



March 24, 2014

10 CFR 50.55a

Docket No. 50-443
SBK-L-14057

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

Seabrook Station

Relief Request No. 3IR-6

Alternative Examination of Reactor Vessel Flange Leak-Off Lines

On February 25, 2014, the U.S. Nuclear Regulatory Commission (NRC) issued information notice (IN) 2014-02, Failure to Properly Pressure Test Reactor Vessel Flange Leak-off Lines, identifying instances in which inspection of the reactor vessel flange leak-off lines were not performed as required by Section XI of the American Society of Mechanical Engineers (ASME) Code and 10 CFR 50.55a.

NextEra Energy Seabrook, LLC (NextEra) reviewed the information for applicability for Seabrook Station and determined that the required system leakage test of the reactor vessel flange leak-off lines, as described by ASME Code Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, was not previously performed.

In order for NextEra to comply with NRC's regulations as provided by 10 CFR 50.55a(g)(4), and pursuant to 10 CFR 50.55a(a)(3)(ii), NextEra requests relief from ASME Code, Section XI, 2004 Edition with no Addenda, Section IWC-2500-1, which requires that a system leakage test be conducted in accordance with IWC-5220, for the Class 2 reactor vessel flange seal leak-off line, each inspection period.

Relief Request No. 3IR-6 is attached herein for review and approval.

NextEra Energy Seabrook is in the second period of the Third Ten-Year Inservice Inspection (ISI) Interval. The Cycle 16 refueling outage is within 12 months after the end of the first period which concluded August 19, 2013. Therefore, performance of the proposed alternative pressure test could be credited towards the first period and subsequently scheduled again in the next two periods. The Cycle 16 outage is currently scheduled to begin on April 1, 2014. According to the refueling outage schedule, the last opportunity to perform the proposed alternative examination for the reactor vessel flange leak-off line for the first period is on April 14, 2014.

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NBR

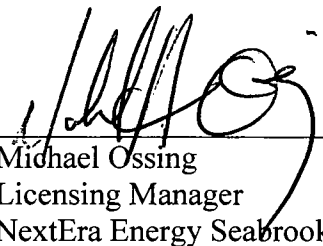
Per 10 CFR 50.55a(a)(3), any proposed alternatives must be submitted and authorized prior to implementation. Considering the circumstances surrounding the late submittal of this relief request due to the late discovery of the inadequate reactor vessel flange leak-off line testing, NextEra requests the NRC to approve the attached Relief Request No. 3IR-6 by April 12, 2014.

Relief Request No. 3IR-6 is requested on the basis that hardship and unusual difficulty exists without a compensating increase in the level of quality and safety. As discussed in the attached Relief Request, the use of the proposed alternative examination provides reasonable assurance of structural integrity or leak tightness of the subject component.

There are no new regulatory commitments contained in this letter.

If you have any questions or require additional information, please contact me at (603) 773-7512.

Sincerely,



Michael Ossing
Licensing Manager
NextEra Energy Seabrook, LLC

Attachment

cc: NRC Region I Administrator
NRC Project Manager, Project Directorate I-2
NRC Senior Resident Inspector

Attachment to SBK-L-14057

Relief Request No. 3IR-6

Alternative Examination of Reactor Vessel Flange Leak-Off Lines

NextEra Energy Seabrook, LLC
Third Ten-Year Interval
10CFR50.55.a Request Number 3IR-6, Rev. 0

Proposed Alternative
In Accordance with 10CFR50.55a (a)(3)(ii)

- Hardship or Unusual Difficulty
Without Compensating Increase in Level of Quality or Safety-

Sheet 1 of 12

Alternative Pressure Testing Requirements for the RPV Flange Inner and Outer O-Ring Leak-Off Piping

ASME Code Components Affected

Code Class:	2
Component Number:	Nominal pipe sizes 1', 3/4", and 3/8" Reactor Pressure Vessel (RPV) flange leak-off piping, line numbers: 1-RC-89-1-2501-1", 1-RC-89-2-2501-3/4", 1-RC-90-1-2501-1", 1-RC-90-2-2501-3/4", 1-RC-90-3-2501-3/8" Class 2 valves within the scope of this request: 1-RC-V-145, 1-RC-V-146, and 1-RC-V-147
Examination Category:	C-H
Item Number:	C7.10

Applicable Code Edition and Addenda

ASME Section XI, 2004 Edition with no Addenda.

Applicable Code Requirement

System Leakage Tests of Class 2 pressure retaining components per Table IWC-2500-1, Examination Category C-H, Item No. C7.10 are to be conducted each inspection period. Paragraph IWC-5221 indicates that system leakage tests shall be conducted at the system pressure obtained while the system, or portion of the system, is in service performing its normal operation function or at a system pressure developed during a test conducted to verify system operability (e.g., to demonstrate system safety function or satisfy technical specification surveillance requirements).

Per IWC-5222(a), the pressure retaining boundary includes the portion of the system required to operate or support the safety function up to and including the first normally closed valve.

NextEra Energy – Seabrook LLC (NextEra) is currently in its third Inservice Interval, which began on August 19, 2010. At the time of this submittal, NextEra is in the second inspection period, which began on August 19, 2013.

Reason for Request

NextEra recently determined, through issuance of NRC Information Notice 2014-02, that NextEra is susceptible to the issue identified to the industry regarding compliance with ASME Section XI for examination of the reactor vessel flange leak-off piping. The issue of not examining RPV leak-off piping is a relatively new issue within the industry and with the proposed alternative, NextEra is seeking to come back into full compliance with the ASME Code.

In accordance with the provisions of 10CFR50.55a(a)(3)(ii), Seabrook requests relief from the Section XI code requirement for system leakage tests of the RPV head flange O-ring leak-off lines on the basis that compliance with the Code specified pressure requirement to test the leak-off lines at system operating pressure is impractical and would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The RPV head flange O-ring leak-off lines direct leakage, if any, from the RPV head flange to the Reactor Coolant Drain tank (RCDT) and provide alarms to alert the Control Room of leakage. These lines are separated from the reactor coolant system operating pressure by an inner and outer RPV flange O-ring. The inner O-ring, in conjunction with the reactor vessel and reactor vessel head flange surfaces, functions to isolate the inner and outer RPV head flange leak-off lines from reactor coolant (RCS) system pressure. The outer O-ring functions as a back-up in the event of the inner O-ring failing to perform its intended function. Because of this, the affected leak-off lines are not expected to experience RCS pressure during normal operation. During normal operation, the lines are typically pressurized to RCDT pressure (approximately 3 psig). The lines are designed to 2485 psig at 650 °F. The 1 inch and ¾ inch lines are schedule 160, SA376, TP316 material. The 3/8 inch line is schedule 80S, SA376, TP316 material. Fittings are 6000 lb., SA182, F316 material.

With the RPV head flange O-rings installed and performing their intended function, the leak-off lines are not expected to be pressurized above the RCDT pressure during the system pressure test following a refueling outage. Applying system pressure to the leak-off lines for the purpose of leakage testing is not practical with the RPV head installed after refueling, since it would require either intentionally failing the O-rings or pressurizing the line with a hydrostatic test pump in the direction opposite to the intended design function of the O-rings resulting in the need for additional maintenance which would require depressurizing and removal of the reactor vessel head or could damage O-ring sealing material with debris. Performing a leakage test during shutdown prior to the removal of the head for refueling activities would delay the shutdown, requiring the plant to be maintained in Mode 3 at normal operating temperature and pressure at higher decay heat loads. This would be contrary to site efforts to reduce the time to reach cold shutdown in order to minimize shutdown risk.

With the RPV head removed, the configuration of the leak-off piping would require the lines to be plugged at the RPV flange to establish a boundary for leakage testing at system operating pressure. Threaded plugs would have to be installed prior to the pressure test and removed after the test was complete. Failure of either plug during the test would result in a personnel safety hazard, in addition to creating a foreign material exclusion (FME) issue. Installation and removal of the plugs for each pressure test would result in significant dose, which would be contrary to keeping dose as low as reasonably achievable (ALARA), and again would present FME issues.

Purposely failing the O-rings to perform the Code required pressure test would require purchase of a new set of O-rings and additional time and radiation exposure to remove the RPV head, install new O-rings, and reinstall the head.

Proposed Alternative and Basis for Use

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), Seabrook proposes to examine the Class 2 portions of the leak detection system consisting of the accessible portions of the RPV head flange O-ring leak-off lines. The leakoff lines shall be examined using the VT-2 visual examination method and will be performed by certified VT-2 examiners. The test shall be conducted at ambient conditions after the refueling cavity has been filled to its minimum water level for refueling operations of 23 feet above the top of the RPV flange for at least four (4) hours. A static pressure of approximately 10 psig is expected to be experienced at the top of the RPV flange with a minimum of 23 feet of borated water above the flange.

The Class 2 portions from the reactor vessel flange to the Class 2 boundaries are required to be examined. Segments of the O-ring leak-off lines that are inaccessible [1-RC-89, Inner O-ring line (approximately 16 ft.) and 1-RC-90, Outer O-ring line (approximately 17 ft.)] for direct VT-2 visual examination, will include inspection of the surrounding areas below the lines for evidence of leakage as permitted by ASME Section XI Code, 2004 Edition, no Addenda IWA-5241(b). The remaining sections of the leak-off lines to be inspected per the proposed alternative will be examined as required by IWC-5000. The accessible portions of the lines include 1-RC-89, (approximately 51 ft.) and 1-RC-90, (approximately 49 ft.) as shown on isometric drawings in Enclosures 1 and 2.

In addition to the proposed alternatives, NextEra also commits to additional visual examination as a result of service history. NextEra experienced a through-wall leak in leak-off line 1-RC-89-1-2501-1" in the normally inaccessible area under the reactor cavity seal ring. This leak was detected in refueling outage OR15 (October 2012) during performance of Alloy 600 bare metal visual examinations. The affected pipe section was replaced. The inner and outer leak-off lines that are inaccessible for examination during the pressure test will receive a VT-2 examination by certified VT-2 examiners once every 10-Year ISI Interval.

In an attempt to communicate piping accessibility/inaccessibility, enclosures containing plant drawings are included. Enclosure 1 is an isometric drawing for the inner leak-off line 1-RC-89. Enclosure 2 is an isometric drawing for the outer leak-off line 1-RC-90. Color codes are explained within Enclosures 1 and 2.

NRC Requests for Additional Information submitted to several other Licensees have been reviewed and included in this submittal. One request pertained to provisions for leak testing should leakage occur past the inner O-ring and the valve subsequently closed, whereby the line would experience operating pressure of 2235 psig. During power operation, the accessible portion of line to the isolation valve represents less than two (2) feet. Also during power operation, the portion of piping not under the cavity seal ring (within the bioshield area) is not accessible to personnel during power operation due to radiation levels. Therefore, NextEra does not plan to institute additional measures for such an unusual and infrequent condition.

The flange seal leak-off lines are essentially a leakage collection/detection system and would only function as a Class 2 pressure boundary in the event of failure of the O-rings that separate the lines from reactor coolant system operating pressure. Any significant leakage due to this condition would be expected to clearly exhibit boric acid accumulation that would be discernible during the proposed alternate VT-2 visual examination that will be performed. The static head developed with the leak detection line filled with water will allow for the detection of any gross indications in the line.

Duration of Proposed Alternative

This Proposed Alternative is requested for the remainder of the (Third) 10-year ISI Interval, which is currently scheduled to end August 18, 2020.

Precedents

Similar relief requests have been previously approved by the NRC for the following (with ADAMS Accession No. references):

- (1) Callaway Plant, Unit 1, Third Inspection Interval Alternative, Proposed Alternative to ASME Section XI Requirements for Leakage Testing of Reactor Pressure Vessel Head Flange Leakoff Lines (Relief Request 13R-14, approved by the NRC in a letter dated August 13, 2013, ADAMS Accession No. ML13221A091.
- (2) Arkansas Nuclear One, Unit 2 – Request for Relief ANO2-ISI-015 from ASME Code, Section XI, for Periodic Pressure Sealing Requirements on the Reactor Vessel Flange Leak Detection Piping, as approved by NRC letter dated June 27, 2013 (ML13161A241).
- (3) Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3 - Request for Relief from the American Society of Mechanical Engineers (ASME) Code, Section XI, Reactor Vessel Head Flange Seal Leak Detection Piping- Relief Request No. 49, as approved by the NRC letter dated April 4, 2013 (ML13085A254).
- (4) STP Nuclear Operating Company (STPNOC) Units 1 and 2, Third Inspection Interval Relief Request RR-ENG-3-10, "Request for Relief from ASME Section XI Code Requirements for Reactor Pressure Vessel Head Flange O-Ring Leakoff Lines Non-Destructive Examination," as approved by NRC letter dated March 12, 2013 (ML12312A234).

References

Code Case N-805, *Alternative to Class 1 Extended Boundary End of Interval or Class 2 System Leakage Testing of Reactor Vessel Head Flange O-ring Leak Detection System*, was issued to the 2010 Edition of the ASME Section XI Code and is listed in Supplement 6 for Code Cases. Code Case N-805 has not been approved by the NRC and is not identified in Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1*.

Enclosure 1

NextEra Energy Isometric Drawing 9763-F-410010

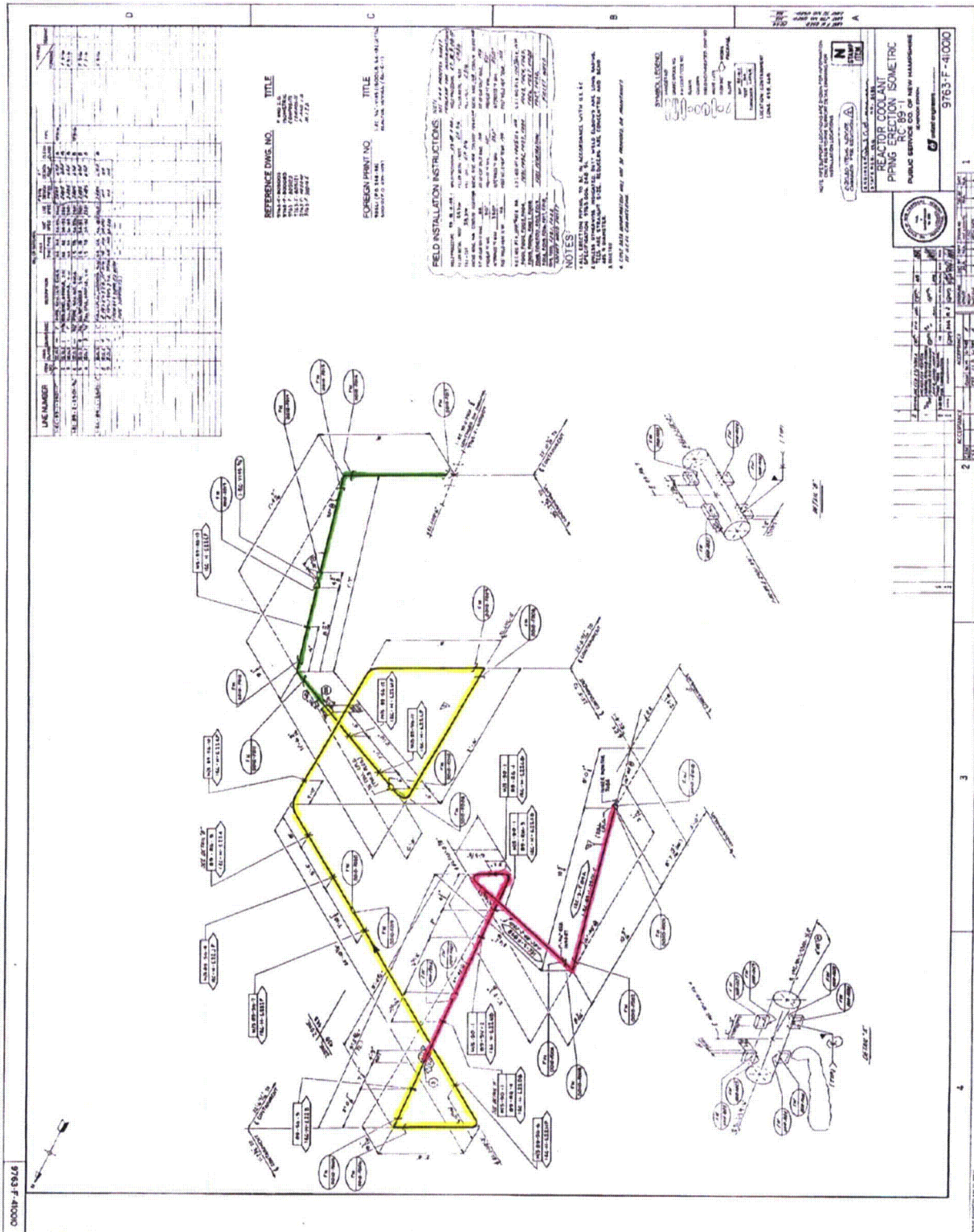
Inner Leak-Off Line RC-89

Explanation of Highlighted Colors

Green: Depicts the section of piping that is located outside the bioshield and is accessible for direct visual examination.

Yellow: Depicts the section of piping that is within the bioshield and is only accessible during plant shutdown.

Purple: Depicts the section of piping that is under the cavity seal ring and only accessible during refueling outages with the reactor cavity drained and hatches removed.



Enclosure 2

NextEra Energy Isometric Drawing 9763-F-410007

Outer Leak-Off Line RC-90

Explanation of Highlighted Colors

Green: Depicts the section of piping that is located outside the bioshield and is accessible for direct visual examination.

Yellow: Depicts the section of piping that is within the bioshield and is only accessible during plant shutdown.

Purple: Depicts the section of piping that is under the cavity seal ring and only accessible during refueling outages with the reactor cavity drained and hatches removed.

