



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

June 4, 2012

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

SUBJECT: SEABROOK STATION, UNIT 1 - SECOND 10-YEAR INTERVAL INSERVICE
INSPECTION PROGRAM PLAN REQUEST FOR RELIEF NO. 2IR-20 (TAC NO.
ME6901)

Dear Mr. Freeman:

By letter dated August 17, 2011, as supplemented March 13, 2012, NextEra Energy Seabrook, LLC (NextEra or licensee) submitted request for relief 2IR-20 for the second 10-year inservice inspection (ISI) interval program at the Seabrook Station, Unit 1 (Seabrook) from certain examination requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code). Specifically, the licensee requested relief from the ASME Code, Section XI requirements for the risk-informed, examination Category R-A, Items R1.11, R1.16, and R1.20, risk-informed piping examinations. The request is for the risk-informed examination for the second 10-year ISI interval, which ended August 18, 2010.

The U.S. Nuclear Regulatory Commission (NRC) staff, with technical assistance from its contractor, the Pacific Northwest National Laboratory (PNNL), has reviewed the subject request and concludes that NexEra has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants relief from the specified ASME Code, Section XI, examination coverage requirements of the subject welds contained in relief request 2IR-20 for the Seabrook second 10-year ISI interval.

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

P. Freeman

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The NRC staff's safety evaluation is enclosed. If you have any questions, please contact John G. Lamb at 301-415-3100 or via e-mail at John.Lamb@nrc.gov.

Sincerely,



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

Docket No. 50-443

Enclosure:
Safety Evaluation

cc w/encl: Distribution via Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SECOND 10-YEAR INTERVAL

REQUEST FOR RELIEF NO. 2IR-20

NEXTERA ENERGY SEABROOK, LLC.

SEABROOK STATION, UNIT 1

DOCKET NUMBER 50-443

1.0 INTRODUCTION

By letter dated August 17, 2011, as supplemented March 13, 2012,¹ NextEra Energy Seabrook, LLC (NextEra or licensee) submitted request for relief 2IR-20 for the second 10-year inservice inspection (ISI) interval program at the Seabrook Station, Unit 1 (Seabrook) from certain examination requirements of the American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (Code). Specifically, the licensee requested relief from the ASME Code, Section XI requirements for the risk-informed, examination Category R-A, Items R1.11, R1.16, and R1.20, risk-informed piping examinations. The request is for the risk-informed examination for the second 10-year ISI interval, which ended August 18, 2010.

2.0 REGULATORY EVALUATION

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(4), American Society of Mechanical Engineers (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(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

10 CFR 50.55a(g)(5)(iii), states, in part, that licensees may determine that conformance with certain code requirements is impractical and that the licensee shall notify the Commission and submit information in support of the determination. Determination of impracticality in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the code requirements during the inservice inspection interval for

¹ Agencywide Documents Access and Management System Accession Numbers ML11234A185 and ML120790313, respectively.

which the request is being submitted. Requests for relief made in accordance with this section must be submitted to the NRC no later than 12 months after the expiration of the initial 120-month inspection interval or subsequent 120-month inspection interval for which relief is sought.

10 CFR 50.55a(g)(6)(i), states that the Commission will evaluate determinations under paragraph (g)(5) of this section that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or property or the common defense and security and is 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 licensee has requested relief from ASME Code requirements pursuant to 10 CFR 50.55a(g)(6)(i). The ASME Code of Record for Seabrook second 10-year interval inservice inspection program, which ended on August 18, 2010, is the 1995 Edition through the 1996 Addenda of Section XI of the ASME *Boiler and Pressure Vessel 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 Commission to grant the relief requested by the licensee.

3.0 TECHNICAL EVALUATION

The information provided by the licensee in support of the request for relief to ASME Code requirements has been evaluated and the bases for disposition are documented below.

3.1 Request for Relief 2IR-20, Risk Informed, Examination Category R-A, Items R1.11, R1.16 and R1.20, Risk Informed Piping Examinations

ASME Code Requirement

The examination requirements for the subject piping welds at Seabrook are governed by a Risk-Informed Inservice Inspection (RI-ISI) program that was approved by the NRC in a Safety Evaluation (SE) dated February 7, 2002.² The RI-ISI program was developed in accordance with the Electric Power Research Institute (EPRI) Topical Report TR-112657, Rev. B-A, *Revised Risk-Informed Inservice Inspection Evaluation Procedure*. As part of the NRC-approved program, the licensee has implemented inspection requirements listed in ASME Code Case N-578³, Risk-Informed Requirements for Class 1, 2 or 3 Piping, Method B, Section XI, Division 1, with more detailed provisions contained in TR-112657. The topical report includes a provision for requesting relief from volumetric examinations if 100 percent of the required volumes cannot be examined.

Table 1 of ASME Code Case N-578 assigns Examination Category R-A, Items R1.11, R1.16, and R1.20, to piping inspection elements subject to thermal fatigue, intergranular stress corrosion cracking (IGSCC), and elements not subject to a known damage mechanism,

2 ADAMS Accession Number ML020250222.

3 ASME Code Case N-578 has not been approved for use in RG-1.147, Revision 16. Licensees base their RI-ISI inspection sample size and examination methodology on Table 1 of ASME Code Case N-578.

respectively. Table 1 of Code Case N-578 requires 100 percent of the examination location volume, as described in Figures IWB-2500-8(c), 9, 10, or 11, as applicable, including an additional ½-inch of base metal adjacent to the ASME Code volume, be completed for selected Class 1 piping welds. ASME Code Case N-460, as an alternative approved for use by the NRC in RG 1.147, Revision 16, states that a reduction in examination coverage due to part geometry or interference for any Class 1 and 2 weld is acceptable provided that the reduction is less than 10 percent, i.e., greater than 90 percent examination coverage is obtained.

Licensee's ASME Code Relief Request

In accordance with 10 CFR 50.55a(g)(5)(iii), the licensee requested relief from 100 percent volumetric examination of Risk-Informed Class 1 piping welds shown in Table 3.4.1 below.

Table 3.4.1 – Risk Informed, Examination Category R-A			
Risk Informed Table 1 Code Item	Weld ID	Weld Type	Coverage (Percent)
R1.11	CS 0366-02 04	3" Valve-to-Pipe	50.0
R1.11	CS 0368-02 04	3" Valve-to-Pipe	50.0
R1.11	RC 0013-01 08	12" Pipe-to-Tee	50.0
R1.11	RC 0013-01 09	12" Tee-to-Pipe	50.0
R1.11	RC 0048-03 01	4" Reducer-to-Pipe	50.0
R1.11	RC 0080-06 10	3" Pipe-to-Valve	50.0
R1.11	RH 0180-05 02	12" Pipe-to-Tee	50.0
R1.11	SI 0202-02 17	10" Valve-to-Pipe	50.0
R1.11	RC 0048-03 06	4" Pipe-to-Safe end	50.0
R1.11	RC 0080-02 10	3" Pipe-to-Valve	50.0
R1.16	SI 0251-07 04	6" Pipe-to-Valve	50.0
R1.20	CS 0329-04 04	2" Valve-to-Pipe	50.0
R1.20	RC 0097-01 08	3" Valve-to-Pipe	50.0
R1.20	RC 0097-01 11	3" Pipe-to-Valve	50.0
R1.20	SI 0251-07 05	6" Valve-to-Pipe	50.0

Note: In the licensee's response to the NRC Request for Additional Information (RAI), Seabrook withdrew pipe-to-safe end Weld RC 0048-03 06 and valve-to-pipe Weld CS 0329-04 04 from Request for Relief 2IR-20, Examination Category R-A, Items R1.11 and R1.20. Pipe-to-safe end Weld RC 0048-03 06 received a full structural weld overlay and the overlay examination was not limited during the interval. Valve-to-pipe Weld CS 0329-04 04 was removed from this relief request and ISI program selection as this weld was not needed to meet the ASME Code minimum inspection requirements.

Licensee's Basis for Relief Request (as stated)

There are currently no [PDI (performance demonstration initiative)] qualified single side examination procedures that demonstrate equivalency to two-sided examination procedures on austenitic piping welds. Current technology is not capable of reliably detecting or sizing flaws on the far side of an austenitic weld. [PDQS (performance demonstration qualification summary)] certificates for austenitic piping list the limitation that single side examination is performed on a best effort basis. The best effort qualification is provided in place of a complete single side qualification to demonstrate that the examiners qualification and the subsequent weld examination is based on application of the best available technology.

Relief is requested from compliance with the 100 percent required examination coverage for piping welds listed in Table [3.4.1 above] based on configurations limited to single side access. Examination coverage listed was obtained during examination with no credit taken for the far side of each weld.

Compliance would require extensive modification or replacement of components with a design that allows examination from both sides of the weld. This option to meet the 100 percent examination coverage requirement is considered impractical.

Licensee's Proposed Alternative Examination:

The licensee did not propose any alternative examinations for the subject welds. However, the licensee's examinations were performed to the maximum extent practical.

NRC Staff Evaluation

Examination requirements for the subject piping welds at Seabrook are governed by an RI-ISI program that was approved by the NRC in an SE dated February 7, 2002. This program assigns Examination Category R-A, Items R1.11, R1.16 and R1.20 to piping inspection elements subject to thermal fatigue, IGSCC, and piping elements not subject to a known damage mechanism, respectively. The program requires inspection of 100 percent of the defined examination volumes for Class 1 circumferential piping welds. However, the design configurations of the subject welds limit volumetric examinations. In order to increase coverage, the welds would have to be re-designed and modified. This would place a burden on the licensee; therefore, the ASME Code-required volumetric examinations are considered impractical.

As shown in the technical descriptions and sketches provided in the licensee's submittals, examinations of the subject welds have been performed to the extent practical, with the licensee obtaining volumetric coverage of approximately 50 percent of the required volumes of the welds, as applied from one accessible side of the welds. The limitations encountered during the performance of the UT examinations were caused by austenitic stainless steel materials and existing tapers in the valve-to-pipe, pipe-to-tee, reducer-to-pipe, and pipe-to-safe end weld configurations (see Table 3.4.1 above for specific weld configurations). These configurations

limit UT scan access primarily to the pipe side of the welds. The licensee stated that selection of one-sided examinations (e.g., pipe-to-valve welds) would normally be avoided for these risk-informed piping examinations, but in some cases, no other choices were available. The licensee also noted that only the subject 15 of the total 72 welds in the risk-informed program had limited examinations due to their configurations; the remaining 57 welds were examined essentially 100 percent of the ASME Code-required examination coverage.

Volumetric examinations on the subject welds were conducted with equipment, procedures and personnel that were qualified to the process outlined in ASME Code Section XI, Appendix VIII. These techniques have been qualified for flaws located on the near-side of the welds; far-side detection of flaws is considered to be a "best effort." For this reason, the licensee has taken credit for completing only 50 percent of the ASME Code-required inspection volumes on the subject piping welds. The licensee's UT techniques included 45-, 60- and 70-degree shear waves and 60- and 70-degree refracted longitudinal waves (L-waves), as applicable. For piping equal to or less than 0.50-inches thick, procedures that include a 70-degree shear wave are the PDI approved techniques for flaw detection in piping welds. For piping greater than 0.50-inches thick, longitudinal wave search units that provide supplemental coverage of the far-side of the weld are included in PDI approved techniques for detection in austenitic stainless steel welds. L-waves have been shown to provide enhanced detection on the far-side of austenitic stainless steel welds.^{4 5 6} While the licensee has only taken credit for obtaining 50 percent volumetric coverage, it is expected that the techniques employed would have provided coverage beyond the near-side of the welds. The UT examinations did not reveal any unacceptable flaws.

The licensee has shown that it is impractical to meet the ASME Code-required volumetric examination coverage for the subject welds due to their design configurations and materials of construction. Based on the UT results and coverage obtained, in addition to the full examination of other piping welds in the same risk segments, 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. Furthermore, the NRC staff determined that the examinations performed to the extent practical on the subject welds provide reasonable assurance of structural integrity of the subject welds.

4.0 CONCLUSIONS

As set forth above, the NRC staff has determined 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. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the NRC staff grants

⁴ F.V. Ammirato, X. Edelmann, and S.M. Walker, *Examination of Dissimilar Metal Welds in BWR Nozzle-to-Safe End Joints*, 8th International Conference on NDE in the Nuclear Industry, ASM International, 1987.

⁵ P. Lemaitre, T.D. Koble, and S.R. Doctor, *PISC III Capability Study on Wrought-to-Wrought Austenitic Steel Welds: Evaluation at the Level of Procedures and Techniques*, Effectiveness of Nondestructive Examination Systems and Performance Demonstration, PVP-Volume 317, NDE-Volume 14, ASME, 1995.

⁶ M. T. Anderson, A.A. Diaz, A.D. Cinson, S.L. Crawford, S.E. Cumblidge, S.R. Doctor, K.M. Denslow, and S. Ahmed, 2011. *An Assessment of Ultrasonic Techniques for Far-Side Examinations of Austenitic Stainless Steel Piping Welds*, NUREG/CR-7113, PNNL-19353, U. S. Nuclear Regulatory Commission, Washington, DC.

relief from the specified ASME Code, Section XI, examination coverage requirements of the subject welds contained in relief request 2IR-20 for the Seabrook second 10-year ISI interval.

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

Principal Contributors: Tom McLellan and Steve Cumblidge

Date: June 4, 2012

SEABROOK STATION, UNIT 1
 Second 10-Year ISI Interval

TABLE 1
 SUMMARY OF RELIEF REQUEST

Relief Request Number	TLR RR Sec.	System or Component	ASME Code Exam. Category	ASME Code, Item No.	Volume or Area to be Examined	Required Method	Licensee Proposed Alternative	Relief Request Disposition
2IR-20	3.1	Risk Informed Piping Examinations	R-A	R1.11 R1.16 R1.20	100% of ASME Code, Class 1 piping subject to specified damage mechanisms	Volumetric	Use volumetric coverage achieved	Granted 10 CFR 50.55a(g)(6)(i)

P. Freeman

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The NRC staff's safety evaluation is enclosed. If you have any questions, please contact John G. Lamb at 301-415-3100 or via e-mail at John.Lamb@nrc.gov.

Sincerely,

/ra/

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

Docket No. 50-443

Enclosure:
Safety Evaluation

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