



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 30, 2022

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

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 170  
RE: REVISION OF 120-VOLT AC VITAL INSTRUMENT PANEL  
REQUIREMENTS (EPID L-2021-LLA-0131)

Dear Mr. Coffey:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 170 to Renewed Facility Operating License No. NPF-86 for the Seabrook Station, Unit No. 1. This amendment consists of changes to the technical specifications (TSs) in response to your application dated July 21, 2021, as supplemented by letters dated September 22, 2021, March 7, 2022, and June 27, 2022.

The amendment revises TS 3/4.8.3, "Onsite Power Distribution – Operating," Limiting Condition for Operation (LCO) 3.8.3.1 by increasing the Allowed Outage Time (AOT) for the 120-volt (V) alternating current (AC) vital instrument panel inverters, deleting a footnote, and adding a new Action for two or more inoperable 120-V AC vital instrument panel inverters of the same electrical train and making related changes.

A copy of the related safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's monthly *Federal Register* notice.

Sincerely,

/RA/

Justin C. Poole, Project Manager  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:

1. Amendment No. 170 to NPF-86
2. Safety Evaluation

cc: Listserv



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

NEXTERA ENERGY SEABROOK, LLC, ET AL.\*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 170  
License No. NPF-86

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by NextEra Energy Seabrook, LLC, et al. (the licensee), dated July 21, 2021, as supplemented by letters dated September 22, 2021, March 7, 2022, and June 27, 2022, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

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\*NextEra Energy Seabrook, LLC, is authorized to act as agent for the: Hudson Light & Power Department, Massachusetts Municipal Wholesale Electric Company, and Taunton Municipal Lighting Plant (collectively, with NextEra Energy Seabrook, LLC, "licensees") and has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-86 is hereby amended to read as follows:

- (2) Technical Specifications

- The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 170, are incorporated into the Renewed Facility Operating License No. NPF-86. NextEra Energy Seabrook, LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Hipólito J. González, Chief  
Plant Licensing Branch I  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility  
Operating License and Technical  
Specifications

Date of Issuance: September 30, 2022

ATTACHMENT TO LICENSE AMENDMENT NO. 170

SEABROOK STATION, UNIT NO. 1

RENEWED FACILITY OPERATING LICENSE NO. NPF-86

DOCKET NO. 50-443

Replace the following page of Renewed Facility Operating License No. NPF-86 with the attached revised page. The revised page is identified by amendment number and contains a marginal line indicating the area of change.

Remove  
3

Insert  
3

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the area of change.

Remove  
3/4 8-17  
3/4 8-17a

Insert  
3/4 8-17  
3/4 8-17a

- (3) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR Part 70, to receive, possess, and use at any time special nuclear material as reactor fuel, in accordance with the limitations for storage and amounts required for reactor operation, as described in the Final Safety Analysis Report, as supplemented and amended;
  - (4) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use at any time any byproduct, source, and special nuclear material as sealed neutron sources for reactor startup, sealed sources for reactor instrumentation and radiation monitoring equipment calibration, and as fission detectors in amounts as required;
  - (5) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess, and use in amounts as required any byproduct, source, or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components; and
  - (6) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR Parts 30, 40, and 70, to possess, but not separate, such byproduct and special nuclear materials as may be produced by the operation of the facility authorized herein.
  - (7) DELETED
- C. This renewed license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:
- (1) Maximum Power Level

NextEra Energy Seabrook, LLC, is authorized to operate the facility at reactor core power levels not in excess of 3648 megawatts thermal (100% of rated power).
  - (2) Technical Specifications

The Technical Specifications contained in Appendix A, and the Environmental Protection Plan contained in Appendix B, as revised through Amendment No. 170, are incorporated into the Renewed Facility Operating License No. NPF-86. NextEra Energy Seabrook, LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

ELECTRICAL POWER SYSTEMS

ONSITE POWER DISTRIBUTION

OPERATING

LIMITING CONDITION FOR OPERATION

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3.8.3.1 (Continued)

- i. Train A, 125-volt D.C. Busses consisting of:
  - 1) 125-volt D.C. Bus #11A energized from Battery Bank 1A or 1C, and
  - 2) 125-volt D.C. Bus #11C energized from Battery Bank 1C or 1A.
  
- j. Train B, 125-volt D.C. Busses consisting of:
  - 1) 125-volt D.C. Bus #11B energized from Battery Bank 1B or 1D, and
  - 2) 125-volt D.C. Bus #11D energized from Battery Bank 1D or 1B.

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

ACTION:

-----NOTE-----  
Enter applicable ACTIONS of LCO 3.8.2.1, "DC Sources – Operating," for DC trains made inoperable by inoperable AC power distribution system.  
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- a. With one of the required trains of A.C. emergency busses (except 480-volt Emergency Bus # E64) not fully energized, reenergize the train within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
  - 1. With 480-volt Emergency bus #E64 not fully energized, reenergize the bus within 7 days or be in HOT STANDBY within 6 hours and COLD SHUTDOWN within the following 30 hours.
  
- b. With one A.C. vital panel either not energized from its associated inverter, or with the inverter not connected to its associated D.C. bus: (1) reenergize the A.C. vital panel within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and (2) reenergize the A.C. vital panel from its associated inverter connected to its associated D.C. bus within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
  
- c. With one D.C. bus not energized from an OPERABLE battery bank, reenergize the D.C. bus from an OPERABLE battery bank within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

## ELECTRICAL POWER SYSTEMS

### ONSITE POWER DISTRIBUTION

#### OPERATING

#### LIMITING CONDITION FOR OPERATION

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3.8.3.1 (Continued)

#### ACTION

- d. With two or more A.C. vital panels of the same electrical train either not energized from their associated inverter, or with their inverters not connected to their associated D.C. bus: (1) reenergize or verify energized all A.C. vital panels within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and (2) reenergize or verify energized at least two A.C. vital panels from their associated inverters connected to their associated D.C. bus within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

#### SURVEILLANCE REQUIREMENTS

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4.8.3.1 The specified busses and panels shall be determined energized in the required manner in accordance with the Surveillance Frequency Control Program by verifying correct breaker alignment and indicated voltage on the busses.



UNITED STATES  
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 170 TO FACILITY OPERATING LICENSE NO. NPF-86

NEXTERA ENERGY SEABROOK, LLC

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

By letter dated July 21, 2021, as supplemented by letters dated September 22, 2021, March 7, 2022, and June 27, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML21202A238, ML21265A416, ML22066B007, and ML22179A029, respectively), NextEra Energy Seabrook, LLC (NextEra or the licensee) submitted License Amendment Request (LAR) No. 21-01, requesting changes to the technical specifications (TSs) for Seabrook Station, Unit No. 1. Specifically, the LAR would revise TS 3/4.8.3, "Onsite Power Distribution – Operating," Limiting Condition for Operation (LCO) 3.8.3.1 by increasing the Allowed Outage Time (AOT) for the 120-volt (V) alternating current (AC) vital instrument panel inverters, deleting a footnote, and adding a new Action for two or more inoperable 120-V AC vital instrument panel inverters of the same electrical train and making related changes. The September 22, 2021, supplement superseded the July 21, 2021, application and the proposed new LCO 3.8.3.1 Action d in the March 7, 2022, supplement, superseded the respective change in the September 22, 2021, supplement.

The supplements dated March 7, 2022, and June 27, 2022, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on November 30, 2021 (86 FR 67989).

2.0 REGULATORY EVALUATION

2.1 120-V AC Vital Instrument System Description

The licensee provided a description of the 120-V AC instrumentation and control power system (vital instrument system) in section 2.1, "System Design and Operation," of the September 22, 2021, supplement, and in section 8.3.1.1.d, "120V Vital Instrumentation and Control Power System," of the Seabrook Station updated safety analysis report (UFSAR).

The 120-V AC Vital Instrument System is the source of AC power for the reactor protection, reactor control, and balance-of-plant (BOP) instrument systems that are essential to the operation of the plant during normal operations and postulated accident conditions. It is



composed of six independent 120-V AC vital instrument distribution panels designated as 1A through 1F, each having its own uninterruptible power supply (UPS). The vital instrument panels and associated vital UPS units are Class 1E and are in a seismic Category I building.

Four of the Class 1E vital UPS units provide separate and independent power supplies to the four safety-related Nuclear Steam Supply Steam (NSSS) instrumentation channels designated as channels I, II, III and IV. These four vital UPS units are normally powered from either the 480-V distribution system or the 125-V direct current (DC) system (station batteries/chargers). The two additional Class 1E vital UPS units provide redundant power supplies to the safety-related BOP Train A and Train B vital instrument panels. These two vital UPS units are normally powered from either the 480-V distribution system and or the 125-V DC power system. Each Class 1E vital UPS unit has adequate capacity to carry the associated load continuously. The safety-related NSSS and BOP instrumentation systems are described in the UFSAR Section 7.1.1.1, "Safety-Related Systems." One of the NSSS channel-associated UPS units and one of the BOP UPS units also feed separate non-safety-related panels for non-vital instrumentation and controls through Class 1E circuit breakers.

Each vital UPS unit includes a rectifier section, which converts three-phase 460-V AC power to a nominal 125-V DC power, and an inverter section, which changes the 125-V DC power to a single phase 120-V AC power, a common DC bus, and a blocking circuitry. The inverters assure an uninterruptible supply of AC electrical power to the AC vital instrument panels even if the 4.16 kilovolts safety buses, which feed the 480-V system, are de-energized. The common DC bus (or DC link) connects the rectifier output, the battery bank, and the inverter input. The blocking circuitry connects the battery bank to the inverter section via the common DC bus when normal AC power is not available to the bus, and it blocks power from the battery bank when normal AC power is available to the common DC bus.

For maintenance purposes, each vital instrument panel is manually connected to a non-safety-related 120-V AC maintenance supply powered by a 460-V AC Motor Control Center (MCC) that is backed up by an emergency diesel generator (EDG) and maintained as a fully qualified Class 1E equipment. On each UPS, instrumentation is provided to monitor AC and DC input currents and the output current and voltage. Alarms are provided on the station computer for loss of AC voltage on the vital instrument panels. When a UPS needs to be isolated, the maintenance supply circuit breaker to the vital instrument panel is closed and the normal circuit breaker is opened. In the March 7, 2022, supplement, the licensee stated that five of the six vital instrument panels are equipped with integral transfer switches for automatic and fast transfer to their maintenance power supplies.

## 2.2 Proposed TS Changes

The proposed changes to TS 3.8.3.1 would revise Action b and add a new Action d, as provided in the supplements dated September 22, 2021, and March 7, 2022, respectively.

Current TS 3.8.3.1 Action b requires for one AC vital panel not energized from its associated inverter or with the inverter not connected to its associated DC bus, (1) reenergization of the AC vital panel within 2 hours, and (2) reenergization of the AC vital panel from its associated inverter connected to its associated DC bus within 24\* hours, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

A footnote for Action b to denote the asterisk next to 24 hours states: "\*A one-time AOT extension for an inoperable 120-volt A.C. Vital Panel #1E allows 7 days to restore the inverter to

OPERABLE status. Compensatory measures within in NEE Letter SBKL-19104 dated October 3, 2019, will remain in effect during the extended AOT period. The one-time AOT extension shall expire 45 days after issuance of amendment ....”

Revised TS 3.8.3.1 Action b will extend from the 24-hour AOT to 7 days to reenergize 120-V AC Vital Instrument Panels 1A, 1B, 1C, 1D, 1E, or 1F from its associated inverter connected to its associated DC bus and delete the asterisk adjacent to the existing 24-hour AOT requirement with associated footnote.

New TS 3.8.3.1 Action d will state:

With two or more A.C. vital panels of the same electrical train either not energized from their associated inverter, or with their inverters not connected to their associated D.C. bus: (1) reenergize or verify energized all A.C. vital panels within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and (2) reenergize or verify energized at least two A.C. vital panels from their associated inverters connected to their associated D.C. bus within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

In section 2.3, “Reason for the Proposed Change,” of the September 22, 2021, supplement, the licensee discussed the reason for the proposed change stating:

The proposed license amendment aligns the 120-V AC vital instrument panel requirements with their safety significance by averting the control room operator challenges associated with conducting an orderly shutdown within 24-hours of inverter inoperability with power to the affected instrument panel restored within 2-hours.

### 2.3 Regulatory Requirements and Guidance

The NRC staff used following regulatory requirements to evaluate the LAR:

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(a)(1) states, in part, that each applicant for an operating license shall include in the application proposed TSs in accordance with the requirements of 10 CFR 50.36, “Technical Specifications.”

10 CFR 50.36(c)(2)(i) requires, in part, that the applicants for a license authorizing operation of a production or utilization facility include in their application proposed TSs that specify limiting conditions for operation (LCOs). LCOs are, in part, “the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a limiting condition for operation of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications until the condition can be met.”

The regulations at 10 CFR 50.65, “Requirements for monitoring the effectiveness of maintenance at nuclear power plants,” Section (a)(1) requires, in part, that performance or condition of structures, systems, or components (SSCs), be monitored with associated goals to provide reasonable assurance that these SSCs can fulfill their intended functions. When the performance or condition of an SSC does not meet established goals, appropriate corrective action shall be taken. It also requires that preventive maintenance activities must not reduce the overall availability of the SSCs. Section 50.65(a)(4) of 10 CFR requires licensees to assess and manage the increase in risk that may result from proposed maintenance activities (including but

not limited to surveillance, post-maintenance testing, and corrective and preventive maintenance) before performing these activities.

10 CFR 50, Appendix A, General Design Criterion (GDC) 17, "Electric Power Systems," states, in part:

An onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety. The safety function for each system (assuming the other system is not functioning) shall be to provide sufficient capacity and capability to assure that (1) specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary are not exceeded as a result of anticipated operational occurrences and (2) the core is cooled and containment integrity and other vital functions are maintained in the event of postulated accidents. The onsite electric power supplies, including the batteries, and the onsite electric distribution system, shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.

The NRC staff used the following guidance to evaluate the LAR:

Standard Review Plan (SRP) section 8.3.1, "AC Power Systems (Onsite)," Revision 4, provides the guidance for reviewing onsite power DC power systems' compliance with GDC 17. The SRP Section 8.3.1 states that meeting GDC 17 "provides assurance that a reliable electric power supply will be provided for all facility operating modes, including anticipated operational occurrences and design-basis accidents (DBAs) to permit safety functions and other vital functions to be performed, even in the event of a single failure."

Regulatory Guide (RG) 1.177, "An Approach for Plant-Specific, Risk-Informed Decision-making: Technical Specifications," Revision 1 (revision the licensee stated in its application), Section 2.3.1, "Technical Adequacy of the [probabilistic risk assessment] PRA," states:

The technical adequacy of the PRA must be compatible with the safety implications of the TS change being requested and the role that the PRA plays in justifying that change. Regulatory Guide 1.200 describes one acceptable approach for determining whether the technical adequacy of the PRA, in total or the parts that are used to support an application, is sufficient to provide confidence in the results such that the PRA can be used in regulatory decisionmaking for light-water reactors.

On January 21, 2021, NRC staff issued RG 1.177, Revision 2, however RG 1.177, Revision 1 continues to provide an acceptable method to implement NRC regulations.

RG. 1.177, Section 2.3.2, "Scope of the Probabilistic Risk Assessment for Technical Specification Change Evaluations," states:

When the risk associated with a particular hazard group or operating mode would affect the decision being made, it is the Commission's policy that, if a staff-endorsed PRA standard exists for that hazard group or operating mode, then the risk will be assessed using a PRA that meets that standard.

The scope and the level of PRA necessary to fully support the evaluation of a TS change depend on the type of TS change being sought...However, in some cases, a PRA of

sufficient scope may not be available. This will have to be compensated for by qualitative arguments, bounding analyses, or compensatory measures.

The scope of the analysis should include all hazard groups (i.e., internal events, internal flood, internal fires, seismic events, high winds, transportation events, and other external hazards) unless it can be shown that the contribution from specific hazard groups does not affect the decision.

### 3.0 TECHNICAL EVALUATION

Seabrook TS LCO 3.8.3.1 requires, in part, the following electrical 120-V AC vital instrument panels to be energized from their associated inverters in Modes 1-4:

- c. 120-volt A.C. Vital Panel #1A energized from its associated inverter connected to D.C. Bus #11A,\*
- d. 120-volt A.C. Vital Panel #1 B energized from its associated inverter connected to D.C. Bus #11 B,\*
- e. 120-volt A.C. Vital Panel #1 C energized from its associated inverter connected to D.C. Bus #11C,\*
- f. 120-volt A.C. Vital Panel #1D energized from its associated inverter connected to D.C. Bus #11 D,\*
- g. 120-volt A.C. Vital Panel #1E energized from its associated inverter connected to D.C. Bus #11A,\*
- h. 120-volt A.C. Vital Panel #1F energized from its associated inverter connected to D.C. Bus #11 B,\*

\* Two inverters may be disconnected from their D.C. bus for up to 24 hours as necessary, for the purpose of performing an equalizing charge on their associated battery bank provided: (1) their vital busses are energized, and (2) the vital busses associated with the other battery bank are energized from their associated inverters and connected to their associated D.C. bus.

Seabrook TS Bases stated that the TS LCO 3.8.3.1, in part, ensures the availability of AC vital bus electrical power for the systems required to shut down the reactor and maintain it in a safe condition after an anticipated operational occurrence or a postulated DBA. Maintaining the Train A and Train B AC vital panels operable ensures that the redundancy incorporated into the design of engineered safety features is not defeated and prevent safe shutdown of the reactor in the event of a single failure.

The NRC staff reviewed the proposed changes against the applicable criterion in 10 CFR 50.36(c)(2)(i). Meeting Seabrook TS LCO 3.8.3.1 provides assurance that the required AC vital electrical power will be provided for facility operating Modes 1-4 to permit the performance of safety functions in the event of a single failure, as required, in part, by GDC 17.

#### 3.1 Proposed Revised TS 3.8.3.1 Action b - Delete Footnote Authorizing One-Time AOT Extension

The footnote to current Action b authorized a one-time AOT extension from 24 hours to 7 days for restoring the inverter associated with the vital instrument panel #1E to operable status that expired 45 days following issuance of Seabrook Amendment 163, dated December 5, 2019. In section 3.1, "Delete ACTION b) Footnote Authorizing One-Time AOT Extension," of the

September 22, 2021, supplement, the licensee stated that the inverter associated with vital instrument panel #1E has been restored.

The NRC staff finds it acceptable to delete the asterisk next to the 24-hour AOT requirement and its associated footnote since the one-time AOT extension authorization period has expired.

### 3.2 Proposed Revised TS 3.8.3.1 Revised Action b - Increase 120-V AC Vital Instrument Panel AOT

The proposed change modifies Seabrook TS 3.8.3.1, Action b, by increasing the AOT for one 120-V AC vital instrument panel 1A, 1B, 1C, 1D, 1E, or 1F in Action b.2 from 24 hours to 7 days. The licensee provided a risk-informed evaluation to support the change.

#### 3.2.1 Defense-in-Depth

According to Seabrook UFSAR Table 8.3-3, "Engineered Safety Features," and Figure 8.3-3, "Separation of Instrument and Control Power Sources," (1) Train A UPSs 1A, 1C, and 1E supply 120-V AC vital instrument panel 1A with associated NSSS Channel I circuits, 120-V AC vital instrument panel 1C with associated NSSS Channel III circuits, and 120-V AC vital instrument panel 1E with associated Train A BOP instrumentation, respectively; and (2) Train B UPSs 1B, 1D, and 1F supply 120-V AC vital instrument panel 1B with associated NSSS Channel II circuits, 120-V AC vital instrument panel 1D with associated NSSS Channel IV, and 120-V AC vital instrument panel 1F with associated Train B BOP instrumentation, respectively. Each UPS includes an inverter that provides an interruptible supply of AC electrical power to the 120-V AC vital buses even in the event of loss of AC power. Train A and Train B equipment are redundant.

In the proposed revised TS 3.8.3.1 Action b, when one 120-V AC vital instrument panel in one train is inoperable due to its associated inverter, the redundant 120-V AC vital instrument panel in the other train will be available to support the minimum safety functions to shut down the reactor and maintain it in safe shutdown conditions.

During entry into the proposed extended 7-day AOT for Action b.2, the redundancy of the UPSs (inverters) that are required for the operability of the affected 120-V AC vital instrument panel will be impacted. In the September 22, 2021, supplement, the licensee stated that the risk associated with the extended 7-day AOT duration is low. The NRC staff evaluated the risk magnitude and finds it acceptable in Section 3.2.4 of this safety evaluation. In addition, in the March 7, 2022, supplement, the licensee provided a deterministic justification for the proposed 7-day AOT that estimated 100 hours for restoring the operability of an inoperable vital instrument panel and an additional 2 to 3 days if the restoration would require "the replacement of multiple failed components due to a short-circuit or the replacement of cards for which burned-in spares are not readily available."

The September 22, 2021, supplement, Section 3.2.2, "Traditional Engineering Considerations," stated that during the proposed AOT extension, defense-in-depth measures will be applied to maintain the safety function of the 120-V AC vital instrument bus system. The licensee stated that its online risk management process "will assess the impact of the inoperability and maintenance repair on plant safety and undertake appropriate actions to minimize risk"; the plant risk-significant configurations will not be entered; and risk-reduction measures will be implemented to maintain defense-in-depth. The licensee provided a summary of the plant defense-in-depth measures including the following:

The proposed AOT extension does not create an over-reliance on existing programmatic activities as compensatory measures. Station response to an inoperable vital instrument inverter begins with entering the appropriate ACTION and evaluating the risk-significance of the repair consistent with 10 CFR 50.6[5](a)(4).

The affected 120-V AC vital instrument panel will be reenergized within 2 hours (Action b.1) of entry into the TS LCO 3.8.3.1 Action b using the maintenance power supply to supply associated instrumentation.

Compensatory actions to be taken when entering the extended AOT will be promptly identified and implemented as appropriate for managing the risk associated with the repair consistent with 10 CFR 50.65(a)(4).

The station's online risk management process will continue to evaluate planned maintenance repair for risk-significant configurations, concurrent equipment outages, abnormal plant conditions, and external events such as challenges to grid stability and adverse weather conditions.

During the proposed AOT extension, human performance practices such as pre-job briefs, job site reviews, place-keeping, etc., which reduce the likelihood of human errors will continue to be implemented in accordance with plant administrative and implementing procedures.

In the September 22, 2021, supplement, Section 3.3.4, "Acceptance Guidelines for Technical Specification Changes," and also in the March 7, 2022, supplement, the licensee provided the below two compensatory measures that will be implemented during required and preventive maintenances to improve Seabrook's defense-in-depth in "recognition that during the period of vital panel inverter inoperability, the reliability of the affected 120-V AC vital instrument panel is reduced while temporarily powered from a maintenance supply reliant on the associated EDG in the event of a loss of offsite power."

- 1) Entry into a proposed AOT extension will not be planned concurrent with EDG maintenance.
- 2) Entry into a proposed AOT extension will not be planned concurrent with maintenance on other RPS, EFSAS or containment isolation actuation instrumentation channels that could result in an affected channel being placed in a tripped condition.

The NRC staff reviewed the information related to defense-in-depth of the vital instrument panels in the supplements and the UFSAR. The staff noted that the affected vital instrument panel once reenergized from the maintenance power supply (Action b.1) will be available as a defense in depth measure to support safety functions, if needed. However, the reenergized affected vital instrument panel cannot support the instrumentation required to perform safety functions at the beginning of a loss of coolant accident (LOCA) concurrent with a loss of offsite power (LOOP) event, as discussed in Seabrook UFSAR Chapter 15 safety analyses, since the panel will not be supplied from its DC power source when AC power is lost. Therefore, the reenergized affected vital instrument panel can only be used as a defense in depth measure, if needed, after the start of the LOCA/LOOP event or any design basis event (DBE) involving a LOOP. Based on its review, the staff finds that the proposed change to TS LCO 3.8.3.1 Action b with its associated above-mentioned defense-in-depth measures meet the intent of the

defense-in-depth philosophy because (1) the redundant train of operable 120-V AC vital instrument panels will be available to support the required minimum safety functions during a DBE; (2) the proposed 7-day AOT will provide Seabrook sufficient time with required margin to perform major repairs and maintenance actions necessary for restoring an inoperable vital instrument panel; and (3) the above-mentioned defense-in-depth measures including the compensatory actions will help protect the required vital instrument panels, EDGs, and instrumentation necessary to safely shutdown the unit during DBE and manage the risk per 10 CFR 50.65(a)(4).

### 3.2.2 Safety Margin

During the proposed 7-day AOT extension for TS 3.8.3.1, Action b, one 120-V AC vital instrument panel will be inoperable. In the June 27, 2022, supplement, the licensee stated that the inoperability of one or more 120-V AC vital instrument panel(s) of the same electrical train will not adversely affect the plant safety analysis' inputs and assumptions because the redundant train of 120-V AC vital instrument panels will be available to support the minimum safety functions necessary to shut down and maintain the reactor in a safe shutdown condition.

The NRC staff notes that the proposed AOT extension in Action b does not affect the design criteria, testing methods, and acceptance criteria for the 120-V AC vital instrument panels specified in applicable codes and standards (or alternatives approved for use by the NRC), as described in Seabrook the UFSAR and TS Bases. Therefore, since the proposed AOT extension will not impact the plant safety analysis and its applicable codes and standards, the NRC staff finds that there will be a minimal reduction in safety margin during the extended AOT duration.

### 3.2.3 Compliance with Existing Regulations:

The regulations at 10 CFR 50.36(c) specify the requirements for TS LCO. When a TS LCO is not met, 10 CFR 50.36(c)(2)(i) requires that remedial actions be taken until the LCO is met or the reactor be shut down. The licensee proposed an AOT extension for one inoperable 120-V AC vital instrument panel in TS LCO 3.8.3.1 Action b.2 from 24 hours to 7 days. During entry into TS LCO 3.8.3.1 Action b, the LCO will not be met because the redundancy of operable 120-V AC vital instrument panels, as required by the TS LCO (in operating modes) and specified by GDC 17, will not be maintained. TS LCO 3.8.3.1 Action b.1 and revised Action b.2 provide actions and limited times (i.e., 2 hours and 7 days) to restore the inoperable AC vital instrument panel to functional state and to operable status, respectively. When the actions cannot be met within the limited times, the revised TS LCO 3.8.3.1 Action b.2 requires the plant to be in shutdown modes within required times.

The NRC staff finds that the proposed revised TS LCO 3.8.3.1 Action b provides acceptable remedial actions including the 7-day AOT for restoring the operability of the affected 120-V AC vital instrument panel, as discussed in Section 3.2.1 of this safety evaluation, and therefore meets the requirements of 10 CFR 50.36(c)(2)(i). GDC 17 will be temporarily impacted by the non-availability of the redundant 120-V AC vital instrument panel inverter while the plant is in the TS Action statement during the 7-day AOT.

The regulations at 10 CFR 50.65(a)(4) provide the requirements for assessing and managing the increase in risk that may result from maintenance activities before performing these activities. As discussed in Section 3.2.1 of this safety evaluation, the NRC staff finds that

licensee will continue to comply with 50.65(a)(4) using its existing maintenance program to protect required equipment and manage the risk associated with maintenance activities.

### 3.2.4 Risk Evaluation

#### 3.2.4.1 Evaluation of Technical Adequacy of the PRA

The NRC staff evaluated the technical quality of the Seabrook PRA models and found that they have undergone several model revisions to incorporate improvements and maintain consistency with the as-built, as-operated plant. The Seabrook PRA models have also been through several self-assessments and was the subject of two internal events peer reviews in accordance with RG 1.200. As such, the staff concludes that the risk evaluation supporting this application using the Seabrook PRA models is an acceptable method.

The NRC staff also verified that the risk impact evaluation performed by the licensee appropriately included internal events, internal flood, fire, seismic, and addressed other hazards, in accordance with RG 1.200.

The licensee also stated that all potential sources of generic and plant-specific uncertainty were identified and reviewed thoroughly and determined to have no significant impact on the results of this risk-informed application. However, no description of the sources of model uncertainties, the assumptions made, or any conservatism or non-conservatism introduced by the analysis approach to the PRA model of internal events and internal flooding events was described in the LAR. Therefore, the NRC staff issued a request for additional information (RAI) to seek clarification and justification for the above statement.

In its March 7, 2022, supplement, the licensee responded to the RAI stating that the 2019 Seabrook PRA Notebook, Section 17, "PRA Sources of Uncertainty," fully evaluated the sources of model uncertainty, and further provided a summary table describing the key assumptions, the sources of model uncertainties, conservatisms, and their disposition. In addition, the licensee stated that there were no Internal Flooding sources of uncertainty that impacted this amendment request. The NRC staff reviewed the assumptions and dispositions related to the use of generic industry data for the loss of offsite power categories, battery life calculation, and manual action time requirements for recovery after battery depletion. The staff determined the response to be acceptable because the assumptions are consistent with the current industry practice, are realistic, and introduced only a small amount of conservatism to the model. Accordingly, the NRC staff finds that the technical quality of the PRA used in this application is consistent with the guidance found in RG 1.200 and therefore is acceptable.

#### 3.2.4.2 PRA Results

RG 1.177 provides quantitative acceptance guidelines for risk impact related to AOT changes to be considered "small" and acceptable if incremental conditional core damage probability (ICCDP) is less than  $1.0E-6$  and incremental conditional large early release probability (ICLERP) is less than  $1.0E-7$  or less. The NRC staff reviewed the licensee's evaluation methodology and the reported total increase in ICCDP of  $7.47E-07$  and ICLERP of  $2.81E-09$  due to the proposed change. The staff determined that the increases in ICCDP and ICLERP are acceptable because the increases are well within the acceptance guidelines of RG 1.177, Revision 1.



### 3.2.4.3 Risk Evaluation Conclusion

The NRC staff finds that the technical adequacy of the PRA supporting this application meets the requirements of RG 1.200. Further, the staff finds that the increase in ICCDP and ICLERP as the result of this proposed change from 24 hours to 7 days in TS 3.8.3.1, Action b.2 is consistent with the guidelines of RG 1.177, Revision 1. Accordingly, the NRC staff concludes that the proposed change to Action b.2 is acceptable.

### 3.3 Proposed TS 3.8.3.1 New Action d - Two Inoperable 120-V AC Vital Instrument Panels on Same Train

In the LAR the licensee proposed a new TS 3.8.3.1, Action d to address the inoperability of two or more inoperable AC vital instrument panels of the same electrical train. The proposed new TS 3.8.3.1 Action d will be applicable to all three 120-V AC vital instrument panels (1A, 1B, and 1E in train A; or 1C, 1D, and 1F in train B) and associated inverters of the same train. In the proposed new TS 3.8.3.1 Action d, the 120-V AC vital instrument panels in the redundant train will be available to support the minimum safety functions to shut down the reactor and maintain it in safe shutdown conditions.

The proposed new Action d.1 requires that all three 120-V AC vital instrument panels be reenergized or verified to be energized within 2 hours. The inoperable vital instrument panels will be reenergized by the non-safety related 480-V MCC maintenance power supplies. In the March 7, 2022, supplement, the licensee stated that five of the six 120-V AC vital instrument panels are each equipped with an integral static transfer switch for an automatic transfer to their maintenance power supplies when their associated UPS/inverters become unavailable. The licensee clarified that the vital instrument panel (1-EDE-PP-1D) without an integral static transfer switch will be manually transferred to its maintenance power supply within the proposed 2-hour AOT for Action d.1. If the inoperable vital instrument panels cannot be reenergized or verified energized within 2 hours, Action d.1 requires gradual plant shutdown within specific times (6 hours for hot standby and 30 hours for cold shutdown).

The NRC staff finds that the proposed 2-hour AOT for reenergizing the inoperable vital instrument panels and times to reach hot standby and cold shutdown for the new Action d.1 are consistent with the AOT and times for hot standby and cold shutdown for current TS 3.8.3.1 Action b.1 and revised Action b.2, which is discussed above, and are, therefore, acceptable.

The proposed new Action d.2 requires that at least two 120-V AC vital instrument panels be reenergized or verified to be energized from their associated inverters connected to their associated D.C. bus within 8 hours. In the June 27, 2002, supplement, the licensee explained that if two vital instrument panels of the same electrical train were inoperable, restoration of at least one inoperable vital instrument panel to operable status would be required to exit proposed Action d.2. Likewise, if three vital instrument panels of the same electrical train were inoperable, restoration of at least two vital instrument panels to operable status would be required to exit proposed Action d.2. The licensee clarified that upon exiting Action d.2, the revised Action b.2, which is discussed above, will apply to the remaining inoperable vital instrument panel and its AOT will begin at the time of its initial inoperability rather than upon exiting Action d.2.

The licensee stated that the proposed 8-hour AOT for Action d.2 will be used for cases where restoration to operability of a vital instrument panel can be accomplished in one work shift. The licensee provided an example of the sudden inoperability of a second vital instrument panel in

the same electrical train where a vital instrument panel is inoperable due to its associated inverter undergoing a preventative maintenance or a minor repair that can be accomplished in one 8-hour shift. The licensee also stated that the proposed "8-hour AOT would avert the added risk of commencing an unplanned unit shutdown when from a plant safety perspective, focus should be on restoring normal Class 1 electrical power to the affected vital instrument panel(s)." Furthermore, the licensee clarified that if a loss of offsite power would occur during the proposed 8-hour AOT for Action d.2, the inoperable vital instrument panels would be momentarily deenergized in approximately 12 seconds before being repowered from their maintenance supplies connected to the EDGs. If at least two or more of the inoperable inverters cannot be reenergized or verified energized within 8-hours, the proposed Action d.2 requires the unit be brought to at least hot standby (Mode 3) within the next 6 hours and in cold shutdown (Mode 5) within the following 30 hours.

The NRC staff notes that in this proposed Action d, the unit is vulnerable to a complete loss of all uninterruptible power to the AC vital instrument panels assuming a single failure of the UPS/inverters in the redundant train, so uninterruptible power should be restored to the affected train in a timely manner. Also, although during the 8 hours AOT of Action d.2, the inoperable vital instrument panels once reenergized within 2 hours in Action d.1 will be available to support safety functions, if needed, they cannot support the instrumentation required to respond to a LOCA/LOOP event, as discussed in the Seabrook UFSAR Chapter 15 safety analyses. Therefore, the NRC staff finds that the proposed 8 hours for Action d.2 is acceptable because (1) the operable vital instrument panels in the redundant train will be available to support the minimum safety functions necessary to shut down the reactor and maintain it in safe shutdown condition in the event of a DBE; (2) the 8-hour AOT will provide sufficient time to perform evaluations and actions necessary for restoring the operability of the affected AC vital instrument panels in one operator work shift to keep the plant in stable conditions rather than requiring an immediate plant shutdown, which can potentially decrease the plant safety; and (3) the potential for an event in conjunction with a single failure in the redundant train necessitates a shorter AOT. The NRC staff also finds that the proposed times to reach hot standby and cold shutdown in the proposed Action d.1 and d.2 are acceptable because they are consistent with the times for hot standby and cold shutdown for current TS 3.8.3.1 Action b.1 and revised Action b.2, which is discussed above, respectively. Therefore, based on the above discussion, the NRC staff concludes that the proposed Action d.1 and d.2 provide acceptable remedial actions for restoring the inoperable 120-V AC vital instrument panels, as required by 10 CFR 50.36(c)(2)(i).

### 3.4 Technical Conclusion

The NRC staff reviewed the proposed change to Seabrook TS 3.8.3.1 for inoperable 120-V AC vital instrument panels. The change would revise Action b by increasing the AOT for restoring the operability of one vital instrument panel to operable status from 24 hours to 7 days, deleting a one-time footnote, and would add a new Action d for two or three inoperable vital instrument panels. Based on its review, the NRC staff finds that the proposed changes are acceptable because (1) the 7-day AOT for Action b will have minimal impact on the continued safe operation and safe shutdown capability of the plant from a defense-in-depth perspective, as required by 10 CFR 50.36(c)(2)(i) and GDC 17, and the continued risk assessment associated with the maintenance activities in accordance with 10 CFR 50.64(a)(4); (2) the one-time footnote in Action b has expired; and (3) the new Action d provides acceptable remedial actions including the AOTs for restoring the operability of the affected 120-V AC vital instrument panels to meet the TS LCO 3.8.3.1 or shut down the plant in accordance with 10 CFR 50.36(c)(2)(i).

Therefore, the NRC staff finds there is reasonable assurance that the proposed changes will not endanger the health and safety of the public.

#### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Commonwealth of Massachusetts official and the New Hampshire State official were notified of the proposed issuance of the amendment on August 23, 2022. The officials had no comments.

#### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff finds that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (November 30, 2021 (86 FR 67989)). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

#### 6.0 CONCLUSION

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

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Date of Issuance: September 30, 2022

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT NO. 170  
 RE: REVISION OF 120-VOLT AC VITAL INSTRUMENT PANEL  
 REQUIREMENTS (EPID L-2021-LLA-0131) DATED SEPTEMBER 30, 2022

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**\*via memorandum**

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