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

October 4, 2022

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

SUBJECT: SEABROOK STATION, UNIT NO. 1 – RELIEF REQUESTS 3IR-18 AND 3IR-19, RELIEF FROM THE REQUIREMENTS OF THE ASME CODE (EPID L-2021-LLR-0098)

Dear Mr. Coffey:

By letter dated August 18, 2021, NextEra Energy Seabrook, LLC (the licensee) submitted relief requests (RR) 3IR-18 and 3IR-19 to the U.S. Nuclear Regulatory Commission (NRC) for relief from certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI requirements at Seabrook Station, Unit No. 1.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief on the basis that achieving the ASME Code-required volumetric examination coverage for the subject welds in RR 3IR-18 and RR 3IR-19 is impractical.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that it is impractical for the licensee to comply with the requirements of the ASME Code, Section XI in the examination of subject welds. The NRC staff finds that requiring the licensee to perform a design modification to obtain ASME Code-required coverage would result in undue burden to the licensee. The NRC staff concludes that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest, given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the NRC staff concludes that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants relief from the ASME Code examination requirements for the welds included in RR 3IR-18 and RR 3IR-19 for Seabrook for the third 10-year ISI interval, which began on August 19, 2010, and ended on August 18, 2020.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

If you have any questions, please contact the Project Manager, Justin Poole, at 301-415-2045 or by email to Justin.Poole@nrc.gov.

Sincerely,

Hipolito J. Gonzalez

Digitally signed by Hipolito J. Gonzalez
Date: 2022.10.04 14:43:11 -04'00'

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

Docket No. 50-443

Enclosure:
Safety Evaluation

cc: ListServ

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUESTS 3IR-18 AND 3IR-19

THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

NEXTERA ENERGY SEABROOK, LLC

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

By letter dated August 18, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21230A157), NextEra Energy Seabrook, LLC (the licensee), submitted relief requests (RR) 3IR-18 and 3IR-19 for the third 10-year inservice inspection (ISI) interval program at Seabrook Station, Unit No. 1 from certain examination requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code). Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(5)(iii), the licensee requested relief on the basis that achieving the ASME Code-required volumetric examination coverage for the subject welds in RR 3IR-18 and RR 3IR-19 are impractical.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, which was incorporated by reference in 10 CFR 50.55a(a) 12 months prior to the start of the 120-month interval, subject to the conditions listed in 10 CFR 50.55a(b)(2).

Pursuant to 10 CFR 50.55a(g)(4)(ii), *Applicable ISI Code: Successive 120-month Intervals*, in-service examination of components and system pressure tests conducted during successive 120-month inspection intervals must comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in paragraph (a) of 10 CFR 50.55a 12 months before the start of the 120-month inspection interval (or the optional ASME Code Cases listed in NRC Regulatory Guide 1.147, when using ASME Code, Section XI, as incorporated by reference in paragraph (a)(3)(ii) of 10 CFR 50.55a, subject to the conditions listed in paragraph (b) of 10 CFR 50.55a.

Pursuant to 10 CFR 50.55a(g)(5)(iii), *ISI Program Update: Notification of Impractical ISI Code Requirements*, if the licensee has determined that conformance with a ASME Code requirement is impractical for its facility, the licensee must notify the NRC and submit, as specified in 10 CFR 50.4, information to support the determinations. Determinations of impracticality in accordance with 10 CFR 50.55a(g)(5)(iii) must be based on the demonstrated limitations experienced when attempting to comply with the ASME Code requirements during the ISI interval for which the request is being submitted. Requests for relief made in accordance with 10 CFR 50.55a(g)(5)(iii) must be submitted to the NRC no later than 12 months after the expiration of the initial or subsequent 120-month inspection interval for which relief is sought.

Pursuant to 10 CFR 50.55a(g)(6)(i), *Impractical ISI Requirements: Granting of Relief*, the Commission will evaluate determinations under paragraph (g)(5) of 10 CFR 50.55a that ASME Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines are authorized by law, will not endanger life or property or the common defense and security, and are otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

The ASME Code of record for Seabrook third 10-year interval inservice inspection program, which ended on August 18, 2020, is the 2004 Edition with no Addenda of Section XI of the ASME Code.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the NRC to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Examination Category R-A, Items R1.11, R1.16, and R1.20

3.1.1 Licensee's Relief Request

Applicable ASME Code Requirements

The examination requirements for Examination Category R-A, Item R1.11, R1.16, and R1.20 are delineated in Table R-2500-1, which require essentially 100 percent volumetric examination, as defined by IWB-2500-8. "Essentially 100%," as clarify by approved ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," is greater than 90 percent coverage of the examination volume.

The Seabrook Risk-Informed, Safety-Based ISI Program was developed based on the Electric Power Research Institute Topical Report 112657 Rev. B-A, with identified differences, and with additional guidance taken from ASME Code Case N-716.

By letter dated November 7, 2011 (ML11319A016), supplemented by letter dated March 8, 2012 (ML12074A111), the licensee submitted request for alternative 3AR-1 to the NRC, requesting relief from the ASME Section XI Code examination requirements for Class 1 and Class 2 piping weld (Examination Categories B-F, B-J, C-F-1, and C-F-2) inservice inspections by implementing a Risk-Informed, Safety-Based Inservice Inspection (RIS_B) Program. The NRC published a Safety Evaluation dated June 21, 2012 (ML121320552), authorizing the use of a RIS_B program for the third 10-year ISI interval at Seabrook.

Pursuant to 10 CFR 50.55a(b)(2)(xv)(A), the following examination coverage when applying Supplement 2 to Appendix VIII is required:

(1) Piping must be examined in two axial directions and when examination in the circumferential direction is required, the circumferential examination must be performed in two directions, provided access is available.

(2) Where examination from both sides is not possible, full coverage credit may be claimed from a single side for ferritic welds. Where examination from both sides is not possible on austenitic welds, full coverage credit from a single side may be claimed only after completing a successful single side Appendix VIII demonstration using flaws on the opposite side of the weld.

Pursuant to 10 CFR 50.55a (b)(2)(xvi)(B), required examinations performed from one side of a stainless-steel pipe weld must be conducted with equipment, procedures, and personnel that have demonstrated proficiency with single side examinations. To demonstrate equivalency to two sided examinations, the demonstration must be performed to the requirements of Appendix VIII as modified by this paragraph and 10 CFR 50.55a(b)(2)(xv)(A).

Licensee's Reason for Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that due to design and geometrical configurations, it is impractical to meet the required essentially 100 percent volumetric coverage. Table 1 below provides a summary of the details of the welds for which the licensee is seeking relief.

Table 1

Weld Type & ID	Item No.	Limitation	Coverage
Valve to Pipe CS 0366-02 04	R1.11	Limited to single side access due to reducer configuration. Examination pipe side complete.	50%
Pipe to Valve CS 0368-02 04	R.1.11	Limited to single side access due to valve configuration. Examination pipe side complete.	50%
Reducer to Pipe RC 0048-03 01	R1.11	Limited to single side access due to reducer configuration. Examination pipe side complete.	50%

Table 1			
Weld Type & ID	**Item No.**	**Limitation**	**Coverage**
Pipe to Reducer RH 0160-06 08	R1.11	Limited to single side access due to reducer configuration. Examination pipe side complete.	50%
Pipe to Reducer RH 0180-03 08	R1.11	Limited to single side access due to reducer configuration. Examination pipe side complete.	50%
Valve to Pipe SI 0201-02 17	R1.11	Limited to single side access due to valve configuration. Examination pipe side complete.	50%
Pipe to Nozzle SI 0201-02 18	R1.11	Limited to single side access due to nozzle configuration. Examination pipe side complete.	50%
Valve to Pipe SI 0202-02 17	R1.11	Limited to single side access due to valve configuration. Examination pipe side complete.	50%
Valve to Pipe SI 0203-02 21	R1.11	Limited to single side access due to valve configuration. Examination pipe side complete.	50%
Valve to Pipe SI 0204-02 21	R1.11	Limited to single side access due to valve configuration. Examination pipe side complete.	50%
Pipe to Tee RH 0160-17 02	R1.11	Limited to single side access due to tee configuration. Examination pipe side complete.	50%

Table 1			
Weld Type & ID	**Item No.**	**Limitation**	**Coverage**
Pipe to Elbow RC 0013-01 04	R1.11	Limited for all scans 4″ of 40″ total scan area due to structural steel that could not be removed.	90%
Pipe to Valve SI 0251-07 04	R1.16	Limited to single side access due to valve configuration. Examination pipe side complete.	50%
Pipe to Elbow RC 0097-01 09	R1.20	Limited to single side access on pipe for 2.5″ due to intrados elbow configuration. Examination pipe side complete.	89.4%
Elbow to Pipe RC 0097-01 10	R1.20	Limited to single side access on pipe for 2.5″ due to intrados elbow configuration. Examination pipe side complete.	89.4%
Valve to Pipe SI 0251-07 05	R1.20	Limited to single side access due to valve configuration. Examination pipe side complete.	50%

Licensee's Basis for Request (as stated)

It is not possible to obtain ultrasonic interrogation of greater than 90 percent of the required examination volume due to interference caused by configuration and/or permanent attachments. Examinations are performed to the maximum extent possible. The ultrasonic (UT) techniques for each weld were reviewed to determine if additional coverage could be achieved. For the welds listed in Table 1, the licensee determined that removal of the obstruction was not possible without significant work, increased radiation exposure, and/or damage to the plant. Additional weld preparation by welding or metal removal is a modification of the examination area requiring significant engineering and construction personnel support.

Radiography is impractical due to the amount of work being performed in the areas on a 24-hour basis. This would result in numerous work-related stoppages and increased exposure due to the shutdown of and startup of other work in the areas. The water must be drained from systems where radiography is performed, which increases the radiation dose rates over a much broader area than the weld being examined.

There would be significant burden associated with the performance of weld or area modifications or radiography to increase the examination coverage.

Licensee's Proposed Alternative Examination (as stated)

The licensee proposed the following:

1. Periodic system pressure tests in accordance with ASME Section XI Category B-P, Table IWB-2500-1.

2. Conduct ultrasonic examinations to the maximum extent possible.

3. Regular walkdowns by operations personnel and system engineers are performed on systems outside containment to check for leakage, piping configuration, and/or damage. During outages, system engineers walkdown systems inside and outside containment. This walkdown is performed to look for system anomalies that could affect plant performance.

3.1.2 NRC Staff Evaluation

ASME Code requires 100 percent of the defined examination volumes for Class 1 circumferential piping welds. However, examination coverage of the subject welds is limited due to the plant's original construction design which results in a geometrical configuration or obstruction that prevents complete examination. Therefore, the licensee has shown that it is impractical to meet the ASME Code-required volumetric coverage of the subject welds. In order to increase coverage, a design modification would be necessary to accomplish the required inspection volume and the level of effort required to accomplish such modification to the plant would be an undue burden to the licensee.

As shown in the technical descriptions and sketches provided in the licensee's submittal, examinations of the subject welds have been performed to the extent practical, with the licensee obtaining volumetric coverage ranging from approximately 50.0 to 90.0 percent of the ASME Code-required volumes (see Table 1 above). Volumetric examinations on the subject welds were conducted with equipment, procedures, and personnel that have been performance demonstrated to the requirements outlined in ASME Code Section XI, Appendix VIII. These techniques have been demonstrated for flaws located on the near-side of the welds; far-side detection of flaws is considered to be a "best effort." The licensee's ultrasonic scanning techniques included combinations of 45-, 60-, and 70-degree shear and 60-degree refracted L-waves, as applicable on the subject welds. While the licensee has only taken credit for obtaining limited volumetric coverage, it is expected that the techniques employed would have provided coverage beyond the near-side of the welds. The ultrasonic examinations had no recordable indications.

Furthermore, the licensee has proposed, in addition to continuing to comply with the required ASME Code, Section XI system pressure test, that a greater emphasis on regular plant walkdowns will be imposed to identify leakage or issues affecting the structural integrity of the weld. The NRC staff finds that the licensee's maximum examination coverage of the accessible volume of these components and the performance of the required Section XI pressure test provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant of 10 CFR 50.55a(g)(6)(i).

3.2 Examination Category B-B, Items B2.40, Steam Generator Tubesheet-to-Head Weld

3.2.1 Licensee's Relief Request

Applicable ASME Code Requirements

The examination requirements for Examination Category B-B, Item Number B2.40 are delineated in Table IWB-2500-1, which require essentially 100 percent volumetric examination, as defined by IWB-2500-6. "Essentially 100%," as clarify by approved ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," is greater than 90 percent coverage of the examination volume.

Licensee's Reason for Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that due to design and geometrical configurations, it is impractical to meet the required essentially 100 percent volumetric coverage. Table 2 below provides a summary of the details of the weld for which the licensee is seeking relief.

Table 2

Weld Identification	Code Item/Number	Limitation	Coverage
"A" Steam Generator RC E-11A SEAM-1	B2.40	Obstruction due to four permanently pedestal welded support attachments as part of original design.	82.4%

Licensee's Basis for Request (as stated)

The ASME Code required volume for this item is as required by the ASME Code, Section XI, Figure IWB-2500-6. As required by ASME Section XI, Table IWB-2500-1, Category B-B Item 2.40, requires this weld be examined volumetrically for essentially 100 percent of the weld length. Weld RC E11A SEAM-1 cannot be examined for essentially 100 percent of the weld length due to design (physical obstruction from four steam generator supports). ISI Drawing 1-NHY-650011 shows the four steam generator support pads. These pads are approximately 18″ in length and block access to this weld in four locations. These obstructions limit the weld examination volume to 82.4 percent. This was the maximum extent achievable.

Licensee's Proposed Alternative Examination (as stated)

The Licensee proposed the following:

1. Periodic system pressure tests in accordance with ASME Section XI Category B-P, Table IWB-2500-1 and C-H, Table IWC-2500-1.

2. Conduct ultrasonic examinations to the maximum extent possible.

3. Regular walkdowns by operations personnel and system engineers are performed on systems outside containment to check for leakage, piping configuration, and/or damage.

During outages, system engineers walkdown systems inside and outside containment. This walkdown is performed to look for system anomalies that could affect plant performance.

3.2.2 NRC Staff Evaluation

The Code requires 100 percent volumetric examination of the subject welds in Table 2. Complete examination coverage of RC Weld E-11A Seam-1 is limited due to the plant's original construction design which results in a geometrical configuration that prevents a complete examination. The NRC staff reviewed the weld schematics provided in the submittal and notes that the obstruction of four steam generator pads result in a reduction of available volumetric coverage of the weld. The staff notes that there are no other obstructions, and the licensee was able to inspect 100 percent of the available coverage. The staff also notes that a design modification would be necessary to accomplish the require inspection volume and the level of effort required to accomplish such modification to the plant would be an undue burden on the licensee. Therefore, the licensee has shown that it is impractical and an undue burden to meet the ASME Code-required volumetric coverage of the subject welds. Furthermore, the licensee has proposed, in addition to continuing to comply with the required Section XI system pressure test, that a greater emphasis on regular plant walkdowns will be imposed to identify leakage or issues affecting the structural integrity of the weld. The staff finds that the licensee's maximum possible examination coverage of these components and the performance of the required Section XI pressure test provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant of 10 CFR 50.55a(g)(6)(i).

3.3 Examination Category B-D, Items B3.110, Pressurizer Nozzle-to-Shell Weld

3.3.1 Licensee's Relief Request

Applicable ASME Code Requirements

The examination requirements for Examination Category B-D, Item Number B3.110 are delineated in Table IWB-2500-1, which require essentially 100 percent volumetric examination, as defined by IWB-2500-7. "Essentially 100%," as clarify by approved ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," is greater than 90 percent coverage of the examination volume.

Licensee's Reason for Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that due to design and geometrical configurations, it is impractical to meet the required essentially 100 percent volumetric coverage. Table 3 below provides a summary of the details of the weld for which the licensee is seeking relief.

Table 3

Weld Identification	Code Item/Number	Limitation	Coverage
Safety Nozzle RC E-10 A-NZ	B3.110	Obstruction due to nozzle-to-shell weld physical configuration as part of original design.	74%

Table 3			
Weld Identification	**Code Item/Number**	**Limitation**	**Coverage**
Safety Nozzle RC E-10 B-NZ	B3.110	Obstruction due to nozzle-to-shell weld physical configuration as part of original design.	71.7%
Safety Nozzle RC E-10 C-NZ	B3.110	Obstruction due to nozzle-to-shell weld physical configuration as part of original design.	71.7%
Safety Nozzle RC E-10 D-NZ	B3.110	Obstruction due to nozzle-to-shell weld physical configuration as part of original design.	71.7%
Safety Nozzle RC E-10 SP-NZ	B3.110	Obstruction due to nozzle-to-shell weld physical configuration as part of original design.	77.5%
Safety Nozzle RC E-10 S-NZ	B3.110	Obstruction due to pressurizer heater and nozzle-to-shell weld physical configuration as part of original design.	71.0%

Licensee's Basis for Request (as stated)

The ASME Code required volume for this item is as required by the ASME Code, Section XI, Figure IWB-2500-7. As required by ASME Section XI, Table IWB-2500-1, Category B-D Item B 3.110 [NRC staff notes that the licensee had a typo and called stated "B1.10" in this paragraph, but correctly stated "B3.110 everywhere else in the document], these welds receive a volumetric examination. The pressurizer nozzle welds RC E-10 A-NZ, RC E-10 B-NZ, RC E-10 C-NZ, RC E-10 D-NZ, RC E-10 SPNZ, RC E-10 S-NZ have limited coverage due to the nozzle to shell geometry. ISI drawing 1-NHY-650006 shows typical pressurizer nozzle to stainless steel safe-end weld detail. The transition, from the carbon steel vessel nozzle to the stainless-steel safe-end to the stainless-steel pipe, is large over a short distance. This causes transducer sound beam propagation angle to change abruptly thereby not fully interrogating the required ASME examination volume. Each nozzle has its own unique fit-up, weld, and finish contour which presents specific individual limitations on examination volume. Grinding these transitions or adding weld material to increase examination volume could decrease the level of quality and safety in the pressurizer nozzle safe-end welds. As depicted in Table 3, these limitations result in coverage from 71 percent to 77.5 percent of the total examination volume. This was the maximum extent achievable.

Licensee's Proposed Alternative Examination (as stated)

The Licensee proposed the following:

1. Periodic system pressure tests in accordance with ASME Section XI Category B-P, Table IWB-2500-1 and C-H, Table IWC-2500-1.

2. Conduct ultrasonic examinations to the maximum extent possible.

3. Regular walkdowns by operations personnel and system engineers are performed on systems outside containment to check for leakage, piping configuration, and/or damage. During outages, system engineers walkdown systems inside and outside containment. This walkdown is performed to look for system anomalies that could affect plant performance.

3.3.2 NRC Staff Evaluation

The Code requires 100 percent volumetric examination of the subject welds in Table 3. These welds are obstructed due to the different pressurizer nozzle-to-shell design configurations. The NRC staff notes that in such nozzle-to-shell configurations, the weld transition from the carbon steel vessel nozzle to a stainless steel safe-end can be large over a short distance preventing the licensee from performing an adequate ultrasonic examination. Particularly, the ultrasonic sound path and angle is affected and unable to fully interrogate the required weld volume. The staff reviewed the licensee's figures for these welds showing the limitations of the examinations due to the nozzle-to-shell configurations. These figures detailed the areas of the successful UT coverage using various angles (e.g., combination of 45L and 60L). Based on an evaluation of the licensee's schematics and coverage calculations, the NRC staff finds that the UT techniques used by the licensee for these examinations achieved the maximum coverage practical. The staff also notes that significant design modifications would be necessary to accomplish the require inspection volume and the level of effort required to accomplish such modification to the plant would be an undue burden on the licensee. Therefore, the licensee has shown that it is impractical and an undue burden to meet the ASME Code-required volumetric coverage of the subject welds. Furthermore, the licensee has proposed, in addition to continuing to comply with the required Section XI system pressure test, that a greater emphasis on regular plant walkdowns will be imposed to identify leakage or issues affecting the weld's structural integrity. The staff finds that the licensee's maximum possible examination coverage of these components and the performance of the required Section XI pressure test provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant of 10 CFR 50.55a(g)(6)(i).

3.4 Examination Category C-A, Items C1.30, Heat Exchanger Tubesheet-to-Shell Weld

3.4.1 Licensee's Relief Request

Applicable ASME Code Requirements

The examination requirements for Examination Category C-A, Item Number C1.30 are delineated in Table IWC-2500-1, which require essentially 100 percent volumetric examination, as defined by IWC-2500-2. "Essentially 100%," as clarify by approved ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," is greater than 90 percent coverage of the examination volume.

Licensee's Reason for Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that due to design and geometrical configurations, it is impractical to meet the required essentially 100 percent volumetric coverage. Table 4 below provides a summary of the details of the weld for which the licensee is seeking relief.

Table 4			
Weld Identification	**Code Item/Number**	**Limitation**	**Coverage**
Containment Spray Heat Exchanger CBS E-16B 01	C1.30	Obstruction due to welded attachment on heat exchanger and instrumentation line.	20%

Licensee's Basis for Request (as stated)

The ASME Code-required volume for this item as required by the ASME Code, Section XI, Figure IWC-2500-2. This figure depicts the examination volume requirements for IWC, Category C-A, Item C1.30, respectively. As illustrated in Figure IWC-2500-2 the required examination volume includes the entire thickness of the weld and base material, including one half inch (0.50″) of the adjacent base material on both sides of the weld. CBS E-16B 01 is limitation on the flange side but it is also limited along the length of the weld on the near side due to attachment welds for the heat exchanger support. The near side limitation for CBS E-16B 01 is 60.25-inches of the 101-inches of circumferential length or approximately 60 percent of the weld length. As depicted in Table 4, these limitations result in coverage of 20 percent of the total examination volume. This was the maximum extent achievable.

The specific technology included conventional, composite, and monolithic ultrasonic search units using shear and longitudinal wave modes. The techniques utilized angles, modes, and frequencies that are equivalent to the techniques required by the industry generic procedure for the manual "Ultrasonic Examination of Austenitic Piping Welds," PDI-UT-2. This is an ASME Code, Section XI, Appendix VIII, Supplement 2 qualified procedure for the detection of circumferential and axial flaws in austenitic piping welds when dual side access is available or if the flaw is located on the near side of a single side access configuration. The licensee believes that the equipment and techniques used represent the most recent technology capable of maximizing volumetric coverage of the welds listed in this relief.

The ultrasonic procedure utilized met the requirements of ASME Code, Section XI, Appendix I and Appendix III as required. The ultrasonic procedure included equivalent techniques and equipment that are also specified for the inspection of the near and far side of welds from an Appendix VIII qualified industry generic procedure for austenitic piping welds, PDI-UT-2. The scope of PDI-UT-2 does not cover austenitic pressure vessel welds. However, the techniques in PDI-UT-2 are applicable due to the similar base and weld materials used for fabrication of weld CBS E-16B 01. The techniques in PDI-UT-2 are not qualified to detect flaws that are on the far side of the weld when access is limited to a single side. However, PDI-UT-2 does provide guidance to perform a "best effort" examination of the far side examination volume. The guidance provided in PDI-UT-2 for the detection of flaws on the far side of the weld is separated into two approaches based upon the thickness of the component being examined.

The procedure utilized for examinations of weld CBS E-16B 01 is not required to be ASME Appendix VIII qualified. There is also no requirement for personnel and equipment to be Appendix VIII qualified. However, the ultrasonic instruments, search units, and techniques used for these examinations have all previously been successfully qualified by demonstration in accordance with the requirements of ASME Section XI, Appendix VIII, Supplement 2 using the industry generic procedure for the Examination of Austenitic Piping Welds, PDI-UT-2. Additionally, personnel performing examinations were qualified by demonstration in accordance with the requirements of ASME Section XI, Appendix VIII, Supplement 2 as implemented by the PDI. The licensee believes that the equipment, techniques, and examination personnel used provide reasonable assurance that service induced flaws would have been identified in the areas covered.

Licensee's Proposed Alternative Examination (as stated)

The Licensee proposed the following:

1. Perform periodic system pressure tests in accordance with ASME Section XI Category B-P, Table IWB-2500-1 and C-H, Table IWC-2500-1.

2. Conduct ultrasonic examinations to the maximum extent possible.

3. Perform regular walkdowns by operations personnel and system engineers on systems outside containment to check for leakage, piping configuration, and/or damage. During outages, system engineers walkdown systems inside and outside containment. This walkdown looks for system anomalies that could affect plant performance.

3.4.2 NRC Staff Evaluation

The Code requires 100 percent volumetric examination of the subject weld in Table 4. Weld CBS E-16B 01 is located on the "B" CBS heat exchanger and it is obstructed due to the component's design configuration and adjacent appurtenances. To achieve greater volumetric coverage, the NRC staff notes that the CBS heat exchanger would require a significant plant modification. This would place an undue burden on the licensee, and therefore, the ASME Code examination is considered impractical. The CBS heat exchanger shell is fabricated of Type 304 austenitic stainless steel. The licensee used the industry's generic procedure PDI-UT-2, "Ultrasonic Examination of Austenitic Piping Welds," as the latest technology available. The staff notes that this procedure requires performance demonstration to be qualified for use, while for weld CBS E-16B 01, it is not required that licensee examine this level of qualification.

The NRC staff reviewed the licensee's figures for Weld CBS E-16B 01 showing the limitation of the examinations due to the design configurations. These figures detailed the areas of the successful UT coverage using various angles (e.g., combination of 45 and 60L) resulting in 20 percent coverage of the total weld volume. Due to the geometrical design and proximity to the bolted flange, UT scan access is limited to only the shell side for the weld. The staff notes that having access to only one side of the weld automatically reduces the weld coverage of the required volume by approximately half. Additionally, welded support attachments limit the access on the shell side of the CBS heat exchanger tubesheet-to-shell weld.

The licensee examined these welds from one accessible side using 45-degree shear and 60-degree longitudinal (L-waves) waves to achieve the maximum possible coverage along the weld length. While the licensee has only taken credit for obtaining volumetric coverage of the near-side of the subject welds, PDI-UT-2 provides guidance to perform a "best effort" examination of the far side examination volume, and therefore, the techniques employed would have provided some coverage on the far-side of the welds. The staff notes that no inservice related flaws were detected in the licensee's previous examinations.

The licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for the subject weld due to the design geometry of the weld, materials, and proximity of welded supports. However, based on the volumetric coverage obtained, and the UT techniques employed, it is reasonable to conclude that, if significant service-induced degradation had occurred in the subject welds, evidence of it would have been detected by the examinations performed. The licensee has proposed, in addition to continuing to comply with the required Section XI system pressure test, that a greater emphasis on regular plant walkdowns will be imposed to identify leakage or issues affecting the weld's structural integrity. The NRC staff finds that the licensee's maximum possible examination coverage of these components, the most up-to-date technology used to perform the examination, and the performance of the required Section XI pressure test provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant of 10 CFR 50.55a(g)(6)(i).

3.5 Examination Category C-B, Items C2.21, Nozzle-to-Shell Weld

3.5.1 Licensee's Relief Request

Applicable ASME Code Requirements

The examination requirements for Examination Category C-B, Item Number C2.21 are delineated in Table IWC-2500-1, which require essentially 100 percent volumetric examination, as defined by IWC-2500-4. "Essentially 100%," as clarified by approved ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," is greater than 90 percent coverage of the examination volume.

Licensee's Reason for Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that due to design and geometrical configurations, it is impractical to meet the required essentially 100 percent volumetric coverage. Table 5 below provides a summary of the details of the weld for which the licensee is seeking relief.

Table 5

Weld Identification	Code Item/Number	Limitation	Coverage
Containment Spray Heat Exchanger CBS E-16B N1	C2.21	Obstruction due to nozzle-to-shell weld configuration.	50%

Table 5			
Weld Identification	**Code Item/Number**	**Limitation**	**Coverage**
Containment Spray Heat Exchanger CBS E-16B N2	C2.21	Obstruction due to nozzle-to-shell weld configuration.	50%

Licensee's Basis for Request (as stated)

The ASME Code required volume for this item is as required by the ASME Code, Section XI, Figure IWC-2500-4. This figure depicts the examination volume requirements for IWC, Category C-B, Item C2.21. As illustrated in Figures IWC- 2500-4, the required examination volume includes the inner 1/3 of the weld and base material thickness, including one quarter inch (0.2″) of the adjacent base material on both sides of the weld. As depicted in Table 5, these limitations result in coverage of 50 percent of the total examination volume due only to the geometry of the weld joint and cannot be adequately examined from the opposite side of the weld due to the nozzle-to-shell configuration. This was the maximum extent achievable. Equipment, procedure, and personnel requirements are the same as discussed within the basis of the CBS E-16B 01 tubesheet to shell weld above.

For steam generator weld RC E-11A Seam 1 and pressurizer nozzle to shell welds RC E-10 A-NZ, RC E-10 B-NZ, RC E-10 C-NZ, RC E-10 D-NZ, RC-E-10 SP-N, RC E-10 S-NZ and Containment Spray Heat Exchanger weld CBS E-16B 01, listed in Table 5, surface examinations were not required. Welds CBS E-16B N1 and CBS E-16B N2 are Class 2 Category C-B nozzle to shell welds, which require surface examinations per ASME Code Category C-B, Item No. C2.21.

The surface and volumetric examinations of all the items listed did not reveal any recordable or reportable flaws in the examination zone or adjacent to any volumetric limitations.

The extent of examination volumes achieved via surface and/or volumetric examinations, combined with the system pressure tests and system walk downs, provide assurance of an acceptable level of quality and safety.

In all cases, 100 percent of the accessible Code required surface area was examined. All welds had a surface examination (liquid penetrant) and radiographic performed and were acceptable for service prior to initial startup.

Licensee's Proposed Alternative Examination (as stated)

The Licensee proposed the following:

1. Perform periodic system pressure tests in accordance with ASME Section XI Category B-P, Table IWB-2500-1 and C-H, Table IWC-2500-1.

2. Conduct ultrasonic examinations to the maximum extent possible.

3. Perform regular walkdowns by operations personnel and system engineers on systems outside containment to check for leakage, piping configuration, and/or damage. During

outages, system engineers walkdown systems inside and outside containment. This walkdown looks for system anomalies that could affect plant performance.

3.5.2 NRC Staff Evaluation

The Code requires 100 percent volumetric examination of the subject welds in Table 5. Welds CBS E-16B N1 and CBS E-16B N2 are located on the "B" CBS Heat Exchanger and are obstructed due to the component's design configuration and adjacent appurtenances. To achieve greater volumetric coverage, the NRC staff notes that the CBS heat exchanger would require a significant plant modification. This would place an undue burden on the licensee, and therefore, the ASME Code examinations are considered impractical. The CBS heat exchanger shell is fabricated of Type 304 austenitic stainless steel. The licensee used the industry's generic procedure PDI-UT-2, "Ultrasonic Examination of Austenitic Piping Welds," as the latest technology available. The staff notes that this procedure requires performance demonstration to be qualified for use, while for welds CBS E-16B N1 and CBS E-16B N2, it is not required to have this level of qualification examined.

The NRC staff reviewed the licensee's figures for Welds CBS E-16B N1 and CBS E-16B N2 showing the limitation of the examinations due to the design configurations. These figures detailed the areas of the successful UT coverage using various angles (e.g., combination of 45L and 60L) resulting in 50 percent coverage of the total of each weld volume. The nozzles' "set-in" design essentially makes these weld volumes in the form of a concentric ring aligned parallel with the nozzle axis. For this reason, no meaningful UT scans can be performed from the nozzle side of the welds. The licensee examined these welds from one accessible side using 45-degree shear and 60-degree longitudinal (L-waves) waves to achieve the maximum possible coverage along the weld length. While the licensee has only taken credit for obtaining volumetric coverage of the near-side of the subject welds, PDI-UT-2 provides guidance to perform a "best effort" examination of the far side examination volume, and therefore, the techniques employed would have provided some coverage on the far-side of the welds. This is confirmed from a review of the welds' cross-sectional information, which indicates that limited volumetric coverage on the far-side of the welds has been obtained. The licensee also completed the full ASME Code-required surface examinations (liquid penetrant) on both welds. No unacceptable indications were noted during the volumetric and surface examinations.

The licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for the subject weld due to the design geometry of the weld, materials, and proximity of welded supports. However, based on the volumetric and full surface coverage obtained, it is reasonable to conclude that, if significant service-induced degradation had occurred in the subject welds, evidence of it would have been detected by the examinations performed. The NRC staff finds that the licensee's maximum possible examination coverage of these components, the most up-to-date technology used to perform the examination, and the performance of the required Section XI pressure test provides reasonable assurance of structural integrity of the subject welds. Therefore, relief is granted pursuant of 10 CFR 50.55a(g)(6)(i).

4.0 CONCLUSION

As set forth above, the NRC staff determines that it is impractical for the licensee to comply with the requirements of the ASME Code, Section XI in the examination of subject welds. The NRC staff finds that requiring the licensee to perform design modifications to obtain ASME Code-required coverage would result in an undue burden to the licensee. The NRC staff concludes that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest, given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the NRC staff concludes that the examinations performed to the extent practical provide reasonable assurance of structural integrity of the subject components. Accordingly, the NRC staff concludes that the licensee has adequately addressed all regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants relief from the ASME Code examination requirements for the welds included in RR 3IR-18 and RR 3IR-19 for Seabrook for the third 10-year ISI interval, which began on August 19, 2010, and ended on August 18, 2020.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

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Date: October 4, 2022

SUBJECT: SEABROOK STATION, UNIT NO. 1 – RELIEF REQUESTS 3IR-18 AND 3IR-19, RELIEF FROM THE REQUIREMENTS OF THE ASME CODE (EPID L-2021-LLR-0098) DATED OCTOBER 4, 2022

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