Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

July 9, 2001

10 CFR 50.55a (a) (3) (i)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Gentlemen:

| | | | | |
|---|---|---|---|---|
| In the Matter of | ) | Docket Nos. | 50-260 | 50-296 |
| Tennessee Valley Authority | ) | | 50-327 | 50-328 |
| | | | 50-390 | |

BROWNS FERRY NUCLEAR PLANT (BFN), UNITS 2 AND 3, SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2, AND WATTS BAR NUCLEAR PLANT (WBN), UNIT 1 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM REQUEST FOR RELIEF - NO. PDI-2 REPLACEMENT SUBMITTAL

TVA submittal dated February 23, 2001, (L44 010223 800) requested two generic ISI Program relief requests applicable to BFN Units 2 and 3, SQN Units 1 and 2, and WBN Unit 1. These two generic requests (PDI-1 and PDI-2) outlined proposed alternatives to meeting the requirements of Appendix VIII, "Performance Demonstration for Ultrasonic Examination Systems," of the 1995 Edition through the 1996 Addenda of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, as required in the September 22, 1999, revision to Code of Federal Regulations, Title 10, Part 50, Section 55a, (10 CFR 50.55a).

As agreed to in recent telephone conversations held the week of June 18, 2001, between TVA Licensing, Susan Ferrell, and NRC Project Manager Ron Hernan, the relief request PDI- 2 is being revised and resubmitted.

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A similar request for relief to TVA's PDI-2 was submitted by Niagara Mohawk Power Corporation, Nine Mile Point, and subsequently granted. The Nine Mile Point submittal package, dated October 26, 2000, and December 1, 2000, was approved by the NRC Staff in a letter dated March 29, 2001.

There are no commitments contained in this letter.

Please contact Susan Ferrell (423) 751-7737, if you have questions.

Sincerely,

Mark J. Burzynski
Manager
Nuclear Licensing

Enclosure
cc: See page 3

cc (Enclosure):

Ronald W. Hernan, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2739

K. N Jabbour, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Mr. L. Mark Padovan, Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2739

**ENCLOSURE**

**TENNESSEE VALLEY AUTHORITY (TVA)**
**AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)**
**SECTION XI INSERVICE INSPECTION (ISI) PROGRAM**

**BROWNS FERRY NUCLEAR PLANT (BFN)**
**3rd 10-YEAR INSPECTION INTERVAL FOR UNIT 2**
**AND**
**2ND 10-YEAR INSPECTION INTERVAL FOR UNIT 3**

**SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2**
**2ND 10-YEAR INSPECTION INTERVAL**

**WATTS BAR NUCLEAR PLANT (WBN)**
**1ST 10-YEAR INSPECTION INTERVAL**

**REQUEST FOR RELIEF - NO. PDI-2**

## EXECUTIVE SUMMARY

TVA's current ISI programs' Code requirements for the examination volumes of the Class 1 reactor vessel pressure-retaining nozzle-to-vessel welds (Examination Category B-D, Item No. B3.90 - Inspection Program B) are shown in Figures IWB-2500-7(a), IWB-2500-7(b), and IWB-2500-7(c) of the applicable ASME Section XI Codes. These figures require that licensees perform examinations of the weld volumes and the adjacent vessel or nozzle base metal material regions to the extent of a length equivalent to one-half (½) the vessel shell thickness ($t_s$)[i.e., $t_s/2$] beyond the end of the weld's boundary. The extent of the examination volume for a given nozzle-to-vessel weld dictates the exam time and the amount of radiation dose exposure of the personnel involved. Historical improvements in the ultrasonic examination techniques and the qualifications of the examiners in accordance with the Section XI Appendix VIII have reduced the necessity of having the nozzle-to-vessel weld exam volumes be as large as currently required in Figures IWB-2500-7 (a), (b), & (c). TVA proposes to reduce the required examination volume's extent (next to the widest part of the weld) from one-half of the shell thickness to one-half (½) inch beyond the boundary of the weld. The reduction of the exam volume in lieu of the current ASME Section XI Code required examination volumes will result in a reduction of examination time and the associated examination personnel radiation exposure while maintaining an acceptable level of quality and safety. Except for the proposed reduced examination volumes, TVA will continue to perform the volumetric examinations in accordance with the other specific aspects and requirements of the ASME Code for these exams. Accordingly, pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested to use the reduced examination volumes in lieu of the requirements shown in ASME Section XI Figures, IWB-2500-7 (a), (b), and (c).

## SYSTEM/COMPONENT(S) FOR WHICH RELIEF IS REQUESTED

ASME Class 1 equivalent (TVA Class A) Reactor Pressure Vessel Pressure-Retaining Nozzle-To-Vessel Welds.

## ASME SECTION XI CODE EDITION/ADDENDA

In addition to the 1995 Edition with the 1996 Addenda ASME Section XI Code (95A96) Appendix VIII requirements dictated by the 10 CFR 50.55a Final Rule, the applicable plant and unit specific ISI Program ASME Section XI Code Editions and Addenda of Record (with incorporated ASME Code Cases, as approved) include:

| | |
|---|---|
| For Browns Ferry Unit 2: | 1995 Edition with addenda through the 1996 Addenda |
| For Browns Ferry Unit 3: | 1989 Edition |
| For Sequoyah Unit 1: | 1989 Edition |
| For Sequoyah Unit 2: | 1989 Edition |
| For Watts Bar Unit 1: | 1989 Edition |

**Note:** The required examination volumes of the nozzle-to-vessel welds described in Figures IWB-2500-7(a), (b),and (c) of the 95A96 Code are the same as those shown in the 1989 Section XI Codes.

## CODE REQUIREMENTS

In accordance with the applicable plant's and unit's ISI Program ASME Section XI Code-of-Record rules for Inservice Inspection of Nuclear Power Plant Components, the requirements for nozzle-to-vessel weld examination volume shown in Section XI, Subsection IWB, Examination Category B-D Full Penetration Welds of Nozzles in Vessels - Inspection Program B, Code Item Number B3.90, with Figures IWB-2500-7(a), IWB-2500-7(b), and IWB-2500-7(c) are applicable.

In addition, by reference in the applicable ASME Section XI Code paragraphs on Ultrasonic Examinations (UT),(i.e., paragraph IWA-2232; Article 4 of ASME Section V [from the corresponding Code Edition and Addenda]) is referenced as the requirements to which UT examinations must be conducted on vessel welds greater than two inches in thickness. Paragraphs T-441.3.2.5 (1989 Edition), T-441.1.4 (1995 Edition With '96 Addenda), "Angle Beam Scanning," T-441.3.2.6, (1989 Edition), T-441.1.5 (1995 Edition with '96 Addenda),"Scanning for Reflectors Oriented Parallel to the Weld," and T-441.3.2.7, (1989 Edition) T-441.1.6 (1995 Edition with '96 Addenda),"Scanning for Reflectors Oriented Transverse to the Weld,' of Article 4 are also applicable.

## REQUIREMENT FROM WHICH RELIEF IS REQUESTED

The specific Code requirement from which relief is requested is the requirement to perform the volumetric examination of the indicated nozzle-to-vessel welds in accordance with the examination volume requirements shown in ASME Section XI Subsection IWB, Figures IWB-2500-7(a), (b), & (c). Pursuant to 10 CFR 50.55a(a)(3)(i), relief is requested to perform the Code examination on a reduced volume of ½ inch beyond the widest part of the boundary of the deposited weld material in lieu of the requirements of ASME Section XI Figures IWB-2500-7(a), IWB-2500-7(b), and IWB-2500-7(c). When performing the examinations of nozzle-to-vessel welds, TVA will comply with the special requirements imposed in 10 CFR 50.55a(b)(2)(xv)(K)(1) and 10 CFR 50.55a(b)(2)(xv)(K)(2). These requirements dictate that the examination scanning processes must also be performed in such a manner to detect flaws oriented axially with the nozzle. TVA will continue to perform the required UT examinations in accordance with the Final Rule, except that the exam volume will be reduced.

## BASIS FOR RELIEF

Inservice examination of selected Reactor Pressure Vessel (RPV) nozzle-to-vessel welds at TVA nuclear plants is currently performed in accordance with the requirements of 10 CFR 50.55a, plant Technical Specifications and/or Technical Requirements, as applicable, and the associated ASME Section XI ISI Program Codes-of-Record Editions and Addenda of the ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." The applicable ISI Program based Code Editions (the 1995 Edition through the 1996 Addenda for Browns Ferry Unit 2 and the 1989 Edition for Browns Ferry Unit 3, Sequoyah Units 1 and 2, and Watts Bar Unit 1) invoke the examination volume requirements of Figures IWB-2500-7(a), IWB-2500-7(b), and IWB-2500-7(c). These Codes also invoke the examination requirements of ASME Section XI Appendix I, Article I-2000 which in turn reference ASME Section V, Article 4 of the associated Editions and Addenda of Section V. The prescribed nondestructive examination requirements of the 1989 Edition of Section V are essentially twenty (20) year old examination methodology. Under the new required Appendix VIII procedures the required examinations will be performed using procedures developed and qualified in accordance with the mandated requirements of the ASME Code, Section XI, Division 1, 1995 Edition with the 1996 Addenda of Appendix VIII and Supplement 7. These procedures provide for a more rigorous methodology for UT examinations.

## JUSTIFICATION FOR GRANTING RELIEF

The examination volume required by IWB-2500-7(a), (b), and (c) for the reactor vessel pressure retaining nozzle-to-vessel welds extends far beyond the weld and the heat-effected zones into the base metal, and is unnecessarily large. This extends examination time significantly, increases the radiation exposure of exam support personnel, and results in no net increase in safety; as the additional area being examined is a base-metal region of the reactor vessel shell or nozzle wall areas where industry experience has shown service-

induced cracks are not prone to occurring. In addition, these regions have been extensively examined during the fabrication and installation periods before the vessels were put in service and during the inservice examinations already performed.

The reduction of UT examination volumes adjacent to the widest part of the weld from one-half of the vessel wall thickness to one-half (½) inch beyond the weld boundary eliminates base metal material volume to be examined that was extensively examined during construction and preservice examinations, where applicable; and, eliminates areas which are not located in the high-stressed areas of the weld geometry. The high-stressed areas of the various nozzle-to-vessel weld configurations and areas where flaws are most likely to initiate are adequately addressed and contained in the examination volume defined by the area ½ inch beyond the weld boundary.

In addition, use of these proposed examination boundaries will be conducted in conjunction with TVA's programmatic implementation of the mandated use of ASME Section XI, Appendix VIII. TVA will implement these requirements in accordance with the requirements shown in ASME Section XI Appendix VIII of the 1995 Edition with the 1996 Addenda, as amended by the Final Rule and as required in paragraphs 10 CFR 50.55a(b)(2)(xiv), (xv),and (xvi); and in 10 CFR 50.55a(g)(6)(ii)(C). TVA will comply with these requirements through the use of the Electric Power Research Institute (EPRI) Performance Demonstration Initiative (PDI) program document, "PDI Program Description," Revision 1, Change 1, as allowed in the discussion on the Final Rule published in the *Federal Register*, Volume 64, No. 183, page 51390, (See Section 2.7), dated September 22, 1999. These procedures will ensure that the performance-based UT methodologies used and the techniques will be qualified and examination personnel will be certified by a performance demonstration.

The use of the reduced examination volumes in lieu of the identified ASME Section XI referenced requirements could reduce on-vessel examination time by as much as 12 hours of outage critical path schedule time, which translates to cost savings in the order of $14,400 for the actual exam costs and some reduction of examination support personnel radiation exposure. An equivalent reduction in the outage duration translates to a replacement power cost savings of from approximately $225,000 to $350,000, depending upon the circumstances of the outage. The personnel radiation exposure is dependent upon the choice of RPV examination equipment (i.e. automated versus manual) and by the degree of plant RPV contamination and/or decontamination conducted prior to the exam.

It should also be noted that a similar request for relief has been submitted by the Florida Power and Light Company's St. Lucie nuclear power plant and was subsequently granted. St. Lucie's Unit 2 Request for Relief No. 25 was approved by the NRC Staff in a letter dated October 4, 1999. In addition, this request is similar to a request (ISI-17) recently approved for use at the Nine Mile Point Nuclear Station in a letter dated March 29, 2001.

In conclusion, use of the reduced examination volume requirements in conjunction with the application of the Appendix VIII implementing PDI program will provide sufficient

assurance that RPV nozzle-to-vessel welds have remained free of service induced flaws or identify such flaws prior to failure. The application of the PDI techniques will enhance quality of the UT examinations and ensure plant safety and pressure boundary reliability. Therefore, the proposed alternative provides for an acceptable level of quality and safety and, pursuant to 10 CFR 50.55a(a)(3)(i), relief to use the reduced examination volumes may be granted.

## ALTERNATIVE EXAMINATIONS

TVA will perform the examinations of the RPV nozzle-to-vessel welds as follows:

1. Ultrasonic examinations of the RPV nozzle-to-vessel welds in accordance with the requirements of ASME Section XI Appendix VIII with examination volumes to include regions up to ½ inch beyond the weld boundary.

2. In accordance with the requirements shown in ASME Section XI Appendix VIII of the 1995 Edition with the 1996 Addenda, as amended by the Final Rule and as required in paragraphs 10 CFR 50.55a(b)(2)(xiv), (xv), and (xvi); and in 10 CFR 50.55a(g)(6)(ii)(C) through the use of the EPRI PDI program document, "PDI Program Description," Revision 1, Change 1, as allowed in the discussion on the Final Rule published in the Federal Register.

3. Continued periodic system pressure tests of the RPV per ASME Section XI requirements of Table IWB-2500-1, for Category B-P items.

## IMPLEMENTATION SCHEDULE

Upon approval by the NRC Staff, TVA will implement the provisions of this request during the current ISI intervals for the applicable plant/unit (i.e. the 3rd ISI program interval for Browns Ferry Unit 2, and the 2nd ISI program interval for Browns Ferry Unit 3 and Sequoyah Units 1 and 2, and the 1st interval for Watts Bar Unit 1) and conduct the next scheduled RPV nozzle-to-vessel weld examinations accordingly.

## ATTACHMENT TO THE RELIEF

None.