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

February 23, 2012

Mr. Paul Freeman
Site Vice President
c/o Michael O'Keefe
Seabrook Station
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT REGARDING REVISION OF THE TECHNICAL SPECIFICATIONS FOR REACTOR COOLANT SYSTEM LEAKAGE DETECTION INSTRUMENTATION (TAC NO. ME6101)

Dear Mr. Freeman:

The Commission has issued the enclosed Amendment No. 129 to Facility Operating License No. NPF-86 for the Seabrook Station, Unit No. 1 (Seabrook). This amendment consists of changes to the Technical Specifications (TSs) to revise the reactor coolant system leakage detection systems in response to your application dated April 21, 2011.

The amendment revises the operability requirements for the leakage detection systems, eliminates redundant TS requirements, and revises the TS actions to include conditions and required actions for inoperable leakage detection systems similar to those in NUREG-1431, "Standard Technical Specifications - Westinghouse Plants."

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

Sincerely,

John G. Lamb, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:
1. Amendment No. 129 to NPF-86
2. Safety Evaluation

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UNITED STATES
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NEXTERA ENERGY SEABROOK, LLC, ET AL.*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 129
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 April 21, 2011, 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.

*NextEra Energy Seabrook, LLC is authorized to act as agent for the: Hudson Light & Power Department, Massachusetts Municipal Wholesale Electric Company, and Taunton Municipal Light Plant 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 Facility Operating License No. NPF-86 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 129 , and the Environmental Protection Plan contained in Appendix B are incorporated into the Facility 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.

FOR THE NUCLEAR REGULATORY COMMISSION

Meena Khanna, Chief
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the License and Technical Specifications

Date of Issuance: February 23, 2012

ATTACHMENT TO LICENSE AMENDMENT NO. 129

FACILITY OPERATING LICENSE NO. NPF-86

DOCKET NO. 50-443

Replace the following page of 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	Insert
3	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 areas of change.

Remove	Insert
3/4 3-37	3/4 3-37
3/4 3-38	3/4 3-38
3/4 3-39	3/4 3-39
3/4 4-14	3/4 4-14
---------	3/4 4-14a
3/4 4-16	3/4 4-16

(4) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR 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 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;

(6) NextEra Energy Seabrook, LLC, pursuant to the Act and 10 CFR 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; and

(7) DELETED

C. This 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; 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, as revised through Amendment No. 129 *, and the Environmental Protection Plan contained in Appendix B are incorporated into the Facility License No. NPF-86. NextEra Energy Seabrook, LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

(3) License Transfer to FPL Energy Seabrook, LLC**

a. On the closing date(s) of the transfer of any ownership interests in Seabrook Station covered by the Order approving the transfer, FPL Energy Seabrook, LLC**, shall obtain from each respective transferring owner all of the accumulated decommissioning trust funds for the facility, and ensure the deposit of such funds and additional funds, if necessary, into a decommissioning trust or trusts for Seabrook Station established by FPL Energy Seabrook, LLC**, such that the amount of such funds deposited meets or exceeds the amount required under 10 CFR 50.75 with respect to the interest in Seabrook Station FPL Energy Seabrook, LLC**, acquires on such dates(s).

* Implemented
** On April 16, 2009, the name "FPL Energy Seabrook, LLC" was changed to "NextEra Energy Seabrook, LLC".

TABLE 3.3-6

RADIATION MONITORING INSTRUMENTATION FOR PLANT OPERATIONS

FUNCTIONAL UNIT	CHANNELS TO TRIP/ALARM	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ALARM/TRIP SETPOINT	ACTION
1. Containment					
a. Containment - Post LOCA - Area Monitor	1	2	All	≤ 10 R/h	27
2. Containment Ventilation Isolation					
a. On Line Purge Monitor	1	2	1, 2, 3, 4	*	23
b. Manipulator Crane Area Monitor	1	2	6#	**	23
3. Main Steam Line	1/steam line	1/steam line	1, 2, 3, 4	N.A.	27
4. Fuel Storage Pool Areas					
a. Fuel Storage Building Exhaust Monitor	N.A.	1	***	****	25
5. Control Room Isolation					
a. Air Intake-Radiation Level					
1) East Air Intake	1/intake	2/intake	All	****	24
2) West Air Intake	1/intake	2/intake	All	****	24
6. Primary Component Cooling Water					
a. Loop A	1	1	All	≤ 2 x Background	28
b. Loop B	1	1	All	≤ 2 x Background	28

TABLE NOTATIONS

* Two times background; purge rate will be verified to ensure compliance with ODCM Control C.7.1.1 requirements

** Two times background or 15 mR/hr, whichever is greater.

*** With irradiated fuel in the fuel storage pool areas.

**** Two times background or 100 CPM, whichever is greater.

\# During CORE ALTERATIONS or movements of irradiated fuel within the containment.

TABLE 3.3-6 (Continued)

ACTION STATEMENTS

ACTION 23 - With less than the Minimum Channels OPERABLE requirement, operation may continue provided the containment ventilation isolation valves are maintained closed.

ACTION 24 - With the number of OPERABLE channels one less than the Minimum Channels OPERABLE requirement, within 1 hour initiate and maintain operation of the Control Room Emergency Ventilation System in the recirculation mode of operation.

ACTION 25 - With less than the Minimum Channels OPERABLE requirement, operation may continue for up to 30 days provided an appropriate portable continuous monitor with the same Alarm Setpoint is provided in the fuel storage pool area. Restore the inoperable monitors to OPERABLE status within 30 days or suspend all operations involving fuel movement in the fuel storage pool areas.

ACTION 27 - With the number of OPERABLE Channels less than the Minimum Channels OPERABLE requirement, initiate the preplanned alternate method of monitoring the appropriate parameter(s), within 72 hours, and:

1) either restore the inoperable Channel(s) to OPERABLE status within 7 days of the event, or

2) prepare and submit a Special Report to the Commission pursuant to Specification 6.8.2 within 14 days following the event outlining the actions taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

ACTION 28 - With the number of OPERABLE Channels less than the Minimum Channels OPERABLE requirement, collect grab samples daily from the Primary Component Cooling Water System and the Service Water System and analyze the radioactivity until the inoperable Channel(s) is restored to OPERABLE status.

TABLE 4.3-3

RADIATION MONITORING INSTRUMENTATION FOR PLANT OPERATIONS SURVEILLANCE REQUIREMENTS

FUNCTIONAL UNIT	CHANNEL CHECK	CHANNEL CALIBRATION	DIGITAL CHANNEL OPERATIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
1. Containment				
a. Containment - Post LOCA - Area Monitor	S	R	Q	All
2. Containment Ventilation Isolation				
a. On Line Purge Monitor	S	R	Q	1, 2, 3, 4
b. Manipulator Crane Area Monitor	S	R	Q	6#
3. Main Steam Line	S	R	Q	1, 2, 3, 4
4. Fuel Storage Pool Areas				
a. Radioactivity-High-Gaseous Radioactivity	S	R	Q	*
5. Control Room Isolation				
a. Air Intake Radiation Level				
1) East Air Intake	S	R	Q	All
2) West Air Intake	S	R	Q	All
6. Primary Component Cooling Water				
a. Loop A	S	R	Q	All
b. Loop B	S	R	Q	All

TABLE NOTATIONS

* With irradiated fuel in the fuel storage pool areas.

During CORE ALTERATIONS or movement of irradiated fuel within the containment.

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3.4.6.1 The following RCS leakage detection systems shall be OPERABLE:

a. One containment atmosphere radioactivity monitor (gaseous or particulate), and

b. The containment drainage sump level monitoring system.

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

ACTION:

a. With the containment drainage sump level monitoring system inoperable:

   1. Perform surveillance requirement 4.4.6.2.1.d, RCS inventory balance at least once per 24 hours*, and

   2. Restore the containment drainage sump level monitoring system to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the required containment atmosphere radioactivity monitor inoperable:

   1. Perform surveillance requirement 4.4.6.2.1.d, RCS inventory balance, at least once per 24 hours*, or analyze grab samples of the containment atmosphere at least once per 24 hours, and

   2. Restore the required inoperable containment atmosphere radioactivity monitor to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the containment drainage sump level monitoring system inoperable and the containment atmosphere particulate monitor inoperable:

   1. Enter Action a, and

   2. Analyze grab samples of the containment atmosphere at least once per 12 hours, and

* Not required to be performed until 12 hours after establishment of steady state operation.

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

LEAKAGE DETECTION SYSTEMS

LIMITING CONDITION FOR OPERATION

3. Restore either the containment drainage sump level monitoring system or the containment atmosphere particulate monitor to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.4.6.1 The leakage detection systems shall be demonstrated OPERABLE by:

a. Required containment atmosphere radioactivity monitor:

   1. Performance of a CHANNEL CHECK at least once per 12 hours,

   2. Performance of a DIGITAL CHANNEL OPERATIONAL TEST at least once per 92 days, and

   3. Performance of a CHANNEL CALIBRATION at least once per 18 months.

b. Containment Drainage Sump Level Monitoring System - performance of CHANNEL CALIBRATION at least once per 18 months.

ACTION: (Continued)

c. With any Reactor Coolant System Pressure Isolation Valve leakage greater than the above limit, isolate the high pressure portion of the affected system from the low pressure portion within 4 hours by use of at least two closed manual or deactivated automatic valves, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.4.6.2.1 Reactor Coolant System operational leakages shall be demonstrated to be within each of the above limits by:

a. Not Used

b. Not Used

c. Measurement of the CONTROLLED LEAKAGE to the reactor coolant pump seals when the Reactor Coolant System pressure is 2235 ± 20 psig at least once per 31 days with the modulating valve fully open. The provisions of Specification 4.0.4 are not applicable for entry into MODE 3 or 4;

d. Performance of a Reactor Coolant System water inventory balance at least once per 72 hours during steady-state operation, except that not more than 96 hours shall elapse between any two successive inventory balances; (1) (2)

e. Monitoring the Reactor Head Flange Leakoff System at least once per 24 hours, and

f. Verifying primary to secondary leakage is ≤ 150 gallons per day through any one SG at least once per 72 hours. (2)

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(1) Not applicable to primary to secondary leakage.

(2) Not required to be performed until 12 hours after establishment of steady state operation.

UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 129

TO FACILITY OPERATING LICENSE NO. NPF-86

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

By letter dated April 21, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession Number ML11115A115), NextEra Energy Seabrook, LLC (NextEra or the licensee) submitted license amendment request (LAR) 11-01, "Application to Revise the Technical Specifications [TSs] for Reactor Coolant System [RCS] Leakage Detection Instrumentation" for Seabrook Station, Unit 1 (Seabrook).

The proposed changes revise TS 3.3.3.1, "Radiation Monitoring for Plant Operations," TS 3.4.6.1 "Reactor Coolant System Leakage Detection Systems," TS 3.4.6.2. "Reactor Coolant System Operational Leakage," and includes TS Bases changes that summarize and clarify the purpose of the TS and the specified safety function of the leakage detection monitors.

The licensee stated that the LAR incorporates changes similar to NRC-approved Revision 3 to Technical Specification Task Force (TSTF) Standard Technical Specification (STS) Change Traveler, TSTF-513, "Revise PWR [pressurized water reactor] Operability Requirements and Actions for RCS Leakage Instrumentation" (ADAMS Accession Number ML102360355). The licensee further stated that the LAR proposed changes beyond those included in TSTF-513.

Due to TS formatting differences between STS and Seabrook TS, the licensee proposed plant-specific deviations from the applicable TS changes described in TSTF-513, Revision 3 as well as TS changes beyond those included in TSTF-513. These deviations are discussed in the Technical Evaluation. The deviations are consistent with the intent of TSTF-513.

2.0 REGULATORY EVALUATION

The U.S. Nuclear Regulatory Commission's (NRC's) regulatory requirements related to the content of the TS are contained in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36. Paragraph (c)(2)(i) of 10 CFR 50.36 states that limiting conditions for operation (LCOs) are the lowest functional capability or performance levels of equipment required for safe operation of the facility. Paragraph (c)(2)(ii) of 10 CFR 50.36 lists four criteria for determining whether particular items are required to be included in the TS LCOs. The first criterion applies to installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary (RCPB). As described in the

Federal Register Notice associated with this regulation (60 FR 36953, July 16, 1995), the scope of TS includes two general classes of technical matters: (1) those related to prevention of accidents, and (2) those related to mitigation of the consequences of accidents. Criterion 1 addresses systems and process variables that alert the operator to a situation when accident initiation is more likely, and supports the first of these two general classes of technical matters which are included in TS. As specified in Paragraph (c)(2)(i) of 10 CFR 50.36, 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 TS until the condition can be met.

The NRC's guidance for the format and content of PWR TS can be found in NUREG-1431, Revision 3.0, "Standard Technical Specifications Westinghouse Plants." STS 3.4.15, "RCS Leakage Detection Instrumentation," contains specific guidance to the RCS leakage detection instrumentation for PWRs. The STS Bases provide a summary statement of the reasons for the STS.

The Bases for STS 3.4.15 contained in NUREG-1431, Revision 3.0, provide background information, the applicable safety analyses, a description of the LCO, the applicability for the RCS leakage detection instrumentation TS, and describe the Actions and Surveillance Requirements. The TS Bases provide the purpose or reason for the TS which are derived from the analyses and evaluation included in the safety analysis report, and for these Specifications, the RCS leakage detection instrumentation design assumptions and licensing basis for the plant.

As stated in NRC Information Notice (IN) 2005-24, "Nonconservatism in Leakage Detection Sensitivity" (ADAMS Accession Number ML051780073), the reactor coolant activity assumptions for containment atmosphere gaseous radioactivity monitors may be nonconservative. This means the monitors may not be able to detect a 1 gallon per minute (gpm) leak within 1 hour under all likely operating conditions.

The issue described in IN 2005-24 has raised questions regarding the operability requirements for containment atmosphere gaseous radioactivity monitors. TSTF-513, Revision 3, revises the TS Bases to reflect the proposed TS changes and more accurately describe the contents of the facility design basis related to operability of the RCS leakage detection instrumentation. Part of the TS Bases changes revise the specified safety function of the RCS leakage detection monitors to specify the required instrument sensitivity level. In addition, TSTF-513, Revision 3, includes revisions to TS Actions for RCS leakage detection instrumentation to establish limits for operation during conditions of reduced monitoring sensitivity because of inoperable RCS leakage detection instrumentation.

The regulation at 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 30, "Quality of Reactor Coolant Pressure Boundary [RCPB]," requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Regulatory Guide (RG) 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973, describes acceptable methods of implementing the GDC 30 requirements with regard to the selection of leakage detection systems for the RCPB.

RG 1.45, Revision 0, Regulatory Position C.2, states that "[l]eakage to the primary reactor containment from unidentified sources should be collected and the flow rate monitored with an accuracy of 1 gallon per minute (gpm) or better."

RG 1.45, Revision 0, Regulatory Position C.3 states:

> At least three separate detection methods should be employed and two of these methods should be (1) sump level and flow monitoring and (2) airborne particulate radioactivity monitoring. The third method may be selected from the following: a. monitoring of condensate flow rate from air coolers [or] b. monitoring of airborne gaseous radioactivity. Humidity, temperature, or pressure monitoring of the containment atmosphere should be considered as alarms or indirect indication of leakage to the containment.

RG 1.45, Revision 0, Regulatory Position C.5 states, "[t]he sensitivity and response time of each leakage detection system in regulatory position 3 above employed for unidentified leakage should be adequate to detect a leakage rate, or its equivalent, of one gpm in less than one hour." RG 1.45, Revision 0, states, "[i]n analyzing the sensitivity of leak detection systems using airborne particulate or gaseous radioactivity, a realistic primary coolant radioactivity concentration assumption should be used. The expected values used in the plant environmental report would be acceptable." The appropriate sensitivity of a plant's containment atmosphere gaseous radioactivity monitors is dependent on the design assumptions and the plant-specific licensing basis as described in the plant's final safety analysis report (FSAR). The NRC staff's approval of the use of expected primary coolant radioactivity concentration values used in the environmental report creates a potential licensing conflict when a licensee is able to achieve and maintain primary coolant radioactivity concentration values lower than the value assumed in the environmental report.

RG 1.45, Revision 1, "Guidance on Monitoring and Responding to Reactor Coolant System Leakage," was issued in May 2008. RG 1.45, Revision 1, describes methods for implementing GDC 30 requirements that are different from those in RG 1.45, Revision 0, and was developed and issued to support new reactor licensing. Revision 1 allows that having two TS leakage detection methods capable of detecting a 1 gpm leak within 1 hour provides adequate leakage detection capability from a safety perspective. It recommends that other potential indicators (including the gaseous radiation monitors) be maintained even though they may not have the same detection capability. These indicators, in effect, provide additional defense-in-depth.

General Design Criterion (GDC) 4 states that "...dynamic effects associated with postulated pipe ruptures in nuclear power units may be excluded from the design basis when analyses reviewed and approved by the Commission demonstrated that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping."

The NRC allows the application of leak-before-break (LBB) technology on the primary piping systems under the broad-scope revision to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix A, GDC 4 (Volume 52 of the *Federal Register* pages 41288-41295, October 27, 1987). Specific guidance on LBB evaluations is discussed in NUREG-0800 Standard Review Plan (SRP) Section 3.6.3, "Leak-Before-Break Evaluation Procedures" (ADAMS Accession Number ML063600396). SRP Section 3.6.3 specifies that leak detection systems be reliable, redundant, diverse and sensitive, and that substantial margin exists to detect the leakage from the through-wall flaw used in the deterministic fracture mechanics evaluation.

3.0 TECHNICAL EVALUATION

The licensee proposed to revise TS 3.4.6.1, "Reactor Coolant System Leakage Detection Instrumentation," TS 3.3.3.1, "Radiation Monitoring for Plant Operations," and TS 3.4.6.2, "Reactor Coolant System Operational Leakage." The proposed changes differ from TSTF-513 changes to NUREG-1431 because the Seabrook TS format and content are based on an earlier version of STS.

3.1 TS 3.3.3.1, "Radiation Monitoring for Plant Operations"

The licensee proposed the following revisions to TS 3.3.3.1:

1. Deletes Functional Unit 1.b, RCS Leakage Detection, from Table 3.3-6
2. Deletes ACTION 26 from Table 3.3-6
3. Deletes Functional Unit 1.b, RCS Leakage Detection, from Table 4.3-3

The NRC staff reviewed the proposed deletion and determined that it is acceptable, because the changes to TS 3.4.6.1 effectively capture all the requirements proposed for deletion from TS 3.3.3.1.

3.2 TS 3.4.6.1,"Reactor Coolant System Leakage Detection Instrumentation"

The licensee proposed revising the TS 3.4.6.1 LCO to state:

> 3.4.6.1 The following RCS leakage detection systems shall be OPERABLE:
> a. One containment atmosphere radioactivity monitor (gaseous or particulate), and
> b. The containment drainage sump level monitoring system.

The licensee proposed revising the TS 3.4.6.1 ACTIONS to state:

a. With the containment drainage sump level monitoring system inoperable:

   1. Perform surveillance requirement 4.4.6.2.1.d, RCS inventory balance at least once per 24 hours*, and

   2. Restore the containment drainage sump level monitoring system to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the required containment atmosphere radioactivity monitor inoperable:

   1. Perform surveillance requirement 4.4.6.2.1.d, RCS inventory balance, at least once per 24 hours*, or analyze grab samples of the containment atmosphere at least once per 24 hours, and

   2. Restore the required inoperable containment atmosphere radioactivity monitor

to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the containment drainage sump level monitoring system inoperable and the containment atmosphere particulate monitor inoperable:

1. Enter Action a, and

2. Analyze grab samples of the containment atmosphere at least once per 12 hours, and

3. Restore either the containment drainage sump level monitoring system or the containment atmosphere particulate monitor to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

*Not required to be performed until 12 hours after establishment of steady state operation.

The licensee proposed revising Surveillance Requirement (SR) 4.4.6.1.a to state:

a. Required containment atmosphere radioactivity monitor:

1. Performance of a CHANNEL CHECK at least once per 12 hours,
2. Performance of a DIGITAL CHANNEL OPERATIONAL TEST at least once per 92 days, and
3. Performance of a CHANNEL CALIBRATION at least once per 18 months.

The proposed changes to the LCO would require operability of one of the containment atmosphere radioactivity monitors in addition to the containment sump level monitoring system. This proposed change is consistent with LCO 3.4.15 in NUREG-1431, and TSTF-513.

ACTION a would apply when the containment drainage sump level monitor is inoperable. It adds a new requirement to perform an RCS inventory balance in accordance with SR 4.4.6.2.1.d at least once per 24 hours when the containment drainage sump level monitor is inoperable. Performing the RCS inventory balance at an increased frequency and the availability of the containment atmosphere radioactivity monitor provides information adequate to detect leakage. The requirement to perform the RCS inventory balance is modified by a footnote that states the SR is not required to be performed until 12 hours after establishing steady-state operation. The 12-hour allowance provides sufficient time to collect and process necessary data after stable conditions are achieved. The change maintains the existing requirement to restore the inoperable monitor to operable status within 30 days. The proposed change is consistent with TS 3.4.15, Condition A, in NUREG-1431, as well as TSTF-513.

ACTION b would be applicable when the required containment atmosphere radioactivity monitor is inoperable. The ACTION requires either analyzing grab samples of the containment atmosphere or performing an RCS inventory balance. With the required radioactivity monitor inoperable, performing an RCS inventory balance at an increased frequency of 24 hours provides an alternate method of periodically monitoring for RCS leakage with consideration that the containment sump monitor remains operable. The requirement to perform the RCS inventory balance is modified by a footnote that states the SR is not required to be performed until 12 hours after establishing steady-state operation. The 12-hour allowance provides sufficient time to collect and process necessary data after stable conditions are achieved. As an alternative to the RCS inventory balance, monitoring for RCS leakage may be accomplished by analyzing grab samples of the containment atmosphere every 24 hours. A containment grab sample is comparable to the containment particulate radiation monitor with respect to the ability to detect RCS leakage. The proposed change maintains the existing requirement to restore the inoperable monitor to operable status within 30 days. The proposed change is consistent with TS 3.4.15, Condition B, in NUREG-1431 for inoperable containment atmosphere radioactivity monitors, as well as TSTF-513.

ACTION c would be applicable when the containment atmosphere gaseous radioactivity monitor is the only operable RCS leakage detection monitor. This ACTION is necessary because improved fuel integrity and the resulting lower primary coolant radioactivity concentration affects a plant's containment atmosphere gaseous radioactivity monitor to a greater extent than other monitors. The proposed required actions for ACTION c require the licensee to enter ACTION a, analyze grab samples of the containment atmosphere once per 12 hours, and restore either the containment drainage sump level monitoring system, or the containment atmosphere particulate monitor within 7 days. The deviations between Seabrook new ACTION c required actions and the applicable TS changes described in TSTF-513, Revision 3, are consistent with the intent of TSTF-513.

Certain ASME Code Class 1 piping systems in Seabrook have been approved by the NRC for LBB. The basic concept of LBB is that certain piping material has sufficient fracture toughness (i.e., ductility) to resist rapid flaw propagation; thereby minimizing the probability of a pipe rupture. The licensee has evaluated postulated flaws in RCS loop piping and determined the piping has sufficient fracture toughness that the postulated flaw would not lead to pipe rupture and potential damage to adjacent safety-related systems, structures and components before the plant could be placed in a safe, shutdown condition. The NRC staff has previously reviewed and approved these plant-specific LBB analyses. Before remotely approaching a pipe rupture, the postulated flaw would lead to limited but detectable leakage, which would be identified by the leak detection systems in time for the operator to take action. The NRC staff previously addressed concerns that LBB depends on erroneous leak rate measurements in the final rule making for use of LBB technology. In addressing the concerns, it was noted that:

> One criterion for application of leak-before-break is that postulated flaw sizes be large enough so that the leakage is about ten times the leak detection capability, and that this flaw be stable even if earthquake loads are applied to the pipe in addition to the normal operating loads. This margin of a factor of ten is more than ample to account for uncertainties in both leakage rate calculations and leak detection capabilities. Furthermore, additional sensitivity studies reported by Lawrence Livermore National Laboratory in NUREG/CR-2189, dated September 1981, entitled "Probability of Pipe Fracture in the Primary Coolant Loop of a PWR Plant" indicate that even in the absence of leak detection, the probability of pipe ruptures in PWR primary coolant loop piping is sufficiently low to warrant exclusion of these events from the design basis. (51 FR 12502-01)

The generic analysis to support elimination of postulated pipe breaks in primary main coolant loop piping as the structural design basis in Westinghouse Owner's Group plants was detailed in Westinghouse Topical Report WCAP-9558, Revision 2, "Mechanistic Fracture Evaluation of Reactor Coolant Pipe Containing a Postulated Circumferential Through-Wall Crack," and subsequently reviewed and approved for use in Generic Letter (GL) 84-04, "Safety Evaluation of Westinghouse Topical Reports Dealing with Elimination of Postulated Pipe Breaks in PWR Primary Main Loops (Generic Letter 84-04)" (ADAMS Legacy Accession Number 8107010410 and 8402010410, respectively). The analysis in WCAP-9558 was performed using elastic-plastic fracture mechanics analysis to demonstrate that large margins against double-ended pipe break would be maintained for stainless steel piping that contains a large postulated crack and is subjected to large postulated loadings. The crack stability calculations included pressure, normal operation and safe shutdown loads. Local failure was assessed by comparison of the J-integral value due to the applied loads, J_{app}, to the material resistance for crack initiation[1], J_{IN}. If the J_{app} exceeded J_{IN}, the tearing modulus, T, was evaluated to determine whether the crack would extend in a stable manner or if the crack would extend in an uncontrolled manner and result in an double ended break.

The analysis in WCAP-9558 did not include plant-specific data from Seabrook and did not show that the generic analysis enveloped the Seabrook plant-specific parameters. Another Westinghouse Topical Report, WCAP-10567, "Technical Bases for Eliminating Large Primary Loop Pipe Rupture as the Structural Design Basis for Seabrook Units 1 & 2," (ADAMS Legacy Accession Number 8408160371) demonstrated that the Seabrook plant parameters were enveloped by the generic Westinghouse report. This conclusion was accepted by the NRC staff, as documented in the Exemption issued November 22, 1985, "Exemption from a Portion of General Design Criterion 4 of Appendix A to 10 CFR Part 50 Regarding the Need to Analyze Large Primary Loop Ruptures as a Structural Design Basis for Seabrook Station, Units 1 and 2," (ADAMS Legacy Accession Number 8512060441).

The LBB methodology is based on sufficient fracture toughness (i.e., ductility) of certain piping material to resist rapid flaw propagation. A postulated flaw in such piping should not lead to pipe rupture and potential damage to adjacent safety-related systems, structures and components before the plant can be placed in a safe, shutdown condition. Before pipe rupture, the postulated flaw should lead to limited, but detectable leakage which would be identified by the leak detection systems of the RCS in time for the operator to take action.

The NRC staff reviewed the application of LBB methodology to primary system piping to ensure that safety margins were satisfied. SRP Section 3.6.3 specifies a margin of the square-root of 2 be applied to the loads to assure that leakage-size flaws are stable at the normal load plus safe-shutdown earthquake load. A margin of 10 is to be applied to leakage so that detection of leakage from the postulated flaw size is ensured when the pipe is subjected to normal operational loads, and the critical flaw size should be twice as large as the leakage flaw size (i.e., a margin of 2 on leakage flaw size). In addition, (1) high and low cycle fatigue effects should be acceptable for the full life of the plant and of negligible effect, (2) overload events

[1] In GL 84-04 the J-integral value for crack initiation is referred to as J_{Ic}. Appendix C of American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, defines J_{Ic} as a measure of toughness due to crack extension at the evaluation temperature. The notation J_{IN} for the J-integral at crack initiation was employed in WCAP-10567, and will also be used here.

such as water hammer should be precluded by design, testing, and operational considerations, (3) adequate margin should exist between the leak rate of a leakage crack and RCS leakage detection system capabilities, (4) sufficient margin should exist between the leakage crack size and critical crack size, and (5) materials properties used in the end-of-service life evaluation should include sufficient margin for materials-aging effects. The NRC staff concluded in the Exemption that the required safety margins were fulfilled for Seabrook.

SRP Section 3.6.3 specifies that leakage detection systems for LBB applications be sufficiently redundant, diverse, and sensitive, and that leak detection systems for LBB applications be equivalent to Regulatory Guide (RG) 1.45, "Guidance on Monitoring and Responding to Reactor Coolant System Leakage," (ADAMS Accession Number ML073200271) for piping inside the containment. RG 1.45 specifies a time frame of 1-hour or less to detect a 1-gpm leak[2] and states: "[p]lants should use multiple, diverse, and redundant detectors at various locations in the containment, as necessary, to ensure that the transport delay time of the leakage from its source to the detector (instrument location) will yield an acceptable overall response time. If LBB analysis is approved for the plant, the overall response time of the leakage monitoring system should be sufficient to support the LBB analysis procedures."

The proposed TS 3.4.6.1 requires the containment drainage sump level monitoring system and one atmosphere radioactivity monitor, either gaseous or particle, to be OPERABLE. If the containment drainage sump level monitoring system is inoperable, an RCS inventory balance must be performed at least once every 24 hours. The RG 1.45 provides that monitoring methods include sufficient diversity to ensure effective monitoring during periods when some systems may become less effective or entirely ineffective. This is fulfilled at Seabrook by the combination of periodic RCS inventory balance and the radioactivity monitor or the grab sample. However, the leak detection sensitivity of 1 gpm in 1 hour is not fulfilled for Action a when the containment drainage sump level monitoring system is inoperative, the coolant radioactivity source term is low and the RCS inventory balance is performed only once in 24 hours. Since the RCS inventory balance is not required to be performed more frequently than once in 24 hours, the NRC staff finds that the flaw growth resulting from time dependent mechanisms must remain small during this time period in order to assure that the LBB analysis remains valid.

The Seabrook RCS primary loop piping consists of wrought seamless austenitic stainless steel pipe (SA-376 Grade 304N), cast austenitic stainless steel (CASS) fittings (SA-351 Grade CF8A), stainless steel welds between the stainless steel piping components, and dissimilar metal butt welds (DMBW), referred to as Inconel in WCAP-10567, associated with the transition from ferritic steel to austenitic stainless steel. The impact of time dependent operational parameters, such as cyclic fatigue, and materials-aging effects in CASS and stainless steel welds, was considered in the NRC staff's safety evaluation of WCAP-10567. The fatigue and materials-aging effects occur over time periods significantly longer than those considered for leakage detection; therefore, they are not influenced by the limited leakage detection times. The other fracture mechanics parameters in the original LBB analysis are not time dependent, thus leakage detection times do not impact these analyses.

Operating experience in PWRs has shown that Nickel (Ni)-based Alloy 182 DMBWs in RCS primary loop piping have experienced primary water stress-corrosion cracking (PWSCC), a time

[2] The NRC staff notes that GL 84-04 states: "At least one leakage detection system with sensitivity capable of detecting 1 gpm in 4 hours must be operable."

dependent crack growth mechanism. Because PWSSC was not recognized at the time of the initial LBB analysis, evaluation of PWSCC in DMBWs was not considered in the safety evaluation.

In order to determine whether the LBB analysis remains valid for the time between successive RCS inventory balance measurements, the rate of PWSCC crack extension in Alloy 182 DMBW must be determined. PWSCC crack growth equations are based on the applied stress intensity factor, K_I, which depends only on loading and geometry. For the weld location near the DMBW, WCAP-10567 states: "... the linear elastic formulation for K will provide a reasonable estimate for J." The use of K associated with J implies that the crack tip stress field is dominated by the elastic component, and that the crack is not extending as the result of plastic deformation. Although the value of K was not tabulated in WCAP-10567, it can be calculated from the value of J_{app} in WCAP-10567 using the equation $K_I = \sqrt{(J_{app}E/(1-v^2))}$, where E is the elastic modulus and v is the Poisson's ratio of the material.

The Alloy 182 DMBWs are nominally the same thickness, location and loading as the aforementioned weld near the DMBW. Therefore, the DMBW would be subjected to the same stress. The yield stress for Alloy 182 weld material at a temperature of 640° F ("Materials Reliability Program: Leak-Before-Break Evaluation for PWR Alloy 82/182 Welds (MRP-140)," Electric Power Research Institute) is greater than the yield stress value tabulated in WCAP-10567 for the weld material in this location. Therefore, the NRC staff finds that the value of the applied K_I for a hypothetical 10 gpm leaking crack in an Alloy 182 DMBW would be the same as that previously calculated for the weld location near the DMBW.

The NRC staff has calculated the expected PWSCC crack growth in an Alloy 182 DMBW for the applied K_I using the crack growth equation in the NRC-sponsored report NUREG/CR-6907, "Crack Growth Rates of Nickel Alloy Welds in a PWR Environment,"(ADAMS Accession Number ML061720302). The NRC staff determined that the total crack growth in 24 hours is expected to be less than 0.06 inches, a value less than 1-percent of the assumed hypothetical leak crack size needed to produce a 10 gpm leak, and well within the accuracy of the LBB analysis. The NRC staff acknowledges that the applied K_I loading is higher than that of the measured data in NUREG/CR-6907, but notes that the form of the PWSCC crack growth equation in NUREG/CR-6907 is experimentally well-established and accepted. Furthermore, the NRC staff is unaware of any operational experience which shows that PWSCC has occurred at a rate which would challenge the margins of the LBB evaluations in 24 hours. The NRC staff concludes that there is reasonable assurance that the LBB analysis of WCAP-10567 will remain valid for a time period of at least 24 hours between the times that an RCS inventory balance is performed.

The NRC staff has established precedent for the continuing acceptance of LBB analyses for conditions in which non-mitigated, PWSCC susceptible welds or components are present based on increased inspections performed under Code Case N-770-1, as required and conditioned by 10 CFR 50.55a(g)(6)(ii)(F). In the present instance, the NRC staff chooses to remain consistent with this precedent and accepts the licensee's LBB analysis.

The proposed actions for inoperable RCS leakage detection instrumentation maintain sufficient continuity, redundancy, and diversity of leakage detection capability that an extremely low probability of undetected leakage leading to pipe rupture is maintained. This extremely low probability of pipe rupture continues to satisfy the basis for acceptability of LBB in GDC 4.

The NRC staff determined that the proposed ACTION c is less restrictive than the current requirement, because the current ACTION that would apply to the situation when the containment atmosphere gaseous radioactivity monitor is the only operable RCS leakage detection monitor would not allow the licensee 30 days to restore the inoperable monitors to operable status. The proposed Actions and Completion Times are adequate because the grab samples combined with the more frequent RCS mass balances will provide an alternate method of monitoring RCS leakage when the containment atmosphere gaseous radioactivity monitor is the only operable RCS leakage detection monitor and the 12-hour interval is sufficient to detect increasing RCS leakage long before a piping flaw could progress to a catastrophic failure of the primary RCPB. Allowing 7 days to restore another RCS leakage monitor to operable status is reasonable given the diverse methods employed in the Required Actions to detect an RCS leak and the low probability of a large RCS leak during this period. Proposed ACTION c is conservative relative to the STS, sufficiently alerts the operating staff, provides a comparable ability to detect RCS leakage, and provides time intervals that are reasonable. Therefore, the NRC staff determined that the proposed new LCO, ACTIONs a, b, and c provide an adequate assurance of safety when judged against current regulatory standards.

3.3 TS 3.4.6.2, "Reactor Coolant System Operational Leakage"

The licensee also proposed deleting SR 4.4.6.2.1.a and 4.4.6.2.1.b from TS 3.4.6.2. The licensee stated that the change would prevent a potential conflict between the new TS 3.4.6.1 actions and the TS 3.4.6.2 SRs. Namely actions a and b of TS 3.4.6.1 allow either the containment sump level monitoring system or the containment atmosphere radioactivity monitor to be inoperable for 30 days, while the SRs of 3.4.6.2 for these system must be met every 12 hours. This conflict occurs because Seabrook TS are different from NUREG-1431. The licensee stated the change would make Seabrook TS more consistent with NUREG-1431. The NRC staff reviewed the proposed deletion and determined that it is acceptable, because the requirements of SR 4.4.6.1.a.1 provide assurance that the systems are operable.

3.4 TS Bases

The associated TS Bases submitted with the licensee's proposed revision for TSs reflect the proposed TS changes and more accurately describe the contents of the facility design basis related to operability of the RCS leakage detection instrumentation and reflect the proposed TS changes. The proposed TS Bases changes related to the operability of the RCS leakage detection instrumentation are acceptable, because they provide background information, the applicable safety analyses, a description of the LCO, and the applicability for the RCS leakage detection instrumentation TS, and are consistent with the design basis of the facility. These instruments satisfy Criterion 1 of 10 CFR 50.36(c)(2)(ii) in that they are installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the RCPB.

3.5 Summary

The NRC staff evaluated the licensee's proposed changes against the applicable regulatory requirements listed in Section 2 of this SE. The NRC staff also compared the proposed changes to the changes made to STS by TSTF-513, Revision 3. The NRC staff determined that all the proposed changes afford adequate assurance of safety when judged against current regulatory standards. Therefore, the NRC staff finds the proposed changes acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Hampshire and Massachusetts State officials were notified of the proposed issuance of the amendment. The State officials provided no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined 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 (76 FR 48913). 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 amendments.

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.

Principal Contributors: Jay Wallace, Matt Hamm, and John G. Lamb

Date: February 23, 2012

February 23, 2012

Mr. Paul Freeman
Site Vice President
c/o Michael O'Keefe
Seabrook Station
NextEra Energy Seabrook, LLC
P.O. Box 300
Seabrook, NH 03874

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT REGARDING REVISION OF THE TECHNICAL SPECIFICATIONS FOR REACTOR COOLANT SYSTEM LEAKAGE DETECTION INSTRUMENTATION (TAC NO. ME6101)

Dear Mr. Freeman:

The Commission has issued the enclosed Amendment No. 129 to Facility Operating License No. NPF-86 for the Seabrook Station, Unit No. 1 (Seabrook). This amendment consists of changes to the Technical Specifications (TSs) to revise the reactor coolant system leakage detection systems in response to your application dated April 21, 2011.

The amendment revises the operability requirements for the leakage detection systems, eliminates redundant TS requirements, and revises the TS actions to include conditions and required actions for inoperable leakage detection systems similar to those in NUREG-1431, "Standard Technical Specifications - Westinghouse Plants."

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

Sincerely,
/ra/
John G. Lamb, Senior Project Manager
Plant Licensing Branch I-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures:
1. Amendment No. 129 to NPF-86
2. Safety Evaluation

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ADAMS Accession No.: ML120030271 ***via memorandum**

OFFICE	LPL1-2/PM	LPL1-2/LA	EPNB/BC	ITSB/BC	OGC-NLO	LPL1-2/BC	LPL1-2/PM
NAME	JLamb	ABaxter (w/comments	TLupold*	RElliott	CKanatas (NLO subject to comments)	MKhanna	JLamb
DATE	01 /10 /12	01/17/12	12/22/2011	02/08/12	02/16/12	02/23/12	02/23/12

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