

March 22, 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, UNITS 2 AND 3, SEQUOYAH, UNITS 1 AND 2, AND  
WATTS BAR, UNIT 1 - REQUESTS FOR CODE RELIEF GISI-1, GISI-2, AND  
GISPT-1 (TAC. NOS. MB2937, MB2938, MB2939, MB2944, AND MB2945)

Dear Mr. Scalice:

By letter dated September 14, 2001, the Tennessee Valley Authority (TVA) submitted three requests for relief from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI for the subject TVA nuclear plants. The requests, designated as GISI-1, GISI-2, and GISPT-1, proposed alternatives to the current Inservice Inspection (ISI) Programs based on ASME Code Cases N-574, N-597, and N-616, respectively.

The U.S. Nuclear Regulatory Commission staff has completed its review of the information provided in TVA's September 14, 2001, letter for Relief Request GISI-2. The staff concludes that use of the alternate inspections in accordance with ASME Code Case N-597 would provide an acceptable level of quality and safety. Therefore, the NRC staff authorizes use of Code Case N-597 at Browns Ferry, Units 2 and 3, Sequoyah, Units 1 and 2, and Watts Bar, Unit 1, for the duration of the respective 10-year ISI intervals. The staff's evaluation and conclusions regarding GISI-2 are contained in the enclosed Safety Evaluation.

Requests for Relief GISI-1 and GISPT-1 will be evaluated in a separate safety evaluation upon completion of the staff's review.

Please contact Mr. Ronald W. Hernan at (301) 415-2010 should you have any questions.

Sincerely,

/RA/

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

Docket Nos. 50-260, 50-296,  
50-327, 50-328, and 50-390

Enclosures: As stated

cc w/enclosures: See next page

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The U.S. Nuclear Regulatory Commission staff has completed its review of the information provided in TVA's September 14, 2001, letter for Relief Request GISI-2. The staff concludes that use of the alternate inspections in accordance with ASME Code Case N-597 would provide an acceptable level of quality and safety. Therefore, the NRC staff authorizes use of Code Case N-597 at Browns Ferry, Units 2 and 3, Sequoyah, Units 1 and 2, and Watts Bar, Unit 1, for the duration of the respective 10-year ISI intervals. The staff's evaluation and conclusions regarding GISI-2 are contained in the enclosed Safety Evaluation.

Requests for Relief GISI-1 and GISPT-1 will be evaluated in a separate safety evaluation upon completion of the staff's review.

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUEST FOR RELIEF NO. GISI-2

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 2, AND 3

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

WATTS BAR NUCLEAR PLANT, UNIT 1

DOCKET NOS. 50-260, 50-296, 50-327, 50-328 AND 50-390

1.0 INTRODUCTION

By letter dated September 14, 2001, the licensee, Tennessee Valley Authority (TVA), submitted a letter to the U.S. Nuclear Regulatory Commission (NRC) forwarding three relief requests for the subject TVA plants as alternatives to certain aspects of TVA's American Society of Mechanical Engineers (ASME) Code Programs, regarding the use of the following Code Cases:

<u>Relief No.</u>	<u>Code Case</u>
GISI-1	N-574, <i>NDE [nondestructive examination] Personnel Recertification Frequency, Section XI, Division I;</i>
GISI-2	N-597, <i>Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1; and,</i>
GISPT-1	N-616, <i>Alternative Requirements for VT-2 Visual Examination of Classes 1, 2, and 3 Insulated Pressure Retaining Bolting Connections, Section XI, Division 1.</i>

2.0 BACKGROUND

Inservice Inspection (ISI) of ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel (B&PV) Code (the Code) and applicable addenda as required by Title 10 of the *Code of Federal Regulations*, Part 50, Section 50.55a(g) (10 CFR 50.55a(g)), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(6)(g)(i). Section 50.55a(a)(3) of 10 CFR states 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.

ENCLOSURE

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2 and 3 components (including supports) shall 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 ISI 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 applicable edition of Section XI of the ASME Code for the respective 10-year ISI interval is as follows:

<u>Plant Name</u>	<u>ASME Code, Section XI Edition and Addenda</u>	<u>Applicable 10-year Interval</u>
Browns Ferry, Unit 2:	1995 Edition through the 1996 Addenda	Third
Browns Ferry, Unit 3:	1989 Edition, no Addenda	Second
Sequoyah, Unit 1:	1989 Edition, no Addenda	Second
Sequoyah, Unit 2:	1989 Edition, no Addenda	Second
Watts Bar, Unit 1:	1989 Edition, no Addenda	First

### 3.0 RELIEF REQUEST NO. GISI-2 (Code Case N-597)

#### 3.1 EVALUATION

##### 3.2.1 Licensee's Evaluation

#### The Systems/Components for Which Relief is Requested

The applicable piping addressed in this request includes the ASME Code Class 1, 2, and 3 (or equivalent) carbon and low-alloy steel piping and fittings, within TVA's nuclear power plants, that have experienced internal wall thinning as a result of corrosion, including flow-accelerated corrosion. The Code Case N-597 requirements will be applicable to non-planar flaws and areas of pressure boundary wall thickness degradation that occur in the piping and fittings.

#### Requirement for Which Relief is Requested

The applicable ASME B&PV Code Edition and Addenda, Section XI, Subarticle IWA-3100 provides the process for the disposition of flaw examination evaluations that exceed the acceptance standards for materials and welds applicable to the construction of the component. The Code further stipulates that in the absence of acceptance standards for a particular component examination category or examination methodology as specified in the applicable Code, the disposition of the examination results shall be subject to review by the regulatory and enforcement authorities with jurisdiction at the plant site.

### Licensee's Basis for Requesting Relief and Justification for Granting Relief

Compliance with the requirements of the applicable ASME Section XI Code, Sub-article IWA-3100, and with the associated flaw and degradations limitations in Subsections IWB, IWC and IWD do not allow for the specialized analysis of localized areas of corrosion/erosion. The ASME Code acceptance criteria requires the repair of flaws or the replacement to piping items where any pipe wall deterioration results in the reduction of the wall thickness below the design basis allowable limits. These gross requirements result in unnecessary plant shutdowns and system outages in order to perform repairs or replacements when a localized analysis methodology would support the integrity of the degraded piping areas for continued operation. Acceptable margins of safety are maintained through the application of the Code Case N-597 analysis methodologies and acceptance criteria.

### Alternative Examinations

The licensee proposes to use the provisions of ASME Code Case N-597 as an alternative to Subarticle IWA-3100. Specifically, the licensee would use Code Case N-597 for the analytical evaluation of Code Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to wall thinning as a result of flow-accelerated or other corrosion phenomena. This code case indicates that the methods of predicting the rate of wall thickness loss and the predicted remaining wall thickness shall be the responsibility of the owner. The licensee has procedures that includes a Flow Accelerated Corrosion (FAC) Program. This program provides requirements for calculating the remaining life, predicting the remaining wall thickness, calculating FAC wear rates, and conducting inspections of components susceptible to FAC. The program includes the use of Electric Power Research Institute's CHECKWORKS FAC computer application program. The analysis procedures in the program are based on the Nuclear Energy Institute guideline NSAC-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program," and incorporate guidance in NRC Generic Letter 89-08, "Erosion/Corrosion Induced Pipe Wall Thinning." The licensee further proposes not to apply Code Case N-597 to Class 1 piping elements at Sequoyah (SQN) and Watts Bar (WBN) since the applicable Class 1 components at these facilities are made of stainless steel materials. However, Code Case N-597 will apply to some Class 1 components at Browns Ferry (BFN) that contain carbon and low-alloy steel.

This licensee proposes to implement this code case during the following ISI intervals:

- BFN Unit 2 - Third 10-year inspection interval
- BFN Unit 3 - Second 10-year inspection interval
- SQN Units 1 and 2 - Second 10-year inspection interval
- WBN Unit 1 - First 10-year inspection interval.

### 3.1.2 Staff's Evaluation

The Code requires that components with flaws that fail the acceptance criteria shall be evaluated to determine disposition. The Code further stipulates that the determined disposition is subject to review by the regulatory and enforcement authorities with jurisdiction at the plant site. As an alternative to the Code requirements, the licensee has proposed to use Code Case N-597, "Requirements for Analytical Evaluation of Pipe Wall Thinning, Section XI, Division 1" for

Class 1 carbon and low-alloy steel piping items at BFN Units 2 and 3, and Class 2 and 3 carbon and low-alloy steel piping items at BFN Units 2 and 3, SQN Units 1 and 2, and WBN Unit 1 (see above). Although the NRC has not endorsed Code Case N-597, the NRC staff has determined that it is conditionally acceptable. Because the code case does not address inspection requirements and wall thinning rates, the staff must review and approve the licensee's proposal of its use. Prior to reaching the allowable minimum wall thickness as specified in this code case, applicable components must be repaired or replaced in accordance with the construction code of record and licensee requirements or a later approved edition of ASME Section III.

Code Case N-597 makes note of the owner's responsibility to develop the methods of predicting the rate of wall thickness loss and the value of the predicted remaining wall thickness. The staff finds that the licensee has developed acceptable methods of calculating these values as outlined in the licensee's FAC program. In addition, the staff finds the licensee's proposed incorporation of Code Case N-597 into the current FAC program acceptable. However, although this code case can be applied to FAC and other corrosion phenomenon, the licensee only demonstrated the incorporation of Code Case N-597 into the FAC program. Therefore, the application of this code case to corrosion phenomenon other than FAC is not within the scope of this evaluation.

The licensee's procedures for calculating remaining life, predicted remaining wall thickness, calculating wear rates, and conducting inspections of components subjected to FAC are based on NSAC-202L, "Recommendations for an Effective Flow Accelerated Corrosion Program." This guideline contains wording for the terms "shall" and "should" that the licensee also uses in its FAC program. However, the licensee stated that these terms are defined as follows in TVA Nuclear (TVAN) administrative process:

Shall, Should, and May - The word 'shall' is used to denote a requirement; the word 'should' to denote a recommendation; and the word 'may,' to denote permission, neither a requirement nor a recommendation.

The licensee further provided the following clarification of "shall" and "should" in the relief request:

Shall is used for absolute requirements normally reserved for regulatory requirements, commitments, specific design based and configuration control requirements, or procedure steps required to be performed in a prescribed manner.

Should is used to indicate TVAN management expectations. Deviations from the expectation is a departure from the normal and requires supporting justification based upon the situation and may require documentation and supervisory and/or management concurrence.

The staff finds that with clarification of the terms "shall" and "should", the licensee's alternative to use Code Case N-597 as applied through NSAC-202L provides an acceptable level of quality and safety for use in evaluating Class 1, 2, and 3 carbon and low-alloy steel piping subject to FAC.

### 3.1.3 CONCLUSION

Pursuant to 10 CFR 50.55a(a)(3)(i), the staff concludes that the use of Code Case N-597, as supplemented by the clarified definitions of “shall” and “should,” provides an acceptable level of quality and safety for the analytical evaluation of Code Class 1, 2, and 3 carbon and low-alloy steel piping items subjected to wall thinning as a result of FAC. The proposed implementation schedule for the code case is also acceptable. However, the application of this code case for corrosion phenomenon other than FAC is not within the scope of this evaluation and is, therefore, not acceptable. In addition, prior to reaching the allowable minimum wall thickness as specified in the code case, the licensee must repair or replace applicable components in accordance with the construction code of record and licensee requirements. Therefore, the use of Code Case N-547 is authorized for the current respective 10-year ISI intervals for BFN Units 2 and 3, SQN Units 1 and 2, and WBN Unit 1, or until such time Code Case N-597 is incorporated into Regulatory Guide (RG) 1.147. If the licensee intends to continue implementing the code case, the licensee shall follow all the provisions in Code Case N-597, with limitations, if any, as stated in RG 1.147.

Principal Contributor: Thomas McLellan, NRR

Date: March 22, 2002