July 26, 2000

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

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNIT 2 - SECOND 10-YEAR INTERVAL INSERVICE INSPECTION - RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE, SECTION Xl REQUIREMENTS: RELIEF REQUEST 2-lSI-12 (TAC NO. MA9056)

Dear Mr. Scalice:

By letter dated June 19, 2000, the Tennessee Valley Authority requested relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section Xl (the Code) requirements. The Request for Relief No. 2-lSI-12, pertains to the Second 10-Year Interval Inservice Inspection for the Browns Ferry Nuclear Plant, Unit 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the request for relief. Based on its review, the NRC staff has determined that use of the proposed alternative provides an acceptable level of quality and safety. Relief is authorized pursuant to Title 10 of the Code of Federal Regulations, Section 50.55a(a)(3)(i). The enclosed Safety Evaluation documents our review.

Sincerely,

/RA/

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

Docket No. 50-260

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE SECTION XI

REQUIREMENTS: RELIEF REQUEST NO. 2-ISI-12

FOR

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNIT 2

DOCKET NUMBER 50-260

1.0 INTRODUCTION

Operating License DPR-52, for the Browns Ferry Nuclear Plant Unit 2 (BFN-2) requires that the Tennessee Valley Authority (TVA, the licensee) comply with the Commission's rules and regulations. Title 10 of the Code of Federal Regulations (10 CFR) Part 50.55a(g) requires that inservice inspection of American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code and applicable addenda. Proposed alternatives to the requirements of 10 CFR 50.55g may be used, subject to a demonstration that; pursuant to 50.55a(a)(3)(i), the proposed alternatives would provide an acceptable level of quality and safety, or, pursuant to 50.55a(a)(3)(ii), compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

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.

Pursuant to 10 CFR 50.55a(g)(4)(iv), inservice examination of components and system pressure tests may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to the limitations and modifications listed in 10 CFR 50.55a(b), and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met. The applicable edition of Section XI of the ASME Code for the BFN-2 second 10-year inservice inspection (ISI) interval is the 1989 Edition. The second 10-year interval, for BFN-2, runs from May 24, 1992 through May 24, 2001. The third period of the second interval extends from May 1998 through May 2001.

By letter dated June 20, 2000, the Tennessee Valley Authority (TVA), submitted Request for Relief No. 2-ISI-12 for BFN-2. The request relates to the requirement for surface examination of the 92 reactor pressure vessel (RPV) closure head nuts.

Enclosure

The information provided by TVA in support of Relief Request 2-lSI-12 has been evaluated. The staff's findings are presented below.

2.0 DISCUSSION

2.1 Code Requirement

The 1986 Edition, no Addenda, ASME Section XI, Table IWB-2500-1, Examination Category B-G-1, Item B6.10, RPV Closure Head Nuts requires a surface examination.

2.2 Relief Request

Relief is requested from the requirement to perform a surface examination on the RPV closure head nuts, as stipulated in ASME Section XI, 1986 Edition (no Addenda), Table IWB-2500-1, Examination Category B-G-1, Item B6.10.

2.3 Basis for Relief

The licensee's basis for relief states:

> Extensive cleaning of the RPV Nuts is required prior to performing the fluorescent magnetic particle examination. This extensive cleaning results in an additional expenditure of resources, along with an increased radiological dose for examination personnel. Also, the 1986 Edition of Section XI does not provide acceptance criteria for the mandated surface examination shown in Table IWB-2500-1. Table IWB-2500-1 was subsequently changed in the 1989 Addenda, and later editions of the code, requiring a visual (VT-1) examination of the closure head nuts, and also providing acceptance criteria for VT-1 examination of bolting greater than 2 inches.

2.4 Alternative Examination Proposal

> TVA will perform a visual (VT-1) examination of the RPV closure head nuts in accordance with the requirements of the 1995 Edition with the 1996 Addenda of ASME Section XI, Table IWB-2500-1, Examination Category B-G-1, Item B.6.10. TVA considers that its proposed alternative provides an acceptable level of quality and safety.

2.5 Justification for the Granting of Relief

The licensee's request states:

> The 1995 Edition with the 1996 Addenda of ASME Section XI has been approved in 10 CFR 50.55a, Industry Codes and Standards, effective November 22, 1999. For these versions of the Code, Table IWB-2500-1, Category B-G-1, Item B6.10 the examination requirement changed from a surface to a visual (VT-1) examination.

Due to design factors, the stripping areas of the female threads (i.e., inside the nut) are approximately 1.3 times the area of the mating male threads (see ASME B1.1, Unified Inch Screw Threads). Consequently, if a defect were to develop during component service, the defects should occur in the threads of the bolt or stud before developing in the threads of the nut because of higher stresses in the male threads. Also, when RPV closure head nuts are tightened for closure or loosened for opening, the studs are tensioned and the nuts are run on/off the threads with no load since the load is taken by the stud or bolt through the tensioning device.

This request for relief is consistent with one granted to Niagara Mohawk Power Corporation's Nine Mile Point Nuclear Station, Unit 2, by NRC letter dated March 3, 2000.

3.0 STAFF'S EVALUATION

The Code of record for BFN-2 requires 100% surface examination, typically using a flourescent magnetic particle method, for RPV closure head nuts. As an alternative, the licensee has proposed to perform a VT-1 visual examination of RPV closure head nuts in lieu of the Code-required surface examination. All Items in Examination Category B-G-1 "Pressure Retaining Bolting Greater than 2 Inches in Diameter" except the reactor pressure vessel closure head nuts and the closure studs (when removed) require VT-1 visual examinations and/or volumetric examination (as applicable).

Typical conditions that would require corrective action prior to putting closure head nuts back into service would include corrosion, sheared threads, deformation, and degradation. Surface examination procedures are typically qualified for the detection of linear flaws (cracks) and have acceptance criteria specifying only rejectable linear flaw lengths. Acceptance criteria for surface examinations are not provided in the 1986 Edition of the Code, Item B6.10, as they were in the course of preparation when the Code was published. Without clearly defined acceptance criteria, conditions that require corrective measures may not be adequately addressed. The 1989 Addenda of Section XI corrected these problems by changing the requirement from surface to VT-1 visual examination and providing appropriate acceptance criteria.

Article IWB-3000, Acceptance Standards for Flaw Indications, IWB-3517.1, Visual Examination, VT-1, describes conditions that require corrective action prior to continued service for bolting and associated nuts. One of these requirements is to compare crack-like flaws to the flaw standards of IWB-3515 for acceptance. The VT-1 visual examination acceptance criteria includes evaluation of crack-like indications and other conditions requiring corrective action, such as deformed or sheared threads, localized corrosion, deformation of part, and other degradation mechanisms. Therefore, the VT-1 visual examination provides a comprehensive assessment of the condition of the closure head nut. As a result, the staff finds that VT-1 visual examination provides an acceptable level of quality and safety.

Based on the comprehensive assessment that the VT-1 visual examination provides, and considering that more recent editions of the Code require only a VT-1 visual examination on reactor pressure vessel closure head nuts, it is concluded that an acceptable level of quality

and safety will be provided by the proposed alternative. Therefore, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i).

4.0 CONCLUSION

The staff has evaluated the licensee's June 20, 2000, request for relief and has concluded that the alternative examination method proposed by the licensee will provide an acceptable level of quality and safety. Therefore, the licensee's Request for Relief No. 2-lSI-12 is authorized. This action will not endanger life, property, or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed.

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Date: July 26, 2000

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BROWNS FERRY NUCLEAR PLANT

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