March 13, 2002

Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY PLANT, UNIT 3, RELIEF REQUEST NO. 3-ISI-11 SAFETY EVALUATION FOR INSERVICE INSPECTION PROGRAM (TAC NO. MB2560)

By letter dated August 13, 2001, as supplemented January 9, and February 5, 2002, Tennessee Valley Authority requested relief from certain requirements of the American Society of Mechanical Engineers' Boiler and Pressure Vessel Code, Section XI, for Browns Ferry Plant, Unit 3.

The U.S. Nuclear Regulatory Commission staff has completed its review and evaluation of your submittals. Based on the enclosed safety evaluation, the staff finds that the Inservice Inspection Program Relief Request No.3-ISI-11 is acceptable.

Sincerely,

/RA/

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-296

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

INSERVICE INSPECTION (ISI) PROGRAM

RELIEF REQUEST NO. 3-ISI-11

BROWNS FERRY PLANT, UNIT 3

DOCKET NO. 50-296

1.0 INTRODUCTION

The Inservice Inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code and applicable editions and addenda as required by Title 10, *Code of Federal Regulation* (10 CFR), Section 50.55a(g), except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) of 10 CFR permits the use of alternatives to the requirements of paragraph (g), 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 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 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. The inservice inspection code of record for Browns Ferry Nuclear Plant Unit 3 second 10-year ISI interval is the 1989 Edition of Section XI of the ASME Boiler and Pressure Vessel Code.

By letter dated August 13, 2001, as supplemented January 9, and February 5, 2002, Tennessee Valley Authority (TVA, the licensee) requested relief from the ASME Section XI requirement to perform volumetric examinations of specific reactor pressure vessel (RPV) head nozzles inside radius section.

2.0 INSERVICE INSPECTION PROGRAM RELIEF REQUEST NO. 3-ISI-11, ULTRASONIC EXAMINATION OF INNER RADIUS FOR EXAMINATION CATEGORY B-D, ITEM NO. B3.100, WELDS N6A, N6B AND N7

2.1 Code Requirements for which Relief is Requested

The 1989 Edition, no addenda, ASME Section XI, Table IWB-2500-1, Examination Category B-D, Item No. B3.100, requires a volumetric examination of the RPV head nozzles inside radius section.

The licensee is requesting relief from the requirement to perform this volumetric examination of the inside radius sections of the nozzles located in the RPV head region (nozzles N6A, N6B, and N7).

2.2 Licensee's Proposed Alternative to the Code

The licensee is petitioning as an alternative to implement the requirements of Code Case N-648-1 for the nozzle inner radius section of three RPV head nozzles only. Code Case N-648-1 permits replacement of the volumetric examination listed under Table IWB-2500-1 with a visual examination (VT-1). The inner radius sections of the RPV shell nozzles would continue to receive the Code-required volumetric examination.

2.3 Licensee's Basis for Relief

The licensee states that the ultrasonic examination (UT) of the RPV nozzles, conducted from the outside surface of the vessel are difficult and time consuming due to the asymmetrical configuration of both the nozzle outside surface (where the transducers are manipulated) and the inside radius section of the nozzle being interrogated. Examination of the asymmetrical surfaces requires several different transducer/wedge/ angle combinations, applied at various azimuths around the nozzle weld blend area on the RPV head surface. Different size nozzles usually require a different transducer/wedge/angle combination and calibrations. Several hours are required for the calibration and examination of one typical 6-inch diameter nozzle inner radius.

The nozzle inner radius sections are the only non-welded areas of the RPV requiring examination on the reactor pressure vessel. This ISI requirement was based on deterministic considerations made early in the development of ASME Section XI. For all RPV nozzles, other than feedwater, there is no significant thermal cycling during operation. The only RPV nozzles having identified failure mechanisms and, therefore, justifying the need to perform volumetric examinations are the feedwater nozzles and operational control rod drive (CRD) return line nozzles.

The VT-1 examination of the nozzle inner radius sections provides the Code-required coverage while showing the presence or absence of surface flaws. The option to perform a VT-1 would provide an acceptable examination without compromising the level of quality and safety. The inside radius section of the nozzles located in the RPV head have previously been examined using UT techniques specific to the nozzle configuration. The proposed alternative will also provide a significant savings in examination resources and personnel radiation exposure.

TVA is requesting that relief be granted, in accordance with 10 CFR 50.55a(a)(3)(i), to perform an alternate VT-1 of the RPV head nozzles inner radius section in lieu of the code required UT examination.

2.4 Evaluation

A volumetric examination is required for all RPV nozzle inside corner radius sections, Item B3.100, per the 1989 Code. Neither the Code nor Figures IWB-2500-7(a) through (d) which show the examination volume make a distinction in coverage whether cladding is present or not. Staff experience with the volumetric examination of the nozzle inside corner radius is consistent with the licensee's position that the work is extensive, labor and dose intensive and requires multiple examination setups.

As an alternative to performing the volumetric examination, the licensee is requesting approval to perform a VT-1 of the inside corner radius, area M-N, Figures IWB-2500-7(a) through (d), from the inside of the reactor head when access is gained during refueling outages as suggested in Code Case N-648-1. While performing the VT-1, the licensee will have complete and unobstructed access to the examination volume.

In the August 10, 2001, letter to the NRC, TVA informed the NRC staff that it would be updating its nondestructive examination procedures to the 1995 Edition of the ASME Code with the 1996 Addenda. These procedures will be used to perform the VT-1 of the nozzle inside corner radius for the reactor pressure vessel head. The 1995 edition of the Code, IWA-2210, states that the visual examination is successfully demonstrated when a near-distance vision test chart containing text with lower case characters without an ascender or descender meeting Table IWA-2210-1 is required. For a VT-1, the maximum procedure demonstration lower case character height is .044". In its January 9, 2002, letter, the licensee stated that the examination would be a direct VT-1. A direct VT-1 may or may not involve the use of equipment to enhance or magnify the characters which are .044" high, as stated previously.

As a result of staff's concerns related to the ability of a Code VT-1 to detect extremely small flaws which typically can be detected using the Code ultrasonic examination requirements, TVA, in it's February 5, 2002 letter, stated that its direct VT-1 would be performed to a .001" wire sensitivity. It is the staff's conclusion that this level of sensitivity is at least equivalent to that provided by the volumetric examination, and exceeds the VT-1 sensitivity demonstration of the .044" lower case characters required by the 1995 Edition with the 1996 Addenda of the ASME Code. Furthermore, the ability to distinguish a .001" wire demonstrates the ability of the examiner to detect flaws more representative of the type of flaws encountered in the field than the Code-specified .044" characters.

2.5 Conclusion

Based on the discussion above, the staff concludes that performing a direct VT-1, demonstrated to .001" wire sensitivity when examining RPV nozzle inside corner radius for RPV nozzles other than feedwater or control rod drive mechanism return lines, provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the proposed alternative under Relief Request

No. 3-ISI-11 for the second 10-year ISI interval at Browns Ferry Nuclear Plant, Unit 3.

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Date: March 13, 2002

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