 months at the time of failure. Because this violation is of very low safety significance (Green) and NextEra entered the issue into their corrective action program, this violation is being treated as a NCV consistent with the NRC Enforcement Policy.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Observation: Evaluation of the Impacts of Alkali-Silica Reaction Related Bulk Structural Deformation of the Fuel Storage Building on the Spent Fuel pool stainless steel liner	71152

NRC inspectors performed a review of any potential impacts of observed alkali-silica reaction caused bulk structural deformation of the fuel storage building on the stainless steel spent fuel pool liner. As part of the review, the inspectors reviewed records associated with measurements of the relative movement of the spent fuel building, plans for future monitoring and remediation of the structure, detailed construction drawings of the spent fuel structure and associated cavity liner system, prints depicting the layout of the spent fuel pool cavity drain systems, procedures for sampling and monitoring of spent fuel pool leak chase sump drain collection system, and corrective action documents describing a number of conditions observed in the spent fuel building.

The inspectors reviewed the results of periodic spent fuel pool cavity leak chase monitoring as well as associated water chemistry results and determined that there did not appear to be any leakage of spent fuel pool water through the liner into the cavity system. Water samples collected from the leak chase system were consistent with groundwater penetration through the structural exterior concrete and did not contain the chemical constituents known to be present in spent fuel pool water. The inspectors also noted that a leak in the liner would be readily identifiable via an automatic spent fuel pool cavity leak chase sump alarm as well as via routine checks and samples of water in the sump.

The inspectors concluded that NextEra staff are appropriately monitoring signs of water leakage from the spent fuel liner cavity drain system in accordance with Seabrook program procedures and would be able to appropriately identify and resolve indications of leakage from the spent fuel pool liner.

Inadequate Corrective Actions Result in the Failure of the Unit 1 'B' Service Water Cooling Tower Fan

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000443/2021003-02 Open/Closed	[H.14] - Conservative Bias	71153

A self-revealed Green non-cited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," was identified when NextEra personnel failed to implement adequate corrective actions following degraded oil samples for the Unit 1, 'B' emergency cooling tower fan. Specifically, a history of degraded oil conditions combined with inadequate or ineffective actions taken in response to the oil degradation led to the gearbox failure on September 17, 2021.

Description: The service water cooling tower provides the alternate source of cooling water for the plant's primary and secondary safety related heat loads. The cooling tower consists of two independent trains, an 'A' train and a 'B' train. The 'B' train cell has two fans, a Unit 1 fan and a Unit 2 fan, designed to remove the heat load from the cooling tower basin while the tower is in operation. Both fans on the 'B' cell are required for design capacity.

NextEra's "Machinery Oil Analysis" program (ES1807.020) section 4.4.3.8 states that, following the second consecutive severity level 4 sample test result, an action request (AR) should be initiated in the corrective action program, and a work request initiated to replace the oil. Additionally, in February 2021, ES1807.020 was revised to add section 4.4.3.2 to initiate an AR for any oil analysis results that reflect severity level 4 for FID 1 or FID 2 components. The Unit 1, 'B' train fan is classified as a FID 2 component and the oil is sampled on a 6-month frequency per NextEra's predictive maintenance monitored equipment list (MA3.5, Figure 5.8). AR 02379755 was initiated in January 2021 for the second consecutive severity level 4 test result received on the Unit 1, 'B' train fan from the oil sample obtained in October 2020. As a result of high particulate and low oil viscosity from the oil analysis performed in 2019 and 2020, NextEra performed an oil change on the gearbox for the Unit 1, 'B' train fan in January 2021. The cause of the high particulate was assumed to be from the carbon steel drain port lines that run from the gearbox to outside the fan enclosure.

NRC Inspection Report 05000443/2021001 (ML21119A260) identified a non-cited violation associated with maintenance personnel not following procedural guidance when performing a scheduled gearbox oil change in January 2021 on the Unit 1, 'B' service water cooling tower fan (1-SW-FN-51B) which resulted in excessive particulate in the gearbox oil which plugged the internal lubrication spray nozzle of the gearbox. Corrective actions from the January 2021 event included cleaning and flushing the gearbox internal oil flow path and components. A management action was also initiated to revise ES1807.020 to ensure ARs are initiated after a single adverse sample for risk significant equipment.

On April 28, 2021 an oil sample was taken from the 1-SW-FN-51B gear box. The results of the analysis indicated a severity level 3 condition with high particulates. The station discussed the condition in AR 02380345 and made the determination that particulate was

likely ‘hiding out’ in inaccessible areas of the gearbox and that the previous flushing activities were inadequate to reduce particulates to satisfactory conditions. On July 30, 2021 oil samples were again taken from the 1-SW-FN-51B gear box and analysis results were reported back to NextEra as severity level 3 due to excessive particulate with high concentrations of black and red oxides which is indicative of thermal degradation of the fluid. The vendor also recommended determining the source of the black and red oxides as well as removal of the particulate to improve running conditions for the gearbox. The condition report was closed to a work order (WO 40779255) to flush the gearbox with a recommendation to sample the oil directly from the gearbox but the work was scheduled to be performed in a timely manner. On September 17, 2021 the 'B' cooling tower fans (1-SW-FN-51B and 2-SW-FN-51B) were started to obtain oil samples from their respective gearboxes. 40 minutes into the run, the control room received an oil pressure low alarm on the 1-SW-FN-51B and immediately secured both fans. Upon investigation, it was noted that oil had sprayed out of the pressure switch for the gearbox and the motor driveshaft had broken. The gearbox was removed and it was discovered that all the oil spray nozzles had clogged, restricting oil flow to the gearbox. The gear shaft, gears, and bearings all had signs of excessive heat.

The inspectors determined that while the station, on multiple occasions, identified adverse conditions associated with oil sample results, sufficient actions were not taken in a timely manner to address the adverse trend prior to the fan failure on September 17.

Corrective Actions: Immediate corrective actions included replacing the gearbox, drive motor, and drive shaft. The oil drain lines were also replaced with stainless steel to eliminate potential contribution to oil particulate.

Corrective Action References: ARs 02404438, 02401370, 02380345

Performance Assessment:

Performance Deficiency: The inspectors determined that NextEra's failure to implement adequate or timely corrective actions to address degraded oil conditions in the Unit 1, 'B' cooling tower fan was a performance deficiency within Seabrook's ability to foresee and correct.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the high particulate concentration in the lube oil caused the oil spray nozzles in the gearbox to clog, resulting in a loss of lubricating oil and the failure of the gearbox and drive shaft rendering the fan non-functional.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix A, “The Significance Determination Process for Findings At-Power.” The inspectors determined that a detailed risk evaluation was required because the issue represented a loss of the probabilistic risk assessment function of one train of a multi-train technical specification system for greater than its technical specification allowed outage time.

Specifically, the risk associated with the performance deficiency was determined for the failure to implement adequate or timely corrective actions from April 28, 2021 until the ‘B’ cooling tower fan was restored to an operable status on September 26, 2021. The exposure

time due to the performance deficiency associated with the degraded condition was therefore assumed to be a nominal five months.

The Unit 1, 'B' service water cooling tower fan (1-SW-FN-51B) supports a mechanical draft evaporative cooling tower which serves as the ultimate heat sink for conditions where the main circulating water tunnel is unavailable. The cooling tower is designed to supply cooling water to the primary component cooling water and diesel heat exchangers. The cooling tower and all of its associated components are designed for the safe shutdown earthquake loads.

A Region I senior reactor analyst completed the detailed risk evaluation and estimated the increase in core damage frequency associated with this performance deficiency to be a nominal 1E-7/yr or of very low safety significance (Green). To perform the detailed risk evaluation, the senior reactor analyst used the Standardized Plant Analysis Risk Model, version 8.61 for Seabrook Station. The basic event, SWS-CTF-FR-1FN51B, failure of the service water cooling water tower to run, was set to TRUE. A dominant core damage sequence involved a common cause failure of the service water intake strainers, with a common cause failure of the cooling tower fans to run, and long-term failure of secondary cooling. NextEra indicated that the 1-SW-FN-51B is not credited for fire safe shutdown in their Appendix R analyses. The senior reactor analyst noted the fire risk would not be a dominant factor or have a notable contribution to the risk evaluation. A review of the dominant core damage sequences indicated that large early release frequency would not be expected to have an impact on the risk conclusion of a very low safety significant issue.

Cross-Cutting Aspect: H.14 - Conservative Bias: Individuals use decision making-practices that emphasize prudent choices over those that are simply allowable. A proposed action is determined to be safe in order to proceed, rather than unsafe in order to stop. Specifically, NextEra did not take timely action to address degraded conditions commensurate with their safety significance. The degraded lubricating oil was a known condition and actions were not taken to understand and address the condition until the fan failed due to a loss of lubricating oil.

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures be established to ensure conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected.

Contrary to the above, from April 28, 2021 to September 26, 2021, NextEra failed to correct a condition adverse to quality. Specifically, multiple oil samples for the Unit 1, 'B' train, cooling tower fan indicated that high particulate existed in the lubricating oil but actions were taken only to confirm the adverse condition, not to correct the condition until the fan failed on September 17, 2021.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Pressurizer Safety Valve Outside of Technical Specification Limits Discovered During As-Found Set Point Testing			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000443/2021003-03 Open/Closed	Not Applicable	71153

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

Description: As reported in LER 05000443/2021-001-00 (ML21140A411), during testing of the pressurizer safety valves performed by an off-site vendor, the as-found set point for one of the three pressurizer safety valves removed during the station's 2020 refueling outage did not meet the technical specification 3.4.2.2 requirement of being within +/- 3 percent of design lift pressure. The subject pressurizer safety valve had an as-found set point pressure that was -4.2 percent of design lift pressure. The pressurizer safety valve was installed in the plant from October 25, 2018 until April 01, 2020.

Although the technical specification limit was surpassed, the as-found set point remained sufficiently higher than normal transient conditions and no inadvertent valve actuation occurred during the cycle. The contributing cause of the excessive set point pressure is attributed to set point drift. A direct cause of the excessive set point drift was not able to be determined.

The inspectors determined that it was not reasonable to foresee the set point drift and therefore no performance deficiency was identified.

Corrective Actions: Since the valve had already been replaced with a tested valve and not in-service at the time of the identified failure, no immediate corrective actions were required. The planned corrective action is to replace the valve spring and perform testing of the affected valve to ensure that is suitable to be placed back in-service.

Performance Assessment: The NRC determined this violation was not reasonably foreseeable and preventable by the licensee and therefore is not a performance deficiency.

Enforcement: The ROP's significance determination process does not specifically consider a violation without a finding in its assessment of licensee performance. Therefore, it is necessary to address this violation using traditional enforcement.

Severity: The inspectors determined that the violation was a condition prohibited by technical specifications of very low safety significance (Severity Level IV) since it did not result in appreciable increase in risk because the setpoint remained significantly higher than normal transient pressures, did not inadvertently actuate during the cycle, and meets the criteria described in Enforcement Policy Section 2.3.2 for disposition as a non-cited violation.

Violation: Technical specification 3.4.2.2, "Reactor Coolant System Safety Valves" requires all pressurizer code safety valves to be operable with a lift setting of 2485 psig +/- 3 percent while the plant is operating in modes 1, 2, or 3. With one pressurizer code safety valve inoperable, either restore the inoperable valve to operable status within 15 minutes or be in hot standby (mode 3) within 6 hours and hot shutdown (mode 4) within the following 6 hours.

Contrary to the above, one pressurizer code safety valve became inoperable during the operating cycle between October 25, 2018 and April 1, 2020 and the plant remained in a mode of applicability.

This closes LER 05000443/2021-001-00.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On August 12, 2021, the inspectors presented the triennial heat sink inspection results to Mr. Jeff Sobotka, Engineering Director and other members of the licensee staff.
- On September 1, 2021, the inspectors presented the occupational ALARA inspection results to Mr. Jeff Sobotka, Engineering Director and other members of the licensee staff.
- On November 9, 2021, the inspectors presented the integrated inspection results to Mr. Brian Booth, Site Vice President and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.07T	Corrective Action Documents	02376063 02377148 02377189 02378941		
	Corrective Action Documents Resulting from Inspection	02400603 02400611 02401369		
	Work Orders	40481527 40638933 40651051 40651054		