



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

January 20, 2012

Mr. Joseph W. Shea
Corporate Manager - Nuclear Licensing
Tennessee Valley Authority
3R Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNIT 3 - SAFETY EVALUATION FOR
RELIEF REQUEST 3-ISI-25, FOR THE THIRD 10-YEAR INSERVICE
INSPECTION INTERVAL (TAC NO. ME5400)

Dear Mr. Shea:

By letter dated January 21, 2011 (Agency Wide Document Access and Management System (ADAMS) Accession No. ML110260395) as supplemented on July 18 and November 9, 2011 (ADAMS Accession No. ML11201A302 and ML11319A012), the Tennessee Valley Authority (TVA) submitted a request for relief from weld examination coverage requirements specified in the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI. Specifically, this request for relief addresses three Residual Heat Removal System full penetration piping welds, two Reactor Water Cleanup System full penetration piping welds and two High Pressure Coolant Injection System full penetration piping welds. Ultrasonic examinations were performed on the accessible areas of these welds to the maximum extent practical for the design configuration of the welds.

Based on our review of your submittals, the U.S. Nuclear Regulatory Commission (NRC) has concluded that the ASME Code examination coverage requirements are impractical; however, the NRC staff finds that the alternative proposed provides reasonable assurance of structural integrity. The NRC staff has determined that granting relief for RR 3-ISI-25, 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. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third-party review by the Authorize Nuclear Inservice Inspector.

This relief is granted and the alternate proposed by TVA is authorized for the remainder of the third 10-year inservice inspection interval at Browns Ferry Unit 3, which began November 19, 2005, and ends November 18, 2015.

J. Shea

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If you have any questions regarding this matter, please contact Ms. Eva Brown at (301) 415-2315.

Sincerely,

A handwritten signature in black ink, appearing to read "Douglas A. Broaddus". The signature is fluid and cursive, with a large initial "D" and "B".

Douglas A. Broaddus, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-296

Enclosure: Safety Evaluation

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUEST FOR RELIEF FROM WELD EXAMINATION

COVERAGE REQUIREMENTS

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT 3

DOCKET NO. 50-296

1.0 INTRODUCTION

By letter dated January 21, 2011 (Agency Wide Document Access and Management System (ADAMS) Accession No. ML110260395) as supplemented on July 18 and November 9, 2011 (ADAMS accession No. ML11201A302 and ML11319A012), the Tennessee Valley Authority (TVA), the licensee, submitted Relief Request (RR) 3-ISI-25 requesting relief from certain weld examination coverage requirements specified in American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 2001 Edition, as amended by Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a (b)(2)(xv)(A)(2), for three full penetration welds due to access limitations caused by design. These welds include one Residual Heat Removal (RHR) System full penetration piping weld and two Reactor Water Cleanup (RWCU) System full penetration piping welds. This relief request is for the third 10-year inspection interval which began November 19, 2005, and is scheduled to end on November 18, 2015.

The U.S. Nuclear Regulatory Commission (NRC) staff notes that in the supplement dated November 9, 2011, TVA requested the removal of four welds from the request. The welds were:

- DRHR-3-03;
- DRHR-3-12;
- HPCI-3-002-002; and
- HPCI-3-002-003.

2.0 REGULATORY EVALUATION

The inservice inspection (ISI) of the ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) to 10 CFR states, in part, that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if

the applicant demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that ISI 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 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.

In a letter dated February 12, 2007 (ADAMS Accession No. ML070090349), the NRC staff approved the licensee's risk-informed program for the third ISI interval that follows the methodology contained in the Westinghouse Owners Group report WCAP-14572, Revision 1-NP-A "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report." The risk-informed program is an alternative to the ASME Code. The subject welds are covered under Code Case N-577-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method A" Paragraph 2500 Table 1 and IWB-2500-1. Regulatory Guide 1.193 "ASME Code Cases Not Approved for Use" has identified Code Case N-577-1 as unacceptable. The NRC staff has, however, accepted the methodology contained in Code Case N-577-1 Paragraph 2500 Table 1, as part of the NRC staff's approval of WCAP-14572, Revision 1-NP-A.

In support of the review, the NRC staff used information from the Safety Evaluation for Browns Ferry Nuclear Plant, Unit 3, "Relief Request 3-ISI-22 Limited Examination Coverage For Valve To Pipe Weld GR-3-63" (ADAMS Accession No. ML080080524).

The ISI Code of record for Browns Ferry Unit 3 for the third 10-year ISI interval is the 2001 Edition with the 2003 Addenda, including, Section XI, Appendix VIII, "Performance Demonstration for Ultrasonic Examination System," of the 2001 Edition for ultrasonic examinations.

3.0 LICENSEE EVALUATION

3.1 Component Descriptions

The components covered under RR 3-ISI-25 include three full-penetration welds ranging in size from 6 inches to 20 inches in nominal pipe diameter. The components and the achieved coverage are given in Table 1. Also included in Table 1 are the Examination Categories and the Risk Informed item number for each weld.

Table 1: Full-Penetration Welds covered in this Relief Request

Component	System	Weld Type	Nominal Pipe Diameter Size (NPS)	Examination Coverage	Examination Category/ RI Item Number
RWCU-3-001-070	Reactor Water Cleanup	Pipe to Valve	6"	30.5%	B9.11/R1.16
RWCU-3-001-071	Reactor Water Cleanup	Pipe to Valve	6"	69%	B9.11/R1.16
DRHR-3-21	Residual Heat Removal	Elbow to Valve	20"	53.75%	B9.11/R1.16

It should be noted that four welds were removed from the original request per TVA's supplement dated November 9, 2011.

Code Requirements for Which Relief is Requested

Code Case N-577-1 Paragraph 2500 Table 1, Examination Category R1.16, requires volumetric examination of 100 percent of the weld and adjacent base material as shown in Figure IWB-2500-8(c). Table IWB-2500-1 requires volumetric examination of essentially 100 percent of the weld length.

The Tennessee Valley Authority, the licensee, has requested relief from the "essentially 100%" volumetric examination coverage requirements for three full penetration welds due to access limitations caused by design.

3.3 Licensee's Bases for Relief (As Stated)

The welds were examined with the latest ultrasonic techniques, procedures, equipment, and personnel qualified to the requirements of the Performance Demonstration Initiative (PDI) Program, in accordance with the requirements of the 2001 Edition, 2003 Addenda, as amended by 10 CFR 50.55a(b)(2)(xv)(A) and 10 CFR 50.55a(b)(2)(xxiv), of ASME Section XI, Division 1, Appendix VIII as mandated by 10 CFR 50.55a(g)(4). These examinations were of the accessible areas to the maximum extent practical due to the design configuration of the weld joints.

10 CFR 50.55a(b)(2)(xv)(A)(2) states, "Where examination from both sides is not possible on austenitic welds or dissimilar metal welds, full coverage credit from a single side may be claimed only after completing a successful single-sided Appendix VIII demonstration using flaws on the opposite side of the weld."

Credit for the one-sided only ultrasonic examination provides coverage ranging from 30.5% to 69%. These examinations provide an acceptable level of quality and safety because the information and data obtained provides sufficient information to judge the overall integrity of the piping welds.

3.4 Technical Evaluation

As indicated previously, the NRC staff approved the licensee's risk-informed program that follows the methodology contained in the Westinghouse Owners Group report WCAP-14572, Revision 1-NP-A. This program assigns Examination Category R-A, Item R1.16, to piping elements subject to intergranular stress corrosion cracking. This examination category must satisfy the inspection requirement of achieving 100 percent of the examination location volume for Class 1 circumferential piping welds.

Weld RWCU-3-001-071 was examined using 45, 60, and 70 degree 2.25 MHz shear wave probes. Weld RWCU-3-001-070 was examined using 45 and 60 degree shear waves and 60 degree longitudinal waves. Weld DRHR-3-21 was examined using a 45 degree shear wave probe and a 60 degree longitudinal wave probe.

The cast austenitic stainless steel materials and design configurations of the subject welded components limit ultrasonic scanning to a single side in welds RWCU-3-001-070, RWCU-3-001-071 and DRHR-3-21. The coverage of weld RWCU-3-001-070 had additional limitations caused by geometry that limited ultrasonic scanning. As shown on the sketches and technical description included in the licensee's submittal, examinations of the subject piping welds have been completed to the extent practical with aggregate volumetric coverage of between 30.5 percent to 69 percent of the ASME Code-required volumes using ASME Code Section XI, Appendix VIII-qualified procedures (see Table 1 above). The ultrasonic examinations performed were qualified to the performance demonstration requirements of ASME Code, Section XI, Appendix VIII. "Best Effort" examinations that do not meet Section XI Appendix VIII were also performed on RWCU-3-001-070 and DRHR-3-21 from the cast stainless steel components with unspecified additional coverage. While a best effort examination does not have the same level of rigor as an Appendix VIII examination, a best effort examination is better than no examination. No recordable indications were found by the best effort examinations.

In order to effectively increase the examination coverage that meets Appendix VIII requirements, each of the weld configurations would require design modifications or replacement. Additionally, PDI has not yet developed a procedure capable of allowing an inspector to conduct a qualified examination from one side of an austenitic weld at this time. This would place a burden on the licensee; thus, 100 percent coverage for volumetric examinations is impractical. The licensee has shown that it is impractical to meet the ASME Code-required 100 percent volumetric examination coverage for the subject piping welds due to their design and ultrasonic access restrictions.

Based on the aggregate coverage obtained for the subject welds, and considering the licensee's performance of ultrasonic techniques used to maximize this coverage, it is reasonable to conclude that if significant service-induced degradation were occurring, evidence of it would have been detected by the examinations that were performed.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal and concludes that the ASME Code examination coverage requirements are impractical for the subject welds listed in the RR No. 3-ISI-25. Further, based on the volumetric coverage obtained, it is concluded that, if significant service-induced degradation were occurring, there is reasonable assurance that evidence of it would have been detected by the examinations that were performed. Therefore, for the items in RR 3-ISI-25 relief is granted pursuant to 10 CFR 50.55a(g)(6)(i), for the third 10-year ISI interval at the Browns Ferry Nuclear Plant, Unit 3.

The NRC staff has determined that granting relief for RR 3-ISI-25, 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. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third-party review by the Authorize Nuclear Inservice Inspector.

Principal Contributor: S. Cumblidge, NRR

Date: January 20, 2012

J. Shea

- 2 -

If you have any questions regarding this matter, please contact Ms. Eva Brown at (301) 415-2315.

Sincerely,

/RA/

Douglas A. Broaddus, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-296

Enclosure: Safety Evaluation

cc w/enclosure: Distribution via Listserv

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