FPL Energy
Seabrook Station

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September 30, 2008

Docket No. 50-443

SBK-L-08171

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

Seabrook Station

Request for Use of a PDI Demonstrated Technique to Examine
The Reactor Pressure Vessel Upper Shell-to-Flange Weld

Pursuant to 10 CFR 50.55a(a)(3)(i), FPL Energy Seabrook, LLC (FPL Energy Seabrook) requests approval to use a Performance Demonstration Initiative (PDI) qualified technique to examine the upper shell-to-flange weld in lieu of the techniques specified in American Society of Mechanical Engineers (ASME) Code, Section V, Article 4.

Seabrook is performing volumetric examinations of all reactor pressure vessel (RPV) welds during the upcoming ten-year RPV inservice inspection (ISI). Seabrook is required to perform the ten-year RPV ISI pursuant to 10 CFR 50.55a. The Code of record (ASME Boiler and Pressure Vessel Code Section XI, 1995 Edition, including Addenda through 1996) requires that ultrasonic (UT) examination of RPV welds be accomplished with techniques that have been demonstrated in accordance with ASME Code Section XI, Appendix VIII (PDI)[1]. In addition, Section XI, Appendix I, Paragraph I-2110(b), states, "Ultrasonic examination of reactor vessel-to-flange welds shall be conducted in accordance with Article 4 of Section V, except that alternative examination beam angles may be used."

The Seabrook ISI vendor has a procedure for examination of RPV welds from the inside surface that has been fully qualified through the PDI program. Seabrook intends to use PDI qualified techniques to examine the upper shell-to-flange weld in lieu of the techniques specified in ASME Section V, Article 4.

[1] In 1991, U.S. nuclear utilities joined together to form the Performance Demonstration Initiative (PDI). This initiative meets the implementation requirements of ASME Section XI, Appendix VIII. It consists of an Executive Committee, a Steering Committee, and Working Groups. The PDI is responsible for preparing the test protocol; providing the interface between the Nuclear Regulatory Commission and the ASME Boiler and Pressure Vessel Code. The EPRI NDE Center is the Performance Demonstration Administrator (PDA) for the program.

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As stated above, the Code of record requires that the (UT) examination of RPV welds, excluding the vessel-to-flange weld, shall be with techniques that have been demonstrated in accordance with the ASME Code Section XI, Appendix VIII. All ultrasonic procedures qualified in accordance with the Appendix VIII requirements are done so by following a very prescriptive set of requirements detailed in the PDI program.

FPL Energy Seabrook requests review and approval of this proposal to support the Seabrook Unit 1 refueling outage in the fall of 2009. Similar alternatives have been submitted for NRC review and approval and are referenced in the attached request.

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

Sincerely,

FPL Energy Seabrook, LLC

Gene St. Pierre
Site Vice President

cc: S. J. Collins, NRC Region I Administrator
G. E. Miller, NRC Project Manager
W. J. Raymond, NRC Resident Inspector

Attachment 1 to SBK-L-08171

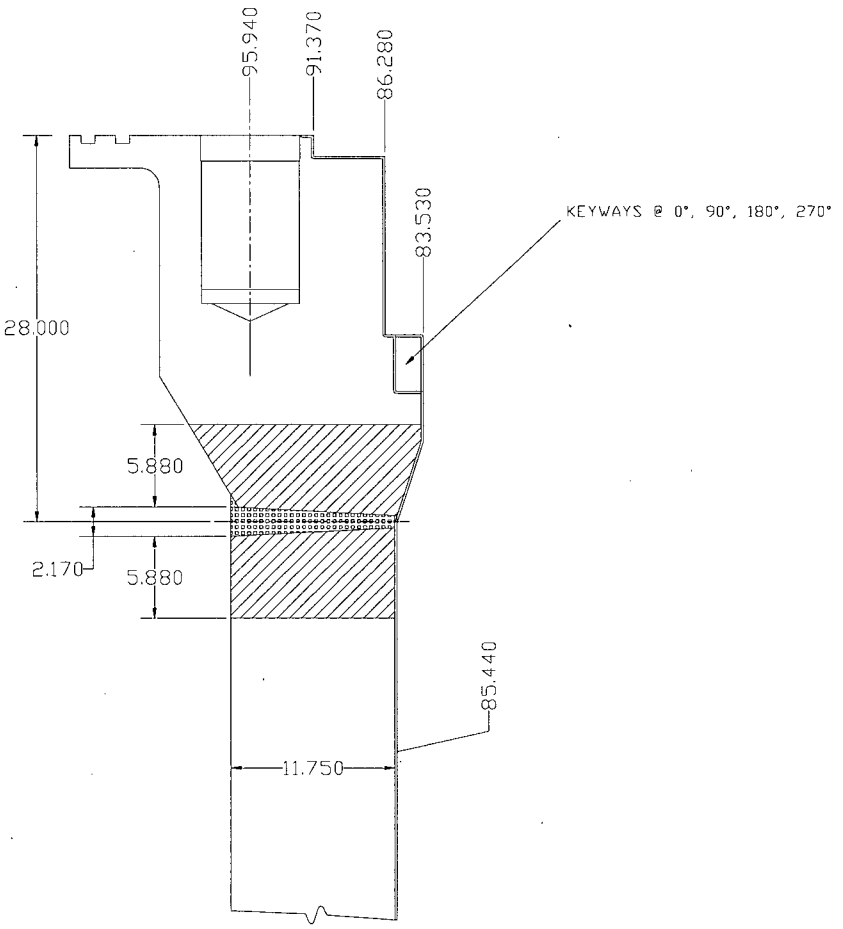
ATTACHMENT 1
2IR-15, Rev. 0
10 CFR 50.55a Request
Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(i)

REQUEST FOR RELIEF TO USE PDI DEMONSTRATED ULTRASONIC TECHNIQUES FOR THE EXAMINATION OF THE REACTOR PRESSURE VESSEL UPPER SHELL-TO-FLANGE WELD FOR SEABROOK UNIT 1

ASME Code Component Affected

Code Class:	1
System:	RC
Examination Categories:	B-A
Item No.	B1.30, Shell-to-Flange Weld
ISI Component ID	RC RPV-101-121

Component Detail Drawing



Applicable Code Edition and Addenda

FPL Energy Seabrook Station (Seabrook) is currently in the 2nd 10-year Inservice Inspection (ISI) interval. The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) of record for the current 10-year ISI interval is Section XI, 1995 Edition, including Addenda through 1996 (Reference 1).

Applicable Code Requirement

ASME Section XI, 1995 Edition, including Addenda through 1996, Appendix I, Article I-2100, paragraph (b) requires "Ultrasonic examination of reactor vessel-to-flange welds shall be conducted in accordance with Article 4 of ASME Section V, except that alternative examination beam angles may be used. These examinations shall be further supplemented by Table I-2000-1."

Reason for Request

Seabrook is performing volumetric examinations of all Reactor Pressure Vessel (RPV) welds during the upcoming ten-year RPV Inservice Inspection (ISI). Seabrook is required to perform the ten-year RPV ISI pursuant to 10CFR50.55a. The Code requires that Ultrasonic (UT) examination of RPV welds, excluding the vessel-to-flange weld, shall be with techniques that have been demonstrated in accordance with AMSE Code Section XI, Appendix VIII. Further, in accordance with Appendix I, Paragraph I-2110(b), "Ultrasonic examination of reactor vessel-to-flange welds, closure head-to-flange welds and integral attachment welds shall be conducted in accordance with Article 4 of Section V, except that alternative examination beam angles may be used."

Examination from the inside surface provides the best access for examination of the RPV shell-to-flange weld. The flange forging contains both inside and outside surface tapers, the outside taper angle is more than twice the angle of the inside surface taper. While both tapers will interfere with the examination to some degree, the inside surface taper provides the least amount of interference. Additionally, the outside surface of the RPV is typically inaccessible due to its placement inside the biological-shield wall and the installed insulation. Examination of this weld from the outside surface would require the removal of the installed insulation and access beneath the cavity seal ring. These efforts would result in significant personnel radiation exposure without a compensating increase in the level of quality and safety.

Although the reactor vessel-to-flange weld is specifically excluded from the referenced codes requiring Appendix VIII/PDI qualified techniques, Seabrook believes that performing the reactor vessel-to-flange weld examination with PDI qualified personnel and procedures from the inside surface will provided an acceptable level of quality and safety.

Proposed Alternative and Basis for Use

In lieu of requirements specified in ASME Code, Section XI, Appendix I, Subarticle I-2110, Paragraph (b), Seabrook proposes to use procedures, personnel, and equipment qualified to the requirements of ASME Section XI Appendix VIII, Supplements 4 and 6 of the 1995 Edition

through the 1996 Addenda, as administered by the Electric Power Research Institute's (EPRI) PDI program to conduct the vessel-to-flange weld examination. The RPV examination vendor will perform examinations designed to achieve the maximum coverage possible utilizing PDI qualified procedures and personnel from the inside surface. The proposed alternative represents the best techniques, procedures, and qualifications available to perform UT examinations of RPV welds. The PDI program addresses qualification requirements for each of the supplements that are defined in Appendix VIII of ASME Section XI. The applicable vendor procedure has been qualified in accordance with PDI's implementation of Supplements 4[2] and 6[3] of Appendix VIII.

The listed weld is the only circumferential shell weld in the RPV that is not examined with ASME Section XI, Appendix VIII techniques, as mandated in 10 CFR 50.55a. This rule mandates the use of ASME Section XI, Appendix VIII, Supplements 4 and 6 for the conduct of all other RPV weld examinations. Per Appendix I, Article I-2100, paragraph (b), ASME Section V, Article 4 techniques shall be used for the listed weld. ASME Section V, Article 4 describes required techniques to be used for UT of welds in ferritic pressure vessels with wall thicknesses greater than 2 inches. The calibration techniques, recording criteria and flaw sizing methods are based upon the use of a distance-amplitude-correction curve (DAC) derived from machined reflectors in a basic calibration block. UT performed in accordance with Section V, Article 4, uses recording thresholds known as percent of DAC for recording and reporting of indications within the examination volume. Indications detected in the exam volume, with amplitudes below these thresholds, are not required to be recorded and/or evaluated. Use of the Appendix VIII qualified techniques would enhance the quality of the examination. The detection criterion is more conservative and the procedure requires the examiner to evaluate all indications determined to be flaws regardless of their amplitude. The recording thresholds in Section V, Article 4 are generic and do not take into consideration such factors as flaw orientation, which can influence the amplitude of UT responses.

EPRI Report NP-6273, "Accuracy of Ultrasonic Flaw Sizing Techniques for Reactor Pressure Vessels," dated March 1989, contains a comparative analysis of sizing accuracy for several different techniques. The results show that UT flaw sizing techniques based on tip diffraction are the most accurate. The proposed alternative Appendix VIII UT qualified detection and sizing methodologies use analysis tools based upon echo dynamics and tip diffraction. This methodology is considered more sensitive and accurate than the Section V, Article 4 processes.

Procedures, equipment and personnel qualified via the PDI Appendix VIII, Supplement 4 and 6 programs have been demonstrated to have a high probability of detection and are generally considered superior to the techniques employed during earlier Section V, Article 4 RPV examinations. Accordingly, approval of this alternative examination and evaluation process is requested pursuant to 10 CFR 50.55a (a)(3)(i).

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[2] "QUALIFICATION REQUIEMENTS FOR THE CLAD/BASE METAL INTERFACE OF REACTOR VESSEL"
[3] "QUALIFICATION REQUIREMENTS FOR REACTOR VESSEL WELDS OTHER THAN CLAD/BASE METAL INTERFACE"

Precedents

Similar relief requests have been granted to the following plants:

- NRC Safety Evaluation dated January 28, 2000, for Point Beach Nuclear Plant, Units 1 and 2; "Point Beach Nuclear Plant, Units 1 and 2 - Safety Evaluation Regarding Relief Requests Associated with the Third 10-Year in-service Inspection (ISI) Interval (TAC Nos. MA5234 and MA5235)" (ML003677847)

- NRC Safety Evaluation dated October 20, 2004, for Catawba Nuclear Station, Units 1 and 2; McGuire Nuclear Station, Unit 2, and Oconee Nuclear Station, Unit 3, dated July 14, 2004, "Request for Relief for Use of an Alternate to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, for Reactor Vessel Examinations RR-04-GO-002 (TAC Nos. MC3804, MC3805, MC3807, and MC3810)" (ML420040261)

- NRC Safety Evaluation dated August 2, 2005, for Browns Ferry Units 1, 2 and 3; Sequoyah Nuclear Plant Units 1 and 2; and Watts Bar Nuclear Plant Unit 1, "in-service Inspection Program Relief Request PDI-4 (TAC Nos. MC6232, MC6233, MC6234, MC6235, MC6236, and MC6237)" (ML051730487)

Duration of Proposed Alternative

The alternative requirements of this request will be applied for the duration of up to and including the last outage of the current 2nd 10-year ISI interval.

References

1. ASME Code, Section XI, 1995 Edition, including Addenda through 1996.