NEXTera ENERGY SEABROOK

April 21, 2011

10 CFR 50.90

SBK-L-11066
Docket No. 50-443

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

Seabrook Station

License Amendment Request 11-01

Application to Revise the Technical Specifications for Reactor Coolant System Leakage Detection Instrumentation

In accordance with the provisions of Section 50.90 of Title 10 of the Code of Federal Regulations (10 CFR), NextEra Energy Seabrook, LLC (NextEra) is submitting License Amendment Request (LAR) 11-01 for an amendment to the Technical Specifications (TS) for Seabrook Station. The proposed change revises the TS for the reactor coolant system (RCS) leakage detection systems. The change 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. The proposed amendment also incorporates the requirements of TSTF-513, Revision 3, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation," which defines a time limit for restoring inoperable RCS leakage detection instrumentation to operable status, establishes alternate methods of monitoring RCS leakage when one or more required monitors are inoperable, and makes conforming changes to the TS Bases. This application proposes changes beyond those included in TSTF–513, Revision 3; therefore, this LAR does not claim to adopt TSTF–513, Revision 3 under the consolidated line item improvement process.

Attachment 1 to this letter provides NextEra's evaluation of the proposed change, and Attachment 2 provides a markup of the TS showing the proposed change. The TS Bases included in Attachment 3 will be implemented in accordance with TS 6.7.6.j, TS Bases Control Program, upon implementation of the license amendment. As discussed in the evaluation, the proposed change does not involve a significant hazards consideration pursuant to 10 CFR 50.92 and there are no significant environmental impacts associated with the change.

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NRR

No new commitments are made as a result of this change.

The Station Operation Review Committee has reviewed this LAR. A copy of this LAR has been forwarded to the New Hampshire State Liaison Officer pursuant to 10 CFR 50.91(b).

NextEra requests NRC review and approval of LAR 11-01 with issuance of a license amendment by May 1, 2012 and implementation of the amendment within 90 days.

Should you have any questions regarding this letter, please contact Mr. Michael O'Keefe, Licensing Manager, at (603) 773-7745.

Sincerely,

NextEra Energy Seabrook, LLC

Paul Freeman
Site Vice President

Attachments

1. NextEra Energy Seabrook's Evaluation of the Proposed Change
2. Markup of the Technical Specifications
3. Proposed Bases Changes

cc: NRC Region I Administrator
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NEXTera ENERGY SEABROOK

AFFIDAVIT

SEABROOK STATION UNIT 1

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

License Amendment Request 11-01

Application to Revise the Technical Specifications for Reactor Coolant System Leakage Detection Instrumentation

The following information is enclosed in support of this License Amendment Request:

- **NextEra Energy Seabrook's Evaluation of the Proposed Change**
- **Markup of the Technical Specifications**
- **Proposed Bases Changes**

I, Paul Freeman, Site Vice President of NextEra Energy Seabrook, LLC hereby affirm that the information and statements contained within this license amendment request are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

Sworn and Subscribed
before me this
21 day of April, 2011

Shirley Sweeney
Notary Public

SHIRLEY SWEENEY
MY COMMISSION EXPIRES NOV. 18, 2014
NOTARY PUBLIC
NEW HAMPSHIRE

Paul Freeman
Site Vice President

Attachment 1

NextEra Energy Seabrook's Evaluation of the Proposed Change

Subject: Application to Revise the Technical Specifications for Reactor Coolant System Leakage Detection Instrumentation

1.0 SUMMARY DESCRIPTION

The proposed change revises the Technical Specifications (TS) for the reactor coolant system (RCS) leakage detection systems. The change 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 [Reference 1]. The proposed change also incorporates the requirements of TSTF-513, Revision 3, "Revise PWR Operability Requirements and Actions for RCS Leakage Instrumentation," [Reference 2] which defines a time limit for restoring inoperable RCS leakage detection instrumentation to operable status, establishes alternate methods of monitoring RCS leakage when one or more required monitors are inoperable, and makes conforming changes to the TS Bases. This application proposes changes beyond those included in TSTF–513, Revision 3; therefore, this LAR does not claim to adopt TSTF–513, Revision 3 under the consolidated line item improvement process.

2.0 DETAILED DESCRIPTION

The proposed changes include the following:

TS 3.3.3.1, Radiation Monitoring for Plant Operations

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

TS 3.4.6.1, Reactor Coolant System Leakage Detection Systems

Revises the LCO to:

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.

Changes the Actions to include:

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.

Modifies surveillance requirement (SR) 4.4.6.1.a to:

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.

TS 3.4.6.2, Reactor Coolant System Operational Leakage

Deletes SR 4.4.6.2.1.a and b

3.0 TECHNICAL EVALUATION

Background

Seabrook Station Leakage Detection Systems [Reference 3]

Reactor coolant pressure boundary (RCPB) leakage is detected by continuous monitoring methods and a periodic RCS water inventory balance. These methods provide a means of detecting both identified and unidentified leakage. The following design bases were established to satisfy the requirements of General Design Criterion 30 for design diversity and redundancy for the RCPB leak detection systems.

1. Leakage to the atmosphere from systems containing radioactive fluid, which would result in an increase in overall containment radioactivity level, is detected by the use of airborne radioactivity monitors.
2. Indications of an increase in local temperature from any source releasing hot liquid to the atmosphere are provided by air temperature monitors.
3. Temperature monitors are provided to indicate temperature flux vs. flow of leakage in drainage and relief lines and tanks.
4. Liquid level monitors are provided for drainage sumps and tanks to monitor the leakage.
5. The systems are designed to reliably annunciate increasing leakages. The radiation monitors are provided with failure alarms that indicate instrument troubles.

6. The monitors supply sufficient information to enable deduction of leakage rates, differentiation, identification, and general location of leaks.

The RCS leakage monitoring systems controlled by TS 3.4.6.1, RCS Leakage Detection Systems, include the containment drainage sump level monitoring system and the containment atmosphere particulate and gaseous radioactivity monitors.

The containment drainage sump level monitoring system is provided to inventory the leakage collected in the containment drainage sumps. Level switches are used to maintain the sump level between predetermined levels by cycling the sump pump. Leaks are indicated by a computer log and a trend of sump level and pump operation. Continuous sump level monitoring is available in the main control room.

Normal leakage from all the unidentified sources within the containment is estimated to be in the range of 20 to 40 gallons per day. RCPB leaks on the order of one gpm are very large in comparison and are easily detected by log and trend of containment sump level. Additionally, the level transmitters have sufficient resolution to detect changes in level due to a flow of as little as one gpm. Leakage of one gpm can be detected in less than 60 minutes. The drainage sump instrumentation system has a sensitivity of one inch and an accuracy of ±5 percent.

The containment atmosphere radioactivity monitor draws a sample from the containment atmosphere for detection of particulate and gaseous radioactivity. The sample, which is representative of the containment atmosphere, is drawn by an integral pumping system, from containment to a moving paper particulate filter, an iodine cartridge and a noble gas chamber. The air sample is then discharged back to the containment. One radiation detector is used to monitor the particulate filter and a second radiation detector monitors the noble gas. The particulate and gas monitors are capable of detecting leakage of one gpm in less than 60 minutes if the reactor is operated with 0.12 percent fuel defects. Also provided within the containment building is a backup gaseous radiation monitor that monitors the containment atmosphere for noble gas. The containment atmosphere radioactivity monitor provides alarms and indication locally and in the control room.

The main plant computer system (MPCS) contains an RCS leakage monitor that provides on-line monitoring of the RCS inventory balance and in-leakage to the containment drainage sump [Reference 4]. The monitor performs an inventory balance of the RCS every 15 minutes and determines the identified and unidentified leak rates based on the previous 10 hours' data. This

monitor also runs every 30 minutes and determines the amount of leakage going into the containment drainage sumps. The monitor converts sump level to volume and determines the difference in volume over the last 30 minutes). The monitor provides indication and alarms to the operators in the control room.

Conditions the Proposed Change is Intended to Resolve

The proposed change is intended to resolve three issues associated with the current TS. First, the change eliminates redundancies and consolidates the requirements for the RCS leakage detection instruments into one TS to reduce the administrative burden on Operations personnel. Second, the proposed change provides operational flexibility by requiring operability of one of the two available containment atmosphere radioactivity monitors while eliminating the potential need for an unnecessary plant shutdown by providing a completion time, consistent with NUREG-1431 and TSTF-513, for the condition in which the containment drainage sump monitor is inoperable and only the containment gaseous monitor remains operable. Third, the change resolves a conflict between TS 3.4.6.1, RCS Leakage Detection Systems, and TS 3.4.6.2, RCS Operational Leakage.

Evaluation

TS 3.3.3.1, Radiation Monitoring for Plant Operations

TS 3.3.3.1 includes a limiting condition for operation (LCO) that requires operability of the RCS leakage detection particulate radioactivity and gaseous radioactivity instruments in Modes 1 through 4. At the same time, TS 3.4.6.1 contains a redundant LCO that requires operability of these monitors in Modes 1 through 4. TS 3.3.3.1 specifies the SRs and frequencies for the particulate and gaseous radioactivity instruments, but the TS does not provide a specific action for an inoperable monitor; the TS refers the user to comply with the action of TS 3.4.6.1. Similarly, TS 3.4.6.1 contains the Action for an inoperable monitor, but it does not specify the SR frequencies for the particulate and gaseous radioactivity instruments; it refers the user to TS 3.3.3.1.

The proposed change deletes the RCS leakage detection particulate radioactivity and gaseous radioactivity instruments from the LCO of TS 3.3.3.1 because TS 3.4.6.1 already imposes the same requirements. The change also removes the SRs for these instruments and relocates them to TS 3.4.6.1. Action 26 of TS 3.3.3.1, which simply directs the user to comply with the action of TS 3.4.6.1, is also deleted.

The proposed changes to TS 3.3.3.1 are administrative in nature and make no changes to the LCO, Actions, or SRs. The current LCO of TS 3.4.6.1 maintains the same requirement for operability of the containment atmosphere particulate and gaseous radioactivity instruments as the current LCO in TS 3.3.3.1. Likewise, the change maintains the existing SRs for these instruments and only involves a relocation of the requirements. With the proposed elimination of the LCO for these instruments, deleting Action 26 of TS 3.3.3.1, which directs the user to comply with the Action of TS 3.4.6.1 for an inoperable monitor is also appropriate. The proposed change simplifies the TS by consolidating the requirements for the RCS leakage detection radioactivity monitors into one TS and reduces the administrative burden on Operations personnel in implementation of the TS.

TS 3.4.6.1, RCS Leakage Detection Systems

The proposed change modifies the LCO to require operability of one of the containment atmosphere radioactivity monitors in addition to the containment sump level monitoring system. In addition, while the current Action only requires a compensatory measure for an inoperable containment atmosphere radioactivity monitor, the proposed change invokes additional monitoring of RCS inventory in the event the containment drainage sump level monitoring system is inoperable. The change also provides the option of performing a periodic RCS inventory balance as an alternate compensatory measure for an inoperable containment atmosphere radioactivity monitor.

Proposed Change to LCO 3.4.6.1

This change revises LCO 3.4.6.1 to require operability of one containment atmosphere radioactivity monitor, which may consist of either the containment atmosphere particulate or gaseous radiation monitor. This proposed change is consistent with LCO 3.4.15 in NUREG-1431, which requires: a. one containment sump (level or discharge flow) monitor, b. one containment atmosphere radioactivity monitor (gaseous or particulate), and [c. One containment air cooler condensate flow rate monitor.]. The design of Seabrook Station does not include a containment air cooler condensate flow rate monitor. This change is also consistent with Regulatory Position C.2.2.3 in Regulatory Guide (RG) 1.45, Revision 1, "Guidance on Monitoring and Responding to Reactor Coolant System Leakage," May 2008 [Reference 5], which states "Plant technical specifications should identify at least two independent and diverse instruments and/or methods that have the detection and monitoring capabilities above."

NRC Information Notice (IN) 2005-24, Nonconservatism in Leakage Detection Sensitivity," August 3, 2005 [Reference 6], informed addressees that the reactor coolant activity assumptions for primary containment

atmosphere gaseous radioactivity monitors may be non-conservative. Improvements in plant fuel integrity have resulted in a reduction in RCS activity, and consequently, the containment atmosphere radioactivity monitors may not be capable of promptly detecting a one gallon per minute (gpm) leak within one hour. As a result, some plants have removed the gaseous monitor from the technical specification list of required monitors. However, experience has shown that the containment atmosphere gaseous radiation monitor is useful in detecting an increase in RCS leak rate and provides a diverse means to confirm an RCS leak exists when other monitors detect an increase in RCS leak rate. Therefore, retaining the containment atmosphere gaseous radiation monitor in the LCO list of required leak detection instruments as implemented in TSTF-513 is preferable.

While the proposed change stipulates that only one containment atmosphere radioactivity monitor is required to be operable, the Seabrook design continues to require that leakage to the atmosphere from systems containing radioactive fluid, which would result in an increase in overall containment radioactivity levels, is detected by the use of airborne radioactivity monitors. One particulate monitor and one gaseous monitor are provided to fulfill this function. In addition, both instruments are subject to surveillance testing as required by the TS to ensure the availability of one monitor in the event of a failure of the other monitor.

Proposed Action *a*

The Action of TS 3.4.6.1 currently allows continued operation for up to 30 days with one leakage detection system inoperable provided containment grab samples are analyzed once every 24 hours when the containment atmosphere gaseous or particulate monitor is inoperable. More restrictive than current requirements, proposed Action *a* adds a new requirement to perform an RCS inventory balance in accordance with SR 4.4.6.2.1.d 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 for an inoperable containment sump monitor.

Proposed Action *b*

With both the containment gaseous and particulate radioactivity monitors inoperable, the current Action requires a plant shutdown within six hours. This proposed Action for an inoperable containment atmosphere radioactivity monitor 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.

Proposed Action *c*

This proposed action addresses the condition in which the containment drainage sump monitor is inoperable and the only operable monitor is the containment atmosphere gaseous radioactivity monitor. A concern with operation in this configuration was discussed in NRC Information Notice (IN) 2005-24, Nonconservatism in Leakage Detection Sensitivity," August 3, 2005, which informed addressees that the reactor coolant activity assumption for primary containment atmosphere gaseous radioactivity monitors may be non-conservative. This means the gaseous monitors may not be able to detect a one gallon per minute leak within one hour.

10 CFR Part 50, Appendix A, GDC 30, "Quality of Reactor Coolant Pressure Boundary," 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 [Reference 7], 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 "Leakage to the primary reactor containment from unidentified sources should be collected and the flow rate monitored with an accuracy of one 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, "The sensitivity and response time of each leakage detection system in regulatory position C.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, "In 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 the containment atmosphere gaseous radioactivity monitors is dependent on the design assumptions and the plant-specific licensing basis as described in the UFSAR. 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 plant achieves and maintains primary coolant radioactivity concentration values lower than the value assumed in the environmental report.

As a result of the issue identified in IN 2005-24, the TSTF and the NRC staff met to develop an approach to address the issue. The agreed solution was to retain the containment atmosphere gaseous radiation monitor in the LCO list of required equipment, revise the specified safety function of the gas monitor to specify the required instrument sensitivity level, revise the Actions to require additional monitoring, and provide less time before a plant shutdown is required when the primary containment atmosphere gaseous radiation monitor is the only operable monitor. NRC-approved Revision 3 to TSTF-513 implements the agreed solution. Proposed Action *c* incorporates the Required Actions included in TSTF-513 for the condition when the

containment atmosphere gaseous radioactivity monitor is the only operable monitor.

Certain ASME Code Class 1 piping systems at Seabrook Station have been approved by the NRC for leak before break (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. NextEra 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 this 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.

When the gaseous radioactivity monitor is the only operable monitor and RCS activity is low, the monitor may not be capable of detecting leakage of one gpm, so alternate methods of monitoring RCS leakage must be implemented. The proposed actions include analyzing grab samples of the containment atmosphere at least once per 12 hours and performing an RCS inventory balance at least once per 24 hours. The RCS inventory balance is capable of detecting RCS leakage of one gpm and is the primary method of confirming that RCS leakage is within limits. However, the inventory balance must be performed under steady state conditions, so the requirement 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. Analyzing grab samples of the containment atmosphere provides an additional method of monitoring RCS leakage and can be implemented under non-steady state operation. In addition, the action requires restoring the containment drainage sump monitor or the particulate radiation monitor within seven days. Performing an RCS inventory balance at an increased frequency and analyzing containment grab samples on a 12-hour frequency are sufficient to detect increasing RCS leakage long before a piping flaw could progress to a catastrophic failure of the primary RCPB. Allowing seven days to restore another RCS leakage monitor to operable status is reasonable given the diverse methods employed in the proposed Actions to detect an RCS leak and the low probability of a large RCS leak during this period.

Proposed Change to Surveillance Requirement 4.4.6.1

Current SR 4.4.6.1.a refers to TS 3.3.3.1 for the frequencies of performing the SRs on the containment atmosphere radioactivity monitors. This change relocates the SR frequencies from TS 3.3.3.1 to SR 4.4.6.1. Also, SR 4.4.6.1

specifies performing a periodic *channel operational test* while TS 3.3.3.1 requires a *digital channel operational test*. The Seabrook Station TS define the term *digital channel operational test* and limit its applicability to only radiation monitoring equipment. This is the correct term to apply to the operational test performed on the containment atmosphere radioactivity monitors and this term is incorporated in the proposed change. This proposed change does not alter the technical requirements for these SRs.

TS 3.4.6.2, RCS Operational Leakage

The proposed change to TS 3.4.6.2 eliminates SRs 4.4.6.2.1.a and 4.4.6.2.1.b, which require 12-hour monitoring of the containment particulate radioactivity monitor and the containment drainage sump, respectively. TS 3.4.6.2 establishes the limits on RCS operational leakage, and an RCS water inventory balance determines if leakage is within limits. The containment atmosphere radioactivity and the containment sump monitors are automatic systems that provide an early warning of pressure boundary leakage or unidentified leakage. The requirements for these instruments are specified in TS 3.4.6.1.

When the containment particulate radioactivity monitor or the containment drainage sump monitor is inoperable, a conflict exists between the current Action of TS 3.4.6.1, RCS Leakage Detection Systems, and the SRs in TS 3.4.6.2. (The same conflict would exist if the proposed changes to the Action of TS 3.4.6.1 were in effect.) The Action in TS 3.4.6.1 allows operation to continue for up to 30 days with an inoperable RCS leakage detection system. However, SRs 4.4.6.2.1.a and 4.4.6.2.1.b monitor the particulate radioactivity monitor and the containment drainage sump every 12 hours to demonstrate compliance with the LCO of TS 3.4.6.2. Consequently, while complying with the 30-day Action of TS 3.4.6.1 for an inoperable particulate or drainage sump monitor, the plant would be unable to perform the 12-hour SRs in TS 3.4.6.2, resulting in a failure to meet the LCO and the need for plant shutdown.

The RCS water inventory balance required by TS 4.4.6.2.1.d is the SR that measures the quantity of RCS identified and unidentified leakage to support a determination of whether RCS leakage is within the TS limits. On the other hand, the containment particulate radioactivity monitor and the containment drainage sump monitor provide an early warning of RCS leakage. Therefore, the proposed change deletes from TS 3.4.6.2 the SRs that monitor the particulate radioactivity and the containment drainage sump monitors. These detection systems are adequately controlled by TS 3.4.6.1, which specifies the SRs, including a 12-hour channel check of the containment particulate and gaseous radioactivity monitors, that demonstrate operability of the systems.

This proposed change, which resolves a conflict in the TS, is consistent with TS 3.4.13, RCS Operational Leakage, in NUREG-1431. The SRs that demonstrate compliance with the operational leakage limits in TS 3.4.13 include an RCS water inventory balance and determination of primary to secondary leakage. Monitoring of the leakage detections systems is not included in this TS.

Proposed TS Bases Changes

A change to the Bases for TS 3.4.6.1 will expand the discussion to include information similar to that contained in the Bases for TS 3.4.15 in TSTF-513. The revised Bases 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.

Conclusion

The proposed changes to TS 3.3.3.1 consolidate redundant requirements into one TS, and they do not make any technical changes. LCO 3.4.6.1 requires instruments of diverse monitoring principles to be operable to provide confidence that small amounts of unidentified leakage are detected in time to allow actions to place the plant in a safe condition, when RCS leakage indicates possible RCPB degradation. The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with the gaseous or particulate radioactivity monitor, provides an acceptable minimum. The Actions proposed in TS 3.4.6.1 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. Elimination of the SRs from TS 3.4.6.2 does not adversely impact the operators' ability to detect RCS leakage. The RCS inventory balance is the primary method of determining compliance with the operational leakage limits, and TS 3.4.6.1 adequately controls and monitors the leakage detection instrumentation.

4.0 REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

- 10 CFR 50.36, "Technical Specifications," establishes the requirements for the items that must be included in the TS. 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

- 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 4, "Environmental and Dynamic Effects Design Bases," requires that structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. However, 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 demonstrate that the probability of fluid system piping rupture is extremely low under conditions consistent with the design basis for the piping.

- 10 CFR Part 50, Appendix A, GDC 30, "Quality of Reactor Coolant Pressure Boundary," requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage.

4.2 Significant Hazards Consideration

No Significant Hazards Consideration

In accordance with 10 CFR 50.92, NextEra Energy Seabrook has concluded that the proposed change does not involve a significant hazards consideration (SHC). The basis for the conclusion that the proposed change does not involve a SHC is as follows:

1. *The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.*

   The proposed change does not impact the physical function of plant structures, systems, or components (SSCs) or the manner in which SSCs perform their design function. The proposed change neither adversely affects accident initiators or precursors, nor alters design assumptions. The proposed change does not alter or prevent the ability of operable SSCs to perform their intended function to mitigate the consequences of an initiating event within assumed acceptance limits. RCS leakage detection instruments are not used in mitigation of any accidents.

   Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. *The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.*

   The proposed change will not impact the accident analysis. The change does not involve a physical alteration of the plant (i.e., no new or different type of equipment will be installed), a significant change in the method of plant operation, or new operator actions. The proposed change will not introduce failure modes that could result in a new accident. The change does not alter assumptions made in the safety analysis.

   Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *The proposed changes do not involve a significant reduction in the margin of safety.*

   Margin of safety is associated with confidence in the ability of the fission product barriers (i.e., fuel cladding, reactor coolant system pressure boundary, and containment structure) to limit the level of radiation dose to the public. The proposed change does not involve a significant change in the method of plant operation, and no accident analyses will be affected by the proposed changes. Additionally, the proposed changes will not relax any criteria used to establish safety limits and will not relax any safety system settings. The safety analysis acceptance criteria are not affected by this change. The proposed change will not result in plant operation in a configuration outside the design basis. The proposed change does not adversely affect systems that respond to safely shutdown the plant and to maintain the plant in a safe shutdown condition.

   Therefore, these proposed changes do not involve a significant reduction in a margin of safety.

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

4.3 Conclusions

Based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not

be inimical to the common defense and security or to the health and safety of the public.

5.0 ENVIRONMENTAL CONSIDERATION

NextEra has evaluated the proposed amendment for environmental considerations. The review has determined that the proposed amendment would change a requirement with respect to installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendments meet the eligibility criterion for categorical exclusion set for in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed amendment.

6.0 REFERENCES

1. NUREG-1431, Standard Technical Specifications Westinghouse Plants, Rev 3

2. Technical Specification Task Force improved Standard Technical Specifications Change Traveler, TSTF-513-A, Revision 3, January 3, 2011

3. Seabrook Station Updated Final Safety Analyses Report, Section 5.2.5, Detection of Leakage through Reactor Coolant Pressure Boundary, Revision 14

4. Seabrook Station MPCS Monitor Definitions (RE-22), Revision 01-00-16

5. Regulatory Guide 1.45, Guidance on Monitoring and Responding to Reactor Coolant System Leakage, Revision 1, May 2008

6. NRC Information Notice 2005-24, Nonconservatism in Leakage Detection Sensitivity, August 3, 2005

7. Regulatory Guide 1.45, Reactor Coolant Pressure Boundary Leakage Detection Systems, May 1973

Attachment 2

Mark-up of the Technical Specifications (TS)

The attached markups reflect the currently issued version of the TS and Facility Operating License. At the time of submittal, the Facility Operating License was revised through Amendment No. 124.

Listed below are the license amendment requests that are awaiting NRC approval and may impact the currently issued version of the Facility Operating License affected by this LAR.

LAR	Title	NextEra Energy Seabrook Letter	Date Submitted
LAR 10-02	Application for Change to the Technical Specifications for the Containment Enclosure Emergency Air Cleanup System	SBK-L-10074	05/14/2010
LAR 10-03	Relocation of Technical Specification 3.8.4.2, Containment Penetration Conductor Overcurrent Protective Devices and Protective Devices for Class 1E Power Sources Connected To Non-Class 1E Circuits	SBK-L-10097	06/28/2010
LAR 10-04	Amendment to the Facility Operating License and Submittal of the Seabrook Station Cyber Security Plan	SBK-L-10119	07/26/2010
LAR 10-05	Application to Delete Technical Specification 3/4.4.10, Structural Integrity.	SBK-L-10153	12/29/2010

The following TS pages are included in the attached markup:

Technical Specification	Title	Page
TS 3.3.3.1	Radiation Monitoring for Plant Operations	3/4 3-36 (info only) 3/4 3-37 3/4 3-38 3/4 3-39
TS 3.4.6.1	Reactor Coolant System Leakage Detection Systems	3/4 4-14
TS 3.4.6.2	Reactor Coolant System Operational Leakage	3/4 4-16

This page provided for information only and contains no changes

3/4.3.3 MONITORING INSTRUMENTATION

RADIATION MONITORING FOR PLANT OPERATIONS

LIMITING CONDITION FOR OPERATION

3.3.3.1 The radiation monitoring instrumentation channels for plant operations shown in Table 3.3-6 shall be OPERABLE with their Alarm/Trip Setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

a. With a radiation monitoring channel Alarm/Trip Setpoint for plant operations exceeding the value shown in Table 3.3-6, adjust the Setpoint to within the limit within 4 hours or declare the channel inoperable.

b. With one or more radiation monitoring channels for plant operations inoperable, take the ACTION shown in Table 3.3-6.

c. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.1 Each radiation monitoring instrumentation channel for plant operations shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and DIGITAL CHANNEL OPERATIONAL TEST for the MODES and at the frequencies shown in Table 4.3-3.

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
b. RCS Leakage Detection					
1) Particulate Radioactivity	N.A.	1	1, 2, 3, 4	N.A.	26
2) Gaseous Radioactivity	N.A.	1	1, 2, 3, 4	N.A.	26
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 26 - Must satisfy the ACTION requirement for Specification 3.4.6.1.~~

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
b. RCS Leakage Detection				
1) Particulate Radioactivity	S	R	Q	1, 2, 3, 4
2) Gaseous Radioactivity	S	R	Q	1, 2, 3, 4
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

Relocated to SR 4.4.6.1.a.

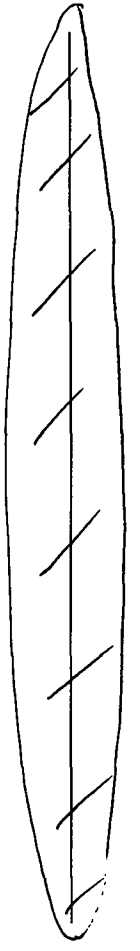

TABLE NOTATIONS

* 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 ~~Reactor Coolant System~~ Leakage Detection Systems shall be OPERABLE:

a. ~~The Containment Atmosphere Particulate Radioactivity Monitoring System~~

b. The Containment Drainage Sump Level Monitoring System ~~and~~.

c. ~~Containment Radioactive Gas Monitor~~

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

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

ACTION: INSERT 1

With ~~only~~ two of the above required Leakage Detection Systems OPERABLE, operation may continue for up to ~~30~~ days provided grab samples of the containment atmosphere are obtained and analyzed at least once per 24 hours when the required Gaseous or Particulate Radioactive Monitoring System is inoperable; otherwise, 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. ~~Containment Atmosphere Gaseous and Particulate~~ Monitoring Systems - performance of CHANNEL CHECK, CHANNEL CALIBRATION, and CHANNEL OPERATIONAL TEST at the frequencies specified in Table 4.3-~~3~~, and

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

INSERT 2

INSERTS

Insert 1

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.

Insert 2

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.

3.4.6.2

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:

Not Used

a. ~~Monitoring the containment atmosphere particulate radioactivity monitor at least once per 12 hours;~~

b. ~~Monitoring the containment drainage sump inventory and discharge at least once per 12 hours;~~

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)

(1) Not applicable to primary to secondary leakage.

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

Attachment 3

Proposed Bases Changes

REACTOR COOLANT SYSTEM LEAKAGE

3/4.4.6 REACTOR COOLANT SYSTEM LEAKAGE

INSERT BASES

3/4.4.6.1 LEAKAGE DETECTION SYSTEMS

The RCS Leakage Detection Systems required by this specification are provided to monitor and detect leakage from the reactor coolant pressure boundary. These Detection Systems are consistent with the recommendations of Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.

3/4.4.6.2 OPERATIONAL-LEAKAGE

BACKGROUND

Components that contain or transport the coolant to or from the reactor core make up the RCS. Component joints are made by welding, bolting, rolling, or pressure loading, and valves isolate connecting systems from the RCS.

During plant life, the joint and valve interfaces can produce varying amounts of reactor coolant leakage, through either normal operational wear or mechanical deterioration. The purpose of the RCS Operational Leakage LCO is to limit system operation in the presence of leakage from these sources to amounts that do not compromise safety. This LCO specifies the types and amounts of leakage.

10 CFR 50, Appendix A, GDC 30 (Ref. 1), requires means for detecting and, to the extent practical, identifying the source of reactor coolant leakage. Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting leakage detection systems.

The safety significance of RCS leakage varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring reactor coolant leakage into the containment area is necessary. Quickly separating the identified leakage from the unidentified leakage is necessary to provide quantitative information to the operators, allowing them to take corrective action should a leak occur that is detrimental to the safety of the facility and the public.

A limited amount of leakage inside containment is expected from auxiliary systems that cannot be made 100% leaktight. Leakage from these systems should be detected, located, and isolated from the containment atmosphere, if possible, to not interfere with RCS leakage detection.

This LCO deals with protection of the reactor coolant pressure boundary (RCPB) from degradation and the core from inadequate cooling, in addition to preventing the accident analyses radiation release assumptions from being exceeded. The consequences of violating this LCO include the possibility of a loss of coolant accident (LOCA).

BACKGROUND

General Design Criteria (GDC) 30 of Appendix A to 10 CFR 50 (Ref. 1) requires means for detecting and, to the extent practical, identifying the location of the source of RCS leakage. Regulatory Guide 1.45, Revision 0, (Ref. 2) describes acceptable methods for selecting leakage detection systems.

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified leakage. In addition to meeting the operability requirements, the monitors are typically set to provide the most sensitive response without causing an excessive number of spurious alarms. The containment sumps used to collect unidentified leakage are instrumented to alarm for increases above the normal flow rates.

The reactor coolant contains radioactivity that, when released to the containment, may be detected by radiation monitoring instrumentation. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS leakage.

Air temperature and pressure monitoring methods may also be used to infer unidentified leakage to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements is affected by containment free volume and, for temperature, detector location. Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.

The above-mentioned leakage detection methods or systems differ in sensitivity and response time. Some of these systems could serve as early alarm systems signaling the operators that closer examination of other detection systems is necessary to determine the extent of any corrective action that may be required.

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary.

The safety significance of RCS leakage varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS leakage into the containment area is necessary. Quickly separating the identified leakage from the unidentified leakage provides quantitative information to the operators, allowing them to take corrective action should a leak occur that is detrimental to the safety of the unit and the public.

RCS leakage detection instrumentation satisfies Criterion 1 of 10 CFR 50.36(c)(2)(ii).

LCO

This LCO requires instruments of diverse monitoring principles to be operable to provide confidence that small amounts of unidentified leakage are detected in time to allow actions to place the plant in a safe condition, when RCS leakage indicates possible RCPB degradation. The LCO requires three instruments to be operable.

The containment sumps are used to collect unidentified leakage. There are two sumps in the containment building, one on the (-)26'-0" level, and the other on the (-)53'-4" level in the reactor instrument pit. Under normal conditions, the lower sump will always be dry as there are no drains directed to it. The LCO requirements apply to the total amount of unidentified leakage collected in both sumps. The RCS leakage monitor runs every 30 minutes and determines the amount of leakage going into the containment drain sumps. This monitor uses raw level indication, converts this to volume, and determines the difference in volume since the last execution. The monitor initiates an alarm when there is leakage of one gpm. The identification of unidentified leakage will be delayed by the time required for the unidentified leakage to travel to the containment sump, and it may take longer than one hour to detect a one gpm increase in unidentified leakage, depending on the origin and magnitude of the leakage. This sensitivity is acceptable for containment sump monitor operability.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by the gaseous and particulate containment atmosphere radioactivity monitor. Only one of the two monitors is required to be operable. Radioactivity detection systems are included for monitoring both particulate and gaseous activities because of their sensitivities and rapid responses to RCS leakage, but have recognized limitations. Reactor coolant radioactivity levels will be low during initial reactor startup and for a few weeks thereafter, until activated corrosion products have been formed and fission products appear from fuel element cladding contamination or cladding defects. If there are few fuel element cladding defects and low levels of activation products, it may not be possible for the gaseous or particulate containment atmosphere radioactivity monitors to detect a one gpm increase within one hour during normal operation. However, the gaseous and particulate containment atmosphere radioactivity monitors are operable when they are capable of detecting a one gpm increase in unidentified leakage within one hour given an RCS activity equivalent to that assumed in the design calculations for the monitors (Reference 3).

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment sump monitor, in combination with the gaseous or particulate radioactivity monitor, provides an acceptable minimum.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be operable.

In MODE 5 or 6, the temperature is to be ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

a.

With the required containment sump monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere radioactivity monitors will provide indications of changes in leakage. Together with the containment atmosphere radioactivity monitors, the periodic surveillance for RCS water inventory balance, surveillance requirement (SR) 4.4.6.2.1.d, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage. A footnote is added allowing that SR 4.4.6.2.1.d is not required to be performed until 12 hours after establishing steady state operation (stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows. The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established.

Restoration of the required sump monitor to operable status within 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the frequency and adequacy of the RCS water inventory balance required by Action a.1.

b.

With both the gaseous and particulate containment atmosphere radioactivity monitoring instrumentation channel inoperable, alternative action is required. Either grab samples of the containment atmosphere must be taken and analyzed or water inventory balances, in accordance with SR 4.4.6.2.1.d, must be performed to provide alternate periodic information.

With a sample obtained and analyzed or water inventory balance performed every 24 hours, the reactor may be operated for up to 30 days to allow restoration of the required containment atmosphere radioactivity monitor.

The 24 hour interval provides periodic information that is adequate to detect leakage. A footnote is added allowing that SR 4.4.6.2.1.d is not required to be performed until 12 hours after establishing steady state operation (stable RCS pressure, temperature, power level, pressurizer and makeup tank levels, makeup and letdown, and RCP seal injection and return flows). The 12 hour allowance provides sufficient time to collect and process all necessary data after stable plant conditions are established. The 30 day restoration time recognizes at least one other form of leakage detection is available.

c.

With the containment sump monitor and the containment atmosphere particulate radioactivity monitor inoperable, the only means of detecting leakage is the containment gaseous monitor. The containment atmosphere gaseous radioactivity monitor typically cannot detect a one gpm leak within one hour when RCS activity is low. In addition, this configuration does not provide the required diverse means of leakage detection. Indirect methods of monitoring RCS leakage must be implemented. Grab samples of the containment atmosphere must be taken to provide alternate periodic information. The

12 hour interval is sufficient to detect increasing RCS leakage. The Action provides 7 days to restore another RCS leakage monitor to operable status to regain the intended leakage detection diversity. The 7 day restoration time ensures that the plant will not be operated in a degraded configuration for a lengthy time period. Two leakage detections systems must be restored to operable status within 30 days to meet the LCO or the plant must shutdown.

SURVEILLANCE REQUIREMENTS

SR 4.4.6.1.a.1

SR 4.4.6.1.a.1 requires the performance of a CHANNEL CHECK of the required containment atmosphere radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 4.4.6.1.a.2

SR 4.4.6.1.a.2 requires the performance of a digital channel operational test on the required containment atmosphere radioactivity monitor. The test ensures that the monitor can perform its function in the desired manner. The test verifies the alarm setpoint and relative accuracy of the instrument string. The frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 4.4.6.1.a.3 and 4.4.6.1.b

These SRs require the performance of a channel calibration for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The frequency of 18 months is a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45, Revision 0, "Reactor Coolant Pressure Boundary Leakage Detection Systems," May 1973.
3. FSAR, Section 5.2.5.