June 18, 2003

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

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of) Docket No. 50-259
Tennessee Valley Authority)

BROWNS FERRY NUCLEAR PLANT (BFN) - UNIT 1 - AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI, INSERVICE INSPECTION (ISI) PROGRAM - REQUEST FOR RELIEF PDI-2 - CLARIFICATION AND ADDITIONAL INFORMATION

This letter provides clarification and changes to BFN Unit 1 request for relief PDI-2, regarding the examination volumes of Class 1 reactor vessel pressure-retaining nozzle-to-vessel welds. TVA submitted PDI-2 request for relief by letter dated October 25, 2002, for the BFN Unit 1, ASME Section XI, Inservice Inspection program, first Ten-Year interval.

PDI-2 allows TVA to limit the extent of the examination volume for reactor pressure vessel nozzle-to-vessel welds to no more than one-half inch beyond the widest part of the weld. PDI-2 reduces the required weld examination volumes from those shown in the 1995 Edition, 1996 Addenda of the ASME Section XI Code, Subsection IWB, Figures IWB-2500-7(a) and (b), [i.e., one-half the vessel shell thickness beyond the widest part of the weld].

During its review of the BFN request for relief PDI-2, the NRC staff identified a question regarding the exact number of welds that had received a preservice weld volume examination defined by T/2 (i.e., one-half the base material). TVA and the NRC staff held a teleconference to discuss the staff’s question.

As a result of that teleconference, TVA is providing a revised request for relief PDI-2. Enclosure 1 to this letter lists the NRC question and provides the corresponding TVA response. Enclosure 2 provides a revised PDI-2 request for relief that addresses TVA's response to the NRC question.

TVA seeks review of this request for relief by August 15, 2003, to support Unit 1 restart activities.

There are no new regulatory commitments in this letter. If you have any questions, please contact me at (256) 729-2636.

Sincerely,

Original signed by:

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ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 1
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(FIRST TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF PDI-2

RESPONSE TO NRC QUESTION

TVA submitted request for relief, PDI-2, by letter dated October 25, 2002, for the BFN Unit 1, ASME Section XI, Inservice Inspection program, first Ten-Year interval. During its review of the BFN request, the NRC staff identified a question regarding the exact number of welds that had received a preservice weld volume examination defined by T/2 (i.e., one-half the base material). Listed below is the NRC question and the corresponding TVA response.

NRC Question

For BFN Unit 1 request for relief PDI-2, TVA should identify each weld that will be affected by this request. Confirm that a preservice inspection of the weld volume defined by T/2 and the full wall thickness was performed for each of the subject welds.

TVA Response

The preservice examination report for Browns Ferry (BFN) Unit 1, dated January 20, 1973, includes examination details for full penetration nozzle-to-vessel weld 4 inches in diameter and larger. The preservice examinations were not required by regulations, 10 CFR 50.55a(g)(1), given the BFN Unit 1 construction permit date of May 10, 1967, and were performed on a voluntary basis. The ultrasonic scan techniques and methods employed during preservice examinations provided coverage of the 1/2T base material adjacent to the weld to the extent practical.

Eighteen of the BFN Unit 1 nozzle-to-vessel welds have been examined inservice to the extent practical, including the 1/2T base material, during the first interval. The welds examined inservice include at least one nozzle-to-vessel weld of each

size/grouping for which relief is requested. There were no reportable indications identified by either the preservice or inservice examinations. The preservice and subsequent inservice examinations performed to date provide the justification basis for granting the relief specified in PDI-2 for BFN Unit 1.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 1
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(FIRST TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF PDI-2, Revision 1

(See Attached)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNIT 1
AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) SECTION XI,
INSERVICE INSPECTION (ISI) PROGRAM
(FIRST TEN-YEAR INSPECTION INTERVAL)

REQUEST FOR RELIEF PDI-2, Revision 1

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) and IWB-2500-7(b) 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 has reduced the necessity of having the nozzle-to-vessel weld exam volumes be as large as currently required in Figures IWB-2500-7 (a) and (b). 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) and (b).

TVA is requesting application of this relief to those nozzle-to-vessel welds previously examined using an ultrasonic procedure requiring the weld and 1/2T coverage of base material to the extent practical.

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

ASME Class 1 equivalent (TVA Class A) Reactor Pressure Vessel Pressure-retaining Nozzle-To-Vessel full penetration welds. There are 29 nozzle-to-vessel welds within the scope of this relief: 3 on the vessel head (two N6 and one N7), 4 main steam (N3), 6 feedwater (N4), 12 recirculation (N1 and N2), 2 core spray (N5), 1 jet pump instrumentation (N8A only), and 1 Control Rod Drive (N9, which has been capped). Two full penetration nozzle-to-vessel welds are excluded from this relief: N10 Standby Liquid Control and N8B Jet Pump Instrumentation.

ASME SECTION XI CODE EDITION/ADDENDA:

In addition to the 1995 Edition with the 1996 Addenda (95A96) ASME Section XI Code Appendix VIII requirements dictated by the 10 CFR 50.55a Final Rule, the applicable plant and unit specific ISI Program ASME Section XI Code Edition and Addenda of Record (with incorporated ASME Code Cases) for Browns Ferry Unit 1 is the 1995 Edition with addenda through the 1996 Addenda.

CODE REQUIREMENTS:

In accordance with the Browns Ferry Unit 1 ISI Program, the 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) and IWB-2500-7(b) 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 is referenced as the requirement to which UT examinations must be conducted on vessel welds greater than two inches in thickness. Paragraph T-441.1.4, “Angle Beam Scanning;” T-441.1.5, “Scanning for Reflectors Oriented Parallel to the Weld,” and T-441.1.6, “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) and (b). 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) and IWB-2500-7(b). 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 Requirements, 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 1995 Edition through the 1996 Addenda of ASME Section XI invokes the examination volume requirements of Figures IWB-2500-7(a) and IWB-2500-7(b). This Code also invokes 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.

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 Ultrasonic Examinations.

JUSTIFICATION FOR GRANTING RELIEF:

The examination volume required by IWB-2500-7(a) and (b) 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.

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 a 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.

Similar relief has been submitted by TVA for Browns Ferry Units 2 and 3, Sequoyah Units 1 and 2, and Watts Bar Unit 1 by letters dated February 23, July 9, and August 23, 2001. TVA's request for relief was subsequently approved by NRC letter dated September 19, 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 the 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 is requested.

ALTERNATIVE EXAMINATIONS:

TVA will perform 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.

As stated in the System/Component(s) section, this relief applies to 29 nozzle-to-vessel welds. The N10-NV Standby Liquid Control and N8B-NV Jet Pump Instrumentation nozzle-to-vessel welds are excluded from the scope of this relief request.

IMPLEMENTATION SCHEDULE:

Upon approval by the NRC Staff, TVA will implement the provisions of this request for relief during the current First Ten-Year Inservice Inspection Interval for Browns Ferry Unit 1 and conduct the next scheduled RPV nozzle-to-vessel weld examinations accordingly. The First Ten-Year Inservice Inspection Interval for BFN Unit 1 will end one year following restart of the unit.