



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
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February 12, 2018

Mr. Mano Nazar
President and Chief Nuclear Officer
Nuclear Division
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Mail Stop: EX/JB
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Juno Beach, FL 33408

**SUBJECT: SEABROOK STATION, UNIT NO. 1 – INTEGRATED INSPECTION REPORT
05000443/2017004**

Dear Mr. Nazar:

On December 31, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Seabrook Station, Unit No. 1 (Seabrook). On January 23, 2018, the NRC inspectors discussed the results of this inspection with Mr. Eric McCartney, Regional Vice President, and other members of his staff. The results of this inspection are documented in the enclosed report.

NRC inspectors documented three findings of very low safety significance (Green) in this report. Two of these findings involved a violation of NRC requirements. The NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the 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. In addition, if you disagree with a cross-cutting aspect assignment or a finding not associated with a regulatory requirement 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.

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 the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Fred Bower, Chief
Reactor Projects Branch 3
Division of Reactor Projects

Docket No. 50-443
License No. NPF-86

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Inspection Report 05000443/2017004
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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: 50-443

License No: NPF-86

Report No.: 05000443/2017004

Licensee: NextEra Energy Seabrook, LLC (NextEra)

Facility: Seabrook Station, Unit No. 1 (Seabrook)

Location: Seabrook, NH 03874

Dates: October 1, 2017 through December 31, 2017

Inspectors: P. Cataldo, Senior Resident Inspector
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N. Perry, Senior Resident Inspector
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Approved By: Fred Bower, Chief
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Division of Reactor Projects

TABLE OF CONTENTS

SUMMARY	3
1. REACTOR SAFETY	6
1R01 Adverse Weather Protection.....	6
1R04 Equipment Alignment	6
1R05 Fire Protection	7
1R06 Flood Protection Measures.....	8
1R07 Heat Sink Performance	8
1R11 Licensed Operator Requalification Program and Licensed Operator Performance ...	9
1R12 Maintenance Effectiveness.....	13
1R13 Maintenance Risk Assessments and Emergent Work Control	13
1R15 Operability Determinations and Functionality Assessments.....	14
1R19 Post-Maintenance Testing.....	14
1R22 Surveillance Testing	15
1EP6 Drill Evaluation	16
2. RADIATION SAFETY.....	20
2RS2 Occupational As Low As Is Reasonably Achievable Planning and Controls	20
2RS3 In-Plant Airborne Radioactivity Control and Mitigation	20
4. OTHER ACTIVITIES	21
4OA1 Performance Indicator Verification.....	21
4OA2 Problem Identification and Resolution	22
4OA3 Follow-Up of Events and Notices of Enforcement Discretion	27
4OA6 Meetings, Including Exit.....	28
SUPPLEMENTARY INFORMATION.....	A-1
KEY POINTS OF CONTACT	A-1
LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED	A-1
LIST OF DOCUMENTS REVIEWED.....	A-1
LIST OF ACRONYMS.....	A-10

SUMMARY

IR 05000443/2017004; 10/01/2017 to 12/31/2017; Seabrook; Licensed Operator Requalification Program, Emergency Preparedness Drill Observation, and Follow-Up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced baseline inspections performed by regional inspectors. The inspectors identified two non-cited violations (NCVs) and one finding, all of which were of very low safety significance (Green). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated October 28, 2016. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated August 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

Cornerstone: Initiating Events

- Green. A self-revealing Green finding was identified for inadequate implementation of procedure MA 4.5, "Configuration Control," Revision 18. Specifically, maintenance technicians failed to properly implement MA 4.5 while backfilling steam generator instrumentation, and inadvertently left an instrumentation valve partially open instead of fully open. This resulted in slow response of the instrument, and ultimately a high steam generator level, a feedwater isolation signal and a manual reactor trip. NextEra promptly rechecked other similar valves, then performed a root cause evaluation that eventually led to additional technician training and improved configuration controls during such evolutions.

This finding is more than minor because it is associated with the configuration control attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure to effectively implement MA 4.5 resulted in a valve being left out of its required position, a subsequent lack of steam generator water level control during low power operations, and ultimately required a manual reactor trip. In accordance with IMC 0609.04, "Initial Characterization of Findings," issued June 19, 2012, and Exhibit 2 of IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," issued June 19, 2012, the inspectors determined that this finding is of very low safety significance (Green), because the finding did not cause a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition. Additionally, the finding has a cross-cutting aspect in the area of Human Performance, Work Management, because the organization did not implement a process of planning, controlling, and executing the work activity such that nuclear safety was the overriding priority. Specifically, NextEra did not ensure that a steam generator backfilling activity was properly executed, which resulted in the slow response of a steam generator level indication, the overfeeding of the steam generator, a feedwater isolation signal, and the ultimate requirement to trip the reactor. [H.5] (Section 4OA3)

Cornerstone: Mitigating System

- Green. The inspectors identified a Green non-cited violation (NCV) of Title 10 of the *Code of Federal Regulations* (10 CFR) 55.49, "Integrity of Examinations and Tests," for the failure of the licensee to ensure that the integrity of the written examinations administered to licensed operators was maintained. During the planning of the biennial written examinations, two written examinations would have exceeded the 50 percent overlap criteria limit of questions administered in the previous four weeks of this examination cycle. This failure resulted in a compromise of examination integrity because it exceeded the NextEra Fleet Procedure TR-AA-220-1004, "Licensed Operator Continuing Training Annual Operating and Biennial Written Exams," Revision 2, requirement to repeat less than or equal to 50 percent of the questions used during the exam cycle. However, this compromise did not lead to an actual effect on the equitable and consistent administration of the examination because of detection of this issue by the NRC prior to examination administration. This issue was entered into NextEra's Corrective Action Program (CAP) as AR 2239906.

The failure of NextEra's training staff to maintain the integrity of examinations administered to licensed operations personnel was a performance deficiency. The performance deficiency was more than minor, and therefore a finding, because if left uncorrected, the performance deficiency could have become more significant in that allowing licensed operators to return to the control room without valid demonstration of appropriate knowledge on the biennial examinations could be a precursor to a more significant event. Using IMC 0609, "Significance Determination Process," and the corresponding Appendix I, "Licensed Operator Requalification Significance Determination Process," the finding was determined to have very low safety significance (Green) because although the finding resulted in a compromise of the integrity of written examination, the equitable and consistent administration of the test was not actually impacted by this compromise. This finding had a cross-cutting aspect in the area of Human Performance, Resources, in that leaders ensure procedures are available and adequate to support nuclear safety. Specifically, NextEra established and implemented a procedure that contained instructions to licensed operator biennial exam writers that were unclear regarding regulatory guidance to limit written examination questions overlap. [H.1] (Section 1R11.3)

Cornerstone: Emergency Preparedness

- Green. The inspectors identified a Green non-cited violation (NCV) of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.47(b)(14) and 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," Section IV.F.2.g. Specifically, Seabrook did not identify and critique a weakness associated with a risk significant planning standard (RSPS) during their critique following the August 30, 2017, emergency preparedness drill. The weakness involved the licensee's declaration of a general emergency (GE) that was based on insufficient information. NextEra entered the issue into the corrective action program (CAP) as AR2242073.

The inspectors determined that not identifying an exercise weakness related to a GE classification based on insufficient information during the exercise critique was a performance deficiency that was reasonably within the ability of Seabrook to foresee and prevent. The finding is more than minor because it is associated with the Emergency Response Organization attribute of the Emergency Preparedness Cornerstone and affected the cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological

emergency. Specifically, Seabrook personnel did not identify an exercise weakness associated with a RSPS when the incorrect basis for a GE declaration was used by the Site Emergency Director (SED). The finding was assessed using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued October 7, 2016. This attachment directs inspectors to utilize IMC 0609, Appendix B, "Emergency Preparedness Significance Determination Process," issued September 22, 2015, because the finding and the associated weakness is in the licensee's emergency preparedness cornerstone. The inspectors determined the finding was a critique finding, the drill scope was full scale, the planning standard was risk-significant, and the performance opportunity was a success utilizing figure 5.14-1, "Significance Determination for Critique Findings," and thus determined this finding was of very low safety significance (Green). The finding was determined to have a cross-cutting aspect in the area of Human Performance, Change Management, in that leaders use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. Specifically, although recent changes to the site's emergency classification and action level standard scheme were effective on July 2017, the new EAL procedure and training regarding the changes lacked sufficient specificity to ensure the users understood the new scheme with respect to the status of the containment integrity. [H.3] (Section 1EP6)

REPORT DETAILS

Summary of Plant Status

Seabrook began the inspection period at full power, and there were no plant status changes of regulatory significance during the remainder of the inspection period. Documents reviewed for each section of this inspection report are listed in the Attachment.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 samples)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors reviewed NextEra's readiness for the onset of seasonal cold temperatures. The review focused on the service water (SW) pump house, the cooling water tower (CWT) pump area, and portions of the turbine building that contains risk important systems. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), technical specifications (TSs), control room logs, and the CAP to determine what temperatures or other seasonal weather could challenge these systems, and to ensure NextEra personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including NextEra's seasonal readiness procedure and applicable operating procedures. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during cold weather conditions.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns (71111.04 – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- 'A' emergency core cooling system (ECCS) during maintenance on the 'B' charging pump and safety injection pump on November 6
- Boric acid flow paths during maintenance on the boric acid control station on November 8-9
- 'B' fire pump during 'A' fire pump maintenance on December 14

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, TSs, work orders

(WOs), condition reports (CRs), and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted the system's performance of its intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether NextEra staff had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

.2 Full System Walkdown (71111.04S – 1 sample)

a. Inspection Scope

During the period of November 27 through December 1, the inspectors performed a complete system walkdown of accessible portions of the SW system to verify the existing equipment lineup was correct. The inspectors reviewed operating procedures, system diagrams, TSs, and the UFSAR to verify the system was aligned to perform its required safety functions. The inspectors also reviewed electrical power availability, component lubrication and equipment cooling, hanger and support functionality, and operability of support systems. The inspectors performed field walkdowns of accessible portions of the systems to verify as-built system configuration matched plant documentation, and that system components and support equipment remained operable. The inspectors confirmed that systems and components were aligned correctly, free from interference from temporary services or isolation boundaries, environmentally qualified, and protected from external threats. The inspectors also examined the material condition of the components for degradation and observed operating parameters of equipment to verify that there were no deficiencies. Additionally, the inspectors reviewed a sample of related CRs and WO's to ensure NextEra appropriately evaluated and resolved any deficiencies.

b. Findings

No findings were identified.

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)

a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that NextEra controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that

station personnel implemented compensatory measures for out of service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Primary auxiliary building (PAB) southeast corner (PAB-F-2A-Z) on December 20
- PAB boric acid tanks and sample sink rooms (PAB-F-2B-Z) on December 20
- PAB primary component cooling water (PCCW) pump area (PAB-F-2C-Z) on December 20
- PAB PCCW heat exchangers (PAB-F-3A-Z) on December 20
- PAB SW pipe slot (PAB-F-1K-Z) on December 20

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, site flooding analysis, and plant procedures to identify internal flooding susceptibilities for the site. The inspectors' review focused on the 'B' residual heat removal (RHR) vault to verify the adequacy of equipment seals located below the flood line, floor and wall penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers. The inspectors assessed the adequacy of operator actions that NextEra had identified as necessary to cope with flooding in this area and also reviewed the CAP to determine if NextEra was identifying and correcting problems associated with both flood mitigation features and site procedures for responding to flooding.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the 'A' and 'B' RHR heat exchanger to ensure readiness and availability. The inspectors conducted a walkdown of the heat exchangers and reviewed the results of the most recent performance test. The inspectors verified that NextEra initiated appropriate corrective actions for identified deficiencies.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program and Licensed Operator Performance

.1 Quarterly Review of Licensed Operator Requalification Testing and Training
(71111.11Q – 1 sample)

a. Inspection Scope

The inspectors observed licensed operator simulator annual requalification exams on November 7, 2017, which included various failures, a transient resulting in an anticipated transient without a scram, and a faulted steam generator requiring safety injection. Another scenario included losing a feedwater pump, requiring a reactor scram, followed by a loss of offsite power/loss-of-coolant accident. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room
(71111.11Q – 1 sample)

a. Inspection Scope

On October 19, 2017, the inspectors observed and reviewed routine activities in the main control room. The inspectors observed operators respond to alarms, complete a reactor coolant system (RCS) dilution, conduct a pre-job briefing for a surveillance test, and perform the surveillance test. Additionally, the inspectors verified that procedure use, crew communications, and coordination of activities between work groups met established expectations and standards.

b. Findings

No findings were identified.

.3 Licensed Operator Requalification (71111.11A – 1 sample, 71111.11B – 1 sample)

a. Inspection Scope

The following inspection activities were performed using NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," Revision 11, and Inspection Procedure 71111.11, "Licensed Operator Requalification Program."

Examination Results

On December 26, 2017, the results of the annual operating tests and biennial written examinations were reviewed to determine if pass/fail rates were consistent with the guidance of NUREG-1021, and NRC IMC 0609, Appendix I, "Operator Requalification Human Performance Significance Determination Process." The review verified that the failure rate (individual or crew) did not exceed 20 percent.

- Five out of 42 operators failed at least one portion of requalification examination (written, job performance measures (JPMs) or individual scenario failures). The overall individual failure rate was 11.9 percent.
- One out of eight crews failed the simulator test. The crew failure rate was 12.5 percent

Written Examination Quality

The inspectors reviewed the written examinations administered to reactor operators (ROs) and senior reactor operators (SRO) during the weeks 2, 4, and 5 of this cycle (November–December 2017) for qualitative and quantitative attributes as specified in Appendix B of Attachment 71111.11,

Operating Test Quality

Ten JPMs and five scenarios were reviewed for qualitative and quantitative attributes as specified in Appendix C of 71111.11.

Licensee Administration of Operating Tests

Observations were made of the dynamic simulator exams and JPMs administered during the week of December 4, 2017. These observations included facility evaluations of crew and individual performance during the dynamic simulator exams and individual performance of JPMs.

Examination Security

The inspectors assessed whether facility staff properly safeguarded exam material. The JPMs, scenarios, and written examinations were checked for excessive overlap of test items.

Remedial Training and Re-Examinations

The inspectors reviewed remediation plans and examinations for one crew failure during the first quarter of 2016.

Conformance with Operator License Conditions

Medical records for six SRO licenses and four RO licenses were reviewed to assess conformance with license conditions. All records reviewed were satisfactory.

Proficiency watch standing records for licensed operators were reviewed for the first three quarters of 2017. All active licensed operators met the watch standing requirements to maintain an active license.

The reactivation plan for licensed operators (three ROs and 13 SROs) were reviewed to assess the effectiveness of the reactivation process. The reactivation was successfully processed in accordance with site procedures.

Records for the participation of licensed operators in the requalification program for the first three quarters in 2017 were reviewed.

Simulator Performance

Simulator performance and fidelity was reviewed for conformance to the reference plant control room. A sample of simulator deficiency reports was also reviewed to ensure facility staff addressed identified modeling problems. Simulator test documentation was also reviewed.

Problem Identification and Resolution

A review was conducted of recent operating history documentation found in inspection reports, the licensee's CAP, and the most recent NRC plant issues matrix. The inspectors also reviewed specific events from the licensee's CAP which indicated possible training deficiencies, to verify that they had been appropriately addressed. These reviews did not detect any operational events that were indicative of possible training deficiencies.

b. Findings

Introduction. The inspectors identified a Green NCV of 10 CFR 55.49, "Integrity of Examinations and Tests," for NextEra's failure to ensure the integrity of the biennial written examinations that were to be administered to licensed operators. This would have resulted in examining Seabrook licensed operators with questions that had been administered to other crews during the exam cycle that were in excess of the limits established for question overlap.

Description. On December 6, 2017, while performing a biennial inspection in accordance with IP 71111.11, "Licensed Operator Requalification Program," the inspectors determined that the written examination that was planned to be administered that day for Crew E (and for Crew F in the following week) contained more than 50 percent of questions that had been used cumulatively to the licensed operators in the previous 4 weeks of the same exam cycle.

NextEra Fleet Procedure TR-AA-220-1004, "Licensed Operator Continuing Training Annual Operating and Biennial Written Exams," Revision 2, requires that, "Each biennial comprehensive written exam version shall consist of at least 50 percent new, different, or significantly modified test items compared to all previously administered versions of the same exam." Since the procedure was not clear regarding the intent of this requirement, the licensee incorrectly applied this to mean that there could be no more than 50 percent overlap of questions in any one week's examination with any other week's examination questions. In other words, the licensee was applying the question overlap criteria from

examination to examination instead of applying it to the cumulative usage of questions in the entire cycle. By applying their overlap criteria as they did, in conjunction with how they selected the questions to be used on each examination, the examinations for Crews E and F would have had 30 of 33 questions that had been previously used in this cycle. According to 10 CFR 55.49, the integrity of a test or examination is considered compromised if any activity, regardless of intent, affected or, but for detection, could have affected the equitable and consistent administration of the test or examination. The inspectors concluded that exceeding the 50 percent overlap was a failure to fulfill the requirements of NextEra's procedure and constituted a compromise of examination integrity required by 10 CFR 55.49.

The inspectors informed the licensee of this overlap issue prior to the administration of the written examination to Crew E. The licensee then postponed this written examination until they could develop a written examination that did not violate the overlap requirement. The first four written examinations of this 2017 cycle did use common questions, but did not exceed the 50 percent overlap limit. Thus, there was no actual effect on the equitable and consistent administration of the written examinations. (Furthermore, the licensee has operators sign a security agreement to not reveal any information about the requalification examinations with other operators who have not yet taken their examinations.) During the previous comprehensive written examination in 2015, the examination developer used unique questions for each of the examinations in that cycle. This year's comprehensive written examination was developed by a different individual who, along with other fleet personnel, misapplied the fleet procedure's overlap criteria. The licensee entered this issue into their CAP as AR 2239906.

Analysis. The failure of NextEra's training staff to ensure the integrity of examinations administered to licensed operations personnel was a performance deficiency. The performance deficiency was a finding that was more than minor because, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern. Specifically, the potential to allow operators to return to the control room without valid demonstration of appropriate knowledge on the biennial written examinations could result in having less than adequately qualified operators manipulating plant controls in response to events. Using IMC 0609, "Significance Determination Process," and the corresponding Appendix I, "Licensed Operator Requalification Significance Determination Process," the finding was determined to have very low safety significance (Green) because, although the examinations were not administered, the integrity of an examination is considered to be compromised if any activity affected, or but for detection, would have affected the equitable and consistent administration of the examination. This finding had a cross-cutting aspect in the area of Human Performance, Resources, in that leaders ensure procedures are available and adequate to support nuclear safety. Specifically, NextEra established and implemented a procedure that contained instructions to licensed operator biennial exam writers that were unclear regarding regulatory guidance to limit written examination questions overlap. [H.1]

Enforcement. Title 10 CFR 55.49, "Integrity of Examinations," requires, in part, that facility licensees shall not engage in any activity that compromises the integrity of any test or examination required by this part. The integrity of a test or examination is considered compromised if any activity, regardless of intent, affected or, but for detection, could have affected the equitable and consistent administration of the test or examination. This includes activities related to the preparation, administration, and

grading of the tests and examinations required by this part. Contrary to the above, during the 2017 annual examination cycle (November through mid-December), NextEra engaged in an activity at Seabrook that compromised the integrity of a test required by 10 CFR Part 55. Specifically, two scheduled written examinations would have contained more than 50 percent of questions previously used in the cycle but for detection by the NRC. Administering a written examination with greater than 50 percent cumulative overlap from previously administered questions during a cycle is considered a compromise of the integrity in that it is a practice that, but for detection, could affect the equitable and consistent administration of the examination. The inspectors determined that this overlap issue did not result in an actual effect on the equitable and consistent administration of the written examinations. Because this finding was of very low safety significance (Green) and has been entered into NextEra's CAP as AR 2239906, this violation is being treated as an NCV consistent with Section 2.3.2.a of the NRC Enforcement Policy. **(NCV 05000443/2017004-01 Licensed Operator Examination Integrity Not Ensured)**

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component (SSC) performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance WOs, and maintenance rule (MR) basis documents to ensure that NextEra was identifying and properly evaluating performance problems within the scope of the MR. For each sample selected, the inspectors verified that the SSC was properly scoped into the MR in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by NextEra staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2). Additionally, the inspectors ensured that NextEra staff was identifying and addressing common cause failures that occurred within and across MR system boundaries.

- Boric acid control station

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 4 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that NextEra performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that NextEra personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When NextEra performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant

risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Switchyard work, startup feed pump testing, and 'A' emergency diesel generator (EDG) maintenance and testing on October 17
- CS-FCV-111B fail to open during the period November 1-4
- Switchyard work and supplemental emergency power system maintenance on November 20
- 'B' solid state protection system Mode 1 actuation logic test on November 27

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 2 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions based on the risk significance of the associated components and systems:

- 'A' EDG fuel oil return line leaks on October 16
- 'D' vital DC battery abnormal ammeter reading on November 15

The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to NextEra's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by NextEra.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis

and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- 'B' CWT bistable card replacement on October 2
- 'C' SW pump instantaneous overcurrent relay set point adjustment on October 16
- RC-V-2832, RCS sample valve relay replacement on November 2
- CS-FCV-111-B repairs on November 4
- Limitorque maintenance for CC-V-266 on November 28
- 'A' fire pump annual maintenance on December 14

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 3 samples)

a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TSs, the UFSAR, and NextEra procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied.

Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- Power range channel 44 resealing calibration on October 4
- 'A' PCCW pump on October 19 (in-service test)
- 'B' charging pump surveillance on October 20

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation (2 samples)

a. Inspection Scope

The inspectors evaluated the conduct of routine NextEra emergency drills on August 30, 2017, and November 29, 2017, to identify any weaknesses and deficiencies in the classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator, technical support center, and emergency operations facility (EOF) to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the station drill critique to compare inspector observations with those identified by NextEra staff in order to evaluate NextEra's critique and to verify whether the NextEra staff was properly identifying weaknesses and entering them into the CAP.

b. Findings

Introduction. The inspectors identified a Green NCV of 10 CFR 50.47(b)(14) and 10 CFR Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," Section IV.F.2.g. Specifically, Seabrook did not identify and critique a weakness associated with a RSPS during their critique following the August 30, 2017, emergency preparedness drill.

Description. On August 30, 2017, Seabrook conducted an emergency preparedness exercise, which included activating the simulator control room, the technical support center (TSC), the operational support center, and the EOF. Consistent with the exercise scenario script, a seismic event caused an RCS leak of approximately 300 gallons per minute and resulted in the actuation of safety injection. The SED, located in the simulator control room responded appropriately by declaring an emergency action level (EAL) of Alert at 8:29 a.m. because the loss of the RCS barrier (loss of single fission product barrier) threshold criterion was met. At 10:15 a.m., a containment release was prematurely introduced by the simulator operator. This release was indicated on the plant stack wide range gas monitor (WRGM) and the containment enclosure ventilation area (CEVA) radiation monitor. The drill controllers recognized the error but did not interject and allowed the events surrounding the premature simulated release to play out.

At 10:19 a.m., consistent with the exercise scenario script, a second seismic event occurred that resulted in a large break loss of coolant accident (LOCA). Plant conditions deteriorated to the point that all ECCS necessary to inject for subsequent core cooling had failed. This plant condition met the threshold for a potential loss of the fuel clad barrier from a valid core cooling orange entry condition. The combination of the prior loss of RCS barrier and the potential loss of the fuel clad barrier met the criteria for classifying the event as a site area emergency (SAE). However, the SED, located in the TSC, did not declare a SAE, but declared a GE at 10:28 a.m. The typical threshold for declaring a GE is the loss of two barriers and the potential loss of the third. The SED's basis for concluding that the GE classification threshold criteria were met was the loss of

the RCS barrier, the potential loss of the fuel clad barrier, and the loss of the containment barrier. The SED determined that a loss of containment barrier occurred based on an unisolable pathway; however, no open pathway was scripted in the exercise scenario and there were no valid indications that this was the case. The SED concluded that the containment barrier was unisolable even though the radiological release data at the time was well below the Environmental Protection Agency's (EPA's) protective action guide (PAG) levels that are incorporated in the emergency plan. Seabrook's emergency plan directs the comparison of radiological release data with EPA's PAGs to inform decision making regarding whether a loss of containment barrier exists.

Seabrook completed their formal drill critique on September 19, 2017. During the critique, Seabrook did not identify that the declaration by the SED of a GE with protective action recommendations (PARs) was based on insufficient information. Specifically, Seabrook's EAL for the loss of the containment barrier is driven by a containment isolation being required and either of the following: 1) Containment integrity has been lost based on Short-Term Emergency Director (STED)/SED judgment, or 2) an unisolable pathway from the containment to the environment exists. ER 1.1, "Classification of Emergencies," Revision 58, defines unisolable, as an open or breached system line that cannot be isolated, remotely or locally.

Following the formal drill critique on September 19, 2017, the inspectors questioned the basis for considering containment integrity lost, which resulted in characterizing the circumstances present as a loss of the containment barrier. NextEra indicated that the SED considered the loss of containment integrity was due to containment isolation being required and the existence of an unisolable pathway from the containment to the environment. NextEra noted that a containment isolation signal was received as expected and all available remote indications showed the containment isolation valves were closed. There were no other confirmed pathways open from containment to the environment. The licensee also confirmed that containment pressures and pressure trends were indeterminate with respect to the status of containment integrity. The licensee validated after the exercise that the higher than normal WRGM readings indicated noble gases that could only come from damaged nuclear fuel inside containment; however, the containment post-LOCA radiation monitors were reading relatively normal with no indication of damaged fuel.

As planned by the exercise scenario script, a containment recirculation sump isolation valve CBS-V-8, was not opening when required, to place the containment on recirculation cooling, which led the SED to suspect the penetration and its encapsulated valve were the possible locations of an unisolable pathway. This determination by the SED is noteworthy, because the control room operators had confirmed that the valve was closed based on remote indication. The status of this valve, encapsulation tank, and penetration line were not validated locally. Taking into account the seismic events that caused the large break LOCA, the suspect encapsulated valve, higher than normal WRGM readings and CEVA radiation levels, the SED concluded that a loss of containment integrity, as defined in their EAL scheme and basis, existed. A GE declaration was made due to the loss of containment conclusion and the previously determined potential loss of fuel clad and the loss of the RCS barrier (versus the originally scripted SAE). Due to the lack of any other valid indications that containment integrity was jeopardized, the SED relied upon the radiological releases seen on the WRGM and CEVA radiation monitor as positive indication of the loss of the containment

barrier. The fission product barrier EAL (FG1) allows the SED to use judgment to make a determination of containment barrier integrity based on less discrete information. Specifically, 4.A.1 states that containment integrity has been lost when the actual containment atmospheric leak rate likely exceeds that associated allowable leakage. However, Seabrook's procedure, ER 1.1 states, "it is expected that the SED will assess the threshold using judgment, and with due consideration given current plant conditions, and available operational and radiological data."

The inspectors determined that, as a result of the deviation from the preplanned scenario script and due to the actual condition experienced during the exercise, the GE declaration would have been an appropriate event classification if it had been based on SED judgment instead of an unisolable pathway. The conditions presented at the time could have warranted the use of judgement to escalate from an SAE to a GE based on imminent fuel melt and the uncertainty recognized by the SED, regarding the fuel condition based on radiation monitors indicating a release outside the containment. Therefore, the GE threshold criteria (loss of two and the potential loss of the third fission product barriers) would have been met by the loss of the RCS barrier, the potential loss of the containment barrier and judgement that the loss of the fuel clad barrier was imminent.

As a result, in accordance with IMC-0609, Appendix B, "Emergency Preparedness Significance Determination Process," the performance demonstrated by NextEra participants in the drill, provided specific opportunities that could preclude effective implementation of the emergency plan that the inspectors concluded was a weakness.

In addition, the inspectors also identified deficiencies associated with the Emergency Classification system RSPS under 10 CFR 50.47(b)(4). These deficiencies involved the less than adequate translation of specific guidance incorporated into the Seabrook EAL basis document during implementation of a recent upgrade to the Seabrook emergency plan to incorporate a revision (5 to 6) to Nuclear Energy Institute (NEI) Document 99-02, "Development of Emergency Action Levels for Non-Passive Reactors." Moreover, the inspectors determined that the requisite training for decision-makers for the most relevant portion of the revised guidance, was also developed and provided in a less than adequate manner. More importantly, the germane sections of the revised guidance associated with the Containment Barrier portion of the Fission Product Matrix EALs were directly exercised during the August 2017 drill.

Analysis. The inspectors determined that not identifying an exercise weakness related to a GE classification based on insufficient information during the exercise critique was a performance deficiency that was reasonably within the ability of Seabrook to foresee and prevent. The finding is more than minor because it is associated with the ERO attribute of the Emergency Preparedness Cornerstone and affected the cornerstone objective to ensure that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Specifically, Seabrook personnel did not identify an exercise weakness associated with a RSPS when the incorrect basis for a GE declaration was used by the SED.

The inspectors assessed the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," issued October 7, 2016. This attachment directs inspectors to use IMC 0609, Appendix B, "Emergency Preparedness Significance Determination Process," issued September 22, 2015, because the finding and the

associated weakness are in the emergency preparedness cornerstone. Inspectors determined the finding was a critique finding, the drill scope was full scale, the planning standard was risk-significant, and the performance opportunity was a success. As a result, and using figure 5.14-1, "Significance Determination for Critique Findings," the inspectors determined this finding was of very low safety significance (Green).

The finding is related to the cross-cutting area of Human Performance, Change Management in that leaders use a systematic process for evaluating and implementing change so that nuclear safety remains the overriding priority. Specifically, although recent changes to the site's emergency classification and action level standard scheme were effective on July 2017, the new EAL procedure and training regarding the changes lacked sufficient specificity to ensure the users understood the new scheme with respect to the status of the containment integrity [H.3].

Enforcement. Title 10 CFR 50.54(q)(2) requires, in part, that a licensee shall follow and maintain the effectiveness of an emergency plan that meets the requirements in Appendix E to this part and, for nuclear power reactor licensees, the planning standards of 10 CFR 50.47(b). Title 10 CFR 50.47(b)(14) requires, in part, that periodic exercises be conducted to evaluate major portions of emergency response capabilities and that deficiencies identified as a result of exercises are corrected. Section IV.F.2.g of Appendix E to 10 CFR Part 50 requires that all training, including exercises, shall provide for formal critiques in order to identify weak or deficient areas that need correction. Any weaknesses or deficiencies that are identified shall be corrected.

Contrary to the above, during a formal critique on September 19, 2017, Seabrook did not identify a weakness needing correction that was demonstrated during a full participation exercise on August 30, 2017. The weakness needing correction involved NextEra's declaration of a GE that was based on insufficient information. Because this violation was of very low safety significance and was entered into Seabrook's CAP as AR 2242073, this finding is being treated as an NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV, 05000443/2017004-02, Failure of Exercise Critique to Identify a Risk Significant Planning Standard Weakness)**

.2 Training Observations (1 sample)

a. Inspection Scope

The inspectors observed a simulator training evolution for licensed operators on November 7, 2017, which required emergency plan implementation by an operations crew. NextEra planned for this evolution to be evaluated and included in the drill and exercise performance indicator (PI) data. The inspectors observed event classification and notification activities performed by the crew. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's performance and ensure that NextEra evaluators noted the same issues and entered them into the CAP.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Public Radiation Safety

2RS2 Occupational As Low As Is Reasonably Achievable Planning and Controls (71124.02 – 1 sample)

a. Inspection Scope

The inspectors assessed NextEra's performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements contained in 10 CFR Part 20, applicable Regulatory Guides (RGs) 8.8 and 8.10, TSs, and procedures required by TSs as criteria for determining compliance.

Verification of Dose Estimates and Exposure Tracking Systems

The inspectors reviewed the current annual collective dose estimate; basis methodology; and measures to track, trend, and reduce occupational doses for ongoing work activities. The inspectors evaluated the adjustment of exposure estimates, or re-planning of work. The inspector reviewed post-job ALARA evaluations of excessive exposure.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03 – 1 sample)

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity and the use of respiratory protection devices in these areas. The inspectors used the requirements in 10 CFR Part 20, RG 8.15, RG 8.25, NUREG/CR-0041, TS, and procedures required by TS as criteria for determining compliance.

Self-Contained Breathing Apparatus for Emergency Use

The inspectors reviewed the following: the status and surveillance records for three Self-Contained Breathing Apparatus (SCBAs) staged in-plant for use during emergencies; Next Era's SCBA procedures and maintenance and test records; the refilling and transporting of SCBA air bottles; SCBA mask size availability; and the qualifications of personnel performing service and repair of this equipment.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index (3 samples)

a. Inspection Scope

The inspectors reviewed NextEra's submittal of the Mitigating Systems Performance Index for the following systems for the period of July 1, 2017, through June 30, 2018:

- Safety System Functional Failures
- RHR System
- Cooling Water System

To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed NextEra's operator narrative logs, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Occupational Exposure Control Effectiveness (1 sample)

a. Inspection Scope

The inspectors reviewed licensee submittals for the occupational radiological occurrences PI for the fourth quarter 2016 through the first, second, and third quarters 2017. The inspectors used PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the PI data reported. The inspectors reviewed electronic personal dosimetry accumulated dose alarms, dose reports, and dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized PI occurrences.

b. Findings

No findings were identified.

.3 Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The inspectors reviewed licensee submittals for the radiological effluent technical specifications/offsite dose calculation manual radiological effluent occurrences PI for the fourth quarter 2016 through the first, second, and third quarters of 2017. The inspectors

used PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine if the PI data was reported properly. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the CAP database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if indicator results were accurately reported.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 3 samples)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify NextEra entered issues into the CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the CAP and periodically attended CR screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, NextEra performed an evaluation in accordance with 10 CFR Part 21.

b. Findings

No findings were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a semi-annual review of site issues to identify trends that might indicate the existence of more significant safety concerns. As part of this review, the inspectors included repetitive or closely-related issues documented by NextEra in quarterly trend reports, site PIs, major equipment problem lists, system health reports, MR assessments, and maintenance or CAP backlogs. The inspectors also reviewed NextEra's CAP database for the third and fourth quarters of 2017 to assess CRs written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRC's daily CR review (Section 4OA2.1). The inspectors reviewed the NextEra trend reports for the previous six months of 2017, conducted under PI-AA-207-1000, Station Self-Evaluation and Trend Analysis,

Revision 8, to verify that NextEra personnel were appropriately evaluating and trending adverse conditions in accordance with applicable procedures.

b. Findings and Observations

No findings were identified.

Overall, the inspectors noted that the system health reports for the safety related systems and systems important to safety to be up to date and reflective of current plant status. The health reports were reflective of issues that were trending on the daily plant status report and discussed on a regular basis by plant management for timely resolution. The inspectors evaluated a sample of CRs generated over the course of the past two quarters by departments that provide input to the quarterly trend reports. The inspectors determined that, in most cases, the issues were appropriately evaluated by Seabrook staff for potential trends and resolved within the scope of the CAP. Moreover, the inspectors identified instances where potential adverse trends were identified by department staff during the course of the assessment period, which were consistent with similar station-level trends, and confirmed that station personnel were utilizing statistical and trending tools to identify potential emerging trends. Additionally, the inspectors verified that discussions between department and performance improvement staff were occurring to ensure emerging trends were appropriately captured either in the CAP or the quarterly trend report, as applicable. One such example was an issue with the overall health of the preventive maintenance program, which included implementation and knowledge issues following a program assessment documented under CR 2219903.

3. Annual Sample: Ultimate Heat Sink

a. Inspection Scope

The inspectors performed an in-depth review of NextEra's evaluations and corrective actions associated with the ultimate heat sink over the last year, which includes the ocean SW system, CWT, and PCCW system. This included degraded piping and leaks, PCCW pump motor issues, and increasing SW pump motor winding temperatures.

The inspectors assessed NextEra's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of NextEra's corrective actions to determine whether NextEra was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of NextEra's CAP and 10 CFR Part 50, Appendix B.

b. Findings and Observations

No findings were identified.

NextEra was timely in documenting issues once they were identified and screened appropriately for immediate operability concerns. For example, control room operators noted an increased trend in SW pump motor winding temperatures. It did not immediately impact the safe operation of the plant, but the issue was captured in the CAP and the motors were systematically replaced in a timely manner.

An outstanding issue continues to be degraded SW piping associated with the ocean SW and the cooling water systems. NextEra has a systematic program, reflected in PEG-94, "Service Water Inspection and Repair Trending," to ensure that long term corrective actions are implemented to minimize unexpected leaks and challenges to the safe operation of the plant. The inspectors verified that PEG-94 is continuously updated, and pipe inspections and replacements are completed as scheduled. When unexpected leaks did occur, the station demonstrated timely assessment and appropriate compensatory measures until final corrective actions to restoration were feasible.

The inspectors noted that NextEra implemented industry initiatives to improve the effectiveness of issue resolution, also known as CAP-002, in August 2017. The changes are reflected in PI-AA-104-1000, "Condition Reporting." The inspectors have been closely monitoring the impact to ensure issues important to nuclear safety are addressed appropriately. No concerns have been noted by the inspectors to date.

.4 Annual Sample: Alkali-Silica Reaction

a. Inspection Scope

The purpose of periodic site visits to Seabrook Station over the past few years has been to review the adequacy of NextEra's monitoring of alkali-silica reaction (ASR) on affected reinforced concrete structures, per their 10 CFR 50.65 "Maintenance Rule" Structures Monitoring Program (SMP), and NextEra's corrective action process. In addition, the inspectors verify on a sampling basis that significant changes or different manifestations of ASR on the affected structures are appropriately considered for impact on the Seabrook prompt operability determinations for the affected structure(s). Two NRC region-based inspectors and a structural engineer from the Office of Nuclear Reactor Regulation were on site from October 10-13, 2017, to conduct an inspection of ongoing ASR related activities. The inspectors also conducted in-office reviews of ASR-related documentation made available before and after the on-site inspection via an electronic server (Certrec Inspection Management System). Although available for review, the inspectors did not receive or take possession of these documents.

The inspectors assessed the problem identification threshold, operability and functionality assessments, extent of condition reviews, and the prioritization and timeliness of corrective actions to determine whether NextEra personnel were appropriately identifying, characterizing, and correcting problems associated with the ASR-affected structures. The inspectors evaluated NextEra's actions to verify compliance with the SMP, the CAP, and 10 CFR Part 50, Appendix B requirements.

b. Findings and Observations

No findings were identified.

The inspectors performed a review of the CEVA north wall operability determination, including a field walkdown of the structure. The North wall is laterally deformed below the CEVA heating, ventilation, and air conditioning (HVAC) room floor slab as measured by the plumbness. NextEra has preliminarily concluded the movement at this location is the result of ASR expansion of the concrete backfill confined between the wall and the adjacent bedrock, which is a load that was not considered in the original design of the

wall in accordance with American Concrete Institute (ACI) 318-71. The out-of-plumb wall section is located between the +3 and +19 foot elevation and exhibits visual horizontal flexure cracks with evidence of delamination (identified via hammer testing) in the vicinity of the cracks. The cracks are spaced at approximately 1 foot intervals, which is the same spacing as the horizontal reinforcing bars. The detected delaminations were found around the horizontal cracks where the largest displacement is occurring on the order of approximately 1.5 inches. An initial SMP structural evaluation by NextEra staff (simple beam finite element analysis) was performed, and with the estimated compressive strains in the concrete in some areas and the opposing tensile strains in the rebar in other sections, the analysis concluded that delamination is "predicted." Subsequently, a nonlinear finite element analysis based on the deformed shape of the wall was performed by NextEra to determine the maximum allowable lateral displacement before a modification is necessary. The inspectors reviewed this analysis as part of the operability determination and determined that NextEra's conclusions that the structure is capable of performing its intended functions was technically supported. The inspectors further verified that SMP Appendix C was updated with additional qualitative monitoring requirements for the CEVA building. Discussions with the responsible NextEra engineering staff identified that remediation methods are being evaluated to ensure long-term continued stabilization and structural performance of the wall. The inspectors noted that this lower portion of the north wall was identified as a non-structural member for the CEVA structure (i.e., not part of the structural load resisting system for the CEVA) and is not part of the boundary that establishes the safety-related CEVA air envelope. However, the wall is required to maintain its structural stability because it supports attached equipment.

Inspectors' walkdown of the RHR/containment spray (CS) Vault confirmed the presence of several small areas of delamination. Review of FP101055, "Condition Assessment of Cracking in RHR and CS Equipment Vault – Second Visit," dated February 4, 2016, summarizes the results of a detailed examination of the RHR/CS Vault by NextEra's staff contractors following an earlier examination in December 2014. One of the recommendations in FP101055 was to remove cores from areas exhibiting delamination to better understand the extent of concrete degradation. At the request of the inspectors, NextEra posted the results of concrete coring and associated petrographic examination (FP101034) on their electronic server (Certrec Inspection Management System) for review. FP101034 summarizes the petrographic examination of 19 core samples and their associated bore holes. The examination results identified that all of the cores taken from the external walls exhibited signs of ASR, whereas the cores taken from the interior walls did not. The large cracks observed in the interior walls were likely a result of upward expansion due to ASR in the exterior walls, which transferred the resulting tension to the interior walls of the Equipment Vault. The inspectors noted that there were no discussions on the surface delamination areas or confirmation of the depth of delamination as was recommended in earlier reports.

The identification of delamination as either a primary (caused by internal ASR expansion in the wall) or secondary (caused by ASR expansion of concrete backfill and associated loading) effect of ASR is preliminarily being reviewed by the NRC inspectors as a phenomenon associated with ASR based on plant operating experience. At the conclusion of the on-site inspection, NextEra staff had not drawn conclusions regarding the implications of delamination associated with ASR expansion and loading. Based upon the inspectors' initial assessment, NextEra decided to develop criteria for identifying and monitoring delamination of ASR-affected structures and how best to use

hammer testing or other non-destructive examination methods (e.g., impact-echo testing), which was captured as an action in their Change Management Plan for the SMP. The SMP currently does not describe hammer testing or include delamination monitoring guidance, and NextEra had not specifically identified this ASR phenomenon in the structures Aging Management Program for their license renewal application.

On November 22, 2017, NextEra provided the inspectors with an assessment of ASR-related delamination, to date, that concluded the delamination areas were a result of loading on the wall and were limited to the cover concrete layer (“near surface”), and therefore, not relevant to structural performance. NextEra staff planned to perform impact-echo testing, a non-destructive test method that uses sound waves to detect flaws within the concrete, to verify that delamination is only occurring in the cover concrete. If delaminations deeper than the cover are identified, then NextEra staff indicated that cores would be taken to verify the condition of the concrete. The inspectors determined that this proposed validation plan was technically adequate to assess the implications of delamination.

Consistent with the current SMP, the ‘B’ Electrical Tunnel Stage 1 structural evaluation was recently completed. NextEra staff concluded that by including an assumed ASR loading from the concrete backfill in the building design shear capacity calculations, the calculated electrical tunnel wall loading (assumed demand) exceeds the design capacity and would not conform to established standards in the ACI 318-71 structural design code. To address this non-conforming condition, NextEra wrote a separate operability determination and initiated further engineering evaluations to review the ASR backfill loading assumptions and to consider potential remediation methods for the B Electrical Building, including support struts and/or bolted plates. The inspectors noted that there are no visual indications of loading distress or other structural integrity issues as evident by the absence of structural cracks. The inspectors conducted a conference call with NextEra staff and their principle ASR engineering contractor (SG&H) on October 18, 2017, to better understand the assumed backfill loading profiles used by NextEra staff in the structural evaluations. The inspectors were informed that the concrete backfill loading profiles differ for each Seabrook structure and that these profiles were developed by a “seven step” iterative process. Based upon this conference call, the inspectors understand that NextEra staff used as-built drawings with backfill details to develop the initial ASR load profiles, taking into consideration whether or not the concrete backfill was confined or unrestrained by any overburden or adjoining excavated surfaces. If appropriate, the backfill load profile adjustments were made utilizing field observations. Examination of NextEra’s methodology for assessing concrete backfill loading is currently under review by the NRC staff, as an element of the August 1, 2016, License Amendment Request (16-03).

Based upon discussions with the responsible engineering staff and inspector review of the Structures Monitoring Program Manual (SMPM), the inspectors understand that as Stage 1, 2, and 3 structural susceptibility evaluations are completed, NextEra staff intend to update SMPM, Appendix C, “Building Deformation Monitoring Tables,” with critical structural monitoring points (qualitative and/or quantitative) that are deemed appropriate to effectively monitor ASR impacts and progression for each affected structure. The inspectors also reviewed the current Change Management Plan for the SMP (AR No. 02148021, dated October 11, 2017), which identified numerous pending changes that were being tracked for the next revision to the SMPM. Revision 03, dated November 17, 2017, was approved after the end of the inspection. The inspectors verified that the

monitoring points for the recently completed structural evaluations were added to Appendix C.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 – 1 sample)

(Closed) Licensee Event Report (LER) 05000443/2017-001-00: Manual Reactor Trip in Response to a Feedwater Isolation due to High Level in Steam Generator 'B'

a. Inspection Scope

The inspectors reviewed the LER, root cause analysis, and event analysis, following the April 29, 2017, plant trip, due to steam generator water level perturbations. Additionally, the inspectors reviewed follow-up actions related to the event to assure that NextEra staff implemented appropriate corrective actions commensurate with their safety significance. The enforcement actions associated with this LER are discussed below. This LER is closed.

b. Findings

Introduction. A self-revealing Green finding was identified for inadequate implementation of procedure MA 4.5, "Configuration Control," Revision 18. Specifically, maintenance technicians failed to properly implement MA 4.5 while backfilling steam generator instrumentation, and inadvertently left an instrumentation valve partially open instead of fully open. This resulted in slow response of the instrument, and ultimately a high steam generator level, a feedwater isolation signal and a manual reactor trip.

Description. On April 29, control room operators manually tripped the reactor when the 'B' steam generator level reached the feedwater isolation signal setpoint. The plant was at approximately 12 percent power, and operators were raising power in preparation for main generator synchronization. At the time, feedwater was being manually controlled by the operators, and the wide range steam generator level indication was being used to determine the required feedwater flow. The wide range level indication was responding slowly to level changes which resulted in overfeeding the steam generator. This caused the steam generator level to increase to the feedwater isolation signal setpoint.

NextEra personnel determined that the slow response of the steam generator level indication was due to an instrumentation valve left partially open instead of fully open as required. On April 26, instrumentation and control technicians had performed a backfilling of the steam generator reference legs. The technicians used procedure MA 4.5, including Form MA 4.5A, "Configuration Change," to track the valve manipulations to maintain configuration control. MA 4.5 requires that all component manipulations and changes to component and plant configuration are performed only to a detailed procedure or written instruction, and shall be documented on form MA 4.5A or in an operating procedure WO, or job plan. The technicians did not properly use place-keeping and concurrent verification during the performance of the backfilling activity, and one instrumentation valve was left in a nearly full closed position instead of the full open position. NextEra promptly rechecked other similar valves, then performed a root cause evaluation that eventually led to additional technician training and improved configuration controls during such evolutions.

Analysis. The inspectors determined that NextEra's failure to properly implement MA 4.5 was a performance deficiency within NextEra's ability to foresee and correct, and should have been prevented. Specifically, instrumentation and control technicians failed to open an instrumentation valve at the end of a steam generator level indicating system backfill maintenance activity. This resulted in operators unable to properly control steam generator water level during startup operations, and ultimately led to a required plant trip due to high steam generator level and a feedwater isolation signal.

This finding is more than minor because it is associated with the configuration control attribute of the Initiating Events cornerstone and affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure to effectively implement MA 4.5 resulted in a valve being left out of its required position, a subsequent lack of steam generator water level control during low power operations, and ultimately required a manual reactor trip. Additionally, the finding is similar to Example 4.b of IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," issued August 11, 2009, in that the performance deficiency caused a reactor trip. In accordance with IMC 0609.04, "Initial Characterization of Findings," issued June 19, 2012, and Exhibit 2 of IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," issued June 19, 2012, the inspectors determined that this finding is of very low safety significance (Green), because the finding did not cause a reactor trip and the loss of mitigation equipment relied upon to transition the plant from the onset of a trip to a stable shutdown condition.

In accordance with IMC 0310, the finding has a cross-cutting aspect in the area of Human Performance, Work Management, because the organization did not implement a process of planning, controlling, and executing the work activity such that nuclear safety was the overriding priority. Specifically, NextEra did not ensure that a steam generator backfilling activity was properly executed, which resulted in the slow response of a steam generator level indication, the overfeeding of the steam generator, a feedwater isolation signal, and the ultimate requirement to trip the reactor [H-5].

Enforcement. This finding does not involve enforcement action because no violation of a regulatory requirement was identified. Because this finding does not involve a violation and is of very low safety significance, it is identified as a finding.

(FIN 05000443 /2017004-03, Inadequate Procedure Implementation Results in a Manual Reactor Trip)

4OA6 Meetings, Including Exit

On January 23, 2018, the inspectors presented the inspection results to Mr. Eric McCartney, Regional Vice President, Northern Region, and other members of the Seabrook Station staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

- E. McCartney, Regional Vice President, Northern Region
- C. Domingos, Site Director
- K. Boehl, Senior Radiation Protection Analyst
- K. Browne, Licensing Manager
- E. Carley, License Renewal Supervisor
- A. Giotos, Senior Analyst
- J. Hulbert, Nuclear Engineer
- D. Robinson, Chemistry Manager
- D. Strand, Radiation Protection Manager
- T. Smith, Radiation Protection Supervisor
- C. Thomas, Licensing Engineer

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000443/2017004-01	NCV	Licensed Operator Examination Integrity Not Ensured (Section 1R11.3)
05000443/2017004-02	NCV	Failure of Exercise Critique to Identify a RSPS Weakness (Section 1EP6)
05000443/2017004-03	FIN	Inadequate Procedure Implementation Results in a Manual Reactor Trip (Section 4OA3)

Closed

05000443/2017-001-00	LER	Manual Reactor Trip in Response to a Feedwater Isolation due to High Level in Steam Generator 'B' (Section 4OA3)
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Procedures

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Condition Reports

2225659 2227085 2227175

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Miscellaneous

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Procedures

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OS1016.03, 'A' Service Water Operation, Revision 17
OS1016.04, 'B' Service Water Operation, Revision 20
OS1016.05, Service Water Cooling Tower Operation, Revision 34
OX1416.01, Service Water Monthly Valve Verification, Revision 12
OX1416.05, Service Water Quarterly Operability Test Cooling Tower Pump, Revision 27
OX1416.03, Cooling Tower Fan Monthly Operability Test, Revision 10
OX1456.02, ECCS Monthly System Verification, Revision 20

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1-CS-B20725, Chemical & Volume Control Charging System Detail, Revision 32
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1-FP-B20266, Fire Protection Fire Pump House Detail, Revision 25
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1-SW-B20795, Service Water System Nuclear Detail, Revision 44

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Section 1R06: Flood Protection Measures

Procedures

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Section 1R07: Heat Sink Performance

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'B' RHR Heat Exchanger Performance Monitoring Data from OR18
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 1-RH-B20660, Residual Heat Removal System Overview, Revision 3
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 9763-F-805203, PAB Vaults Piping Zone 30D Plan at EL(-) 9'-0", Revision 12

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OP 9.2, Transient Response Procedure User's Guide, Revision 18
 OP-AA-100-1001, License Maintenance and Activation, Revision 4
 TR-AA-220-1004, Licensed Operator Continuing Training Annual Operating and Biennial
 Written Exams, Revision 2
 TR-AA-230-1007, Conduct of Simulator Training and Evaluation, Revision 5

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Seabrook 2016-2017 Requalification Training Program Annual Examination Sample Plan

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 NT-3730-1, Seabrook Transient No. 1, Manual Reactor Trip, Rev. 17, dated 3/25/17
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2234311					

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4054097	40437454	40490516	40513114	40513114	40516271
40516273	40568790	94167526			

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Condition Reports

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2238038	2238053	2240790			

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HD0958.33, Performance of Radiation Protection Supervisory Plant Walkdowns, Revision 6
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 PI-AA-207-1000, Station Self-Evaluation and Trending Analysis, Revision 8
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2214502	2215560	2215959	2216230	2216936	2217146
2217211	2219903	2222763	2222809	2223576	2224985
2227328	2232578	2235442	2236473	2237328	2237940
2238405	2111108	2148021	2240426		

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Condition Reports

2202358

Maintenance Orders/Work Orders

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Manual Reactor Trip in Response to a Feedwater Isolation due to High Level in Steam Generator 'B,' Event Date: 4/29/17, Root Cause Evaluation

P-14 Event Analysis

LIST OF ACRONYMS

ACI	American Concrete Institute
ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As is Reasonably Achievable
ASR	alkali silica reaction
CAP	corrective action program
CEVA	containment enclosure ventilation area
CFR	<i>Code of Federal Regulations</i>
CR	condition report
CS	containment spray
CWT	cooling water tower
FIN	finding
EAL	emergency action level
ECCS	emergency core cooling system
EDG	emergency diesel generator
EOP	emergency operations facility
EPA	Environmental Protection Agency
GE	general emergency
HVAC	heating, ventilation, and air conditioning
IMC	Inspection Manual Chapter
JPM	job performance measure
LER	Licensee Event Report
LOCA	loss of coolant accident
MR	Maintenance Rule
NCV	non-cited violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PAB	primary auxiliary building
PAG	protective action guide
PAR	protective action recommendation
PCCW	primary component cooling water
PI	performance indicator
RCS	reactor coolant system
RHR	residual heat removal
RG	Regulatory Guide
RO	reactor operator
RSPS	risk significant planning standard
SAE	site area emergency
SCBA	self-contained breathing apparatus
SED	Site Emergency Director
SMP	Structures Monitoring Program
SMPM	Structures Monitoring Program Manual
SRO	senior reactor operator
SSC	structure, system, and component

STED	Short-Term Emergency Director	
SW	service water	
TS	technical specification	
TSC	technical support center	
UFSAR	September 22, 2015, because the finding	Updated Final Safety
Analysis Report		
WO	work order	
WRGM	wide range gas monitor	