

August 29, 2007

Mr. William R. Campbell, Jr.  
Chief Nuclear Officer and  
Executive Vice President  
Tennessee Valley Authority  
6A Lookout Place  
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Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 1 - SAFETY EVALUATION FOR RELIEF  
REQUEST 1-ISI-20 REGARDING PRESSURIZER SURGE LINE WELD  
INSPECTION (TAC NO. MD5267)

Dear Mr. Campbell:

By letter dated April 5, 2007, Tennessee Valley Authority (the licensee) submitted relief request 1-ISI-20 for the Watts Bar Nuclear Plant (WBN) Unit 1. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(g)(5)(iii), 1-ISI-20 requested relief from certain American Society of Mechanical Engineers (ASME) Code requirements pertaining to the amount of coverage obtained during the examination of the pressurizer surge line nozzle-to-vessel weld conducted during the first 10-year inservice inspection (ISI) interval at WBN Unit 1.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the licensee's request and concludes that compliance with the ASME Code coverage requirements is impractical for the configuration identified in the subject relief request. Also, there is reasonable assurance of structural integrity of the subject component. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the first 10-year ISI interval at WBN Unit 1, which began on May 27, 1996 and ended on May 26, 2007. This granting of relief is authorized by law and will not endanger life or 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 on the facility.

Further details on the bases for the NRC staff's conclusions are contained in the enclosed safety evaluation. If you have any questions regarding this issue, please feel free to contact the WBN Unit 1 Project Manager, Brendan Moroney, at (301) 415-3974.

Sincerely,

/RA/

Thomas Boyce, Chief  
Plant Licensing Branch II-2  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-390

Enclosure: Safety Evaluation

cc: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST 1-ISI-20

WATTS BAR NUCLEAR PLANT UNIT 1

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-390

1.0 INTRODUCTION

By letter dated April 5, 2007, Tennessee Valley Authority (TVA, the licensee) submitted request for relief 1-ISI-20 for the Watts Bar Nuclear Plant (WBN) Unit 1. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(g)(5)(iii), 1-ISI-20 requested relief pertaining to the amount of coverage obtained during the examination of the pressurizer surge line nozzle-to-vessel weld conducted during the first 10-year inservice inspection (ISI) interval at WBN Unit 1.

2.0 REGULATORY EVALUATION

The ISI of American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Class 1, 2, and 3 components is to be performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable edition and addenda as required by 10 CFR 50.55a(g), except when specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC or Commission) pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states, in part, 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.

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, 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) twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The ISI code of record for WBN Unit 1 for the first 10-year ISI interval is the ASME Code, Section XI, 1989 Edition, no addenda.

Pursuant to 10 CFR 50.55a(g)(5)(iii), if the licensee has determined that conformance with certain code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in 10 CFR 50.4, information to support the determinations.

Pursuant to 10 CFR 50.55a(g)(5)(iv), where an examination requirement by the code or addenda is determined to be impractical by the licensee and is not included in the revised ISI program as permitted by 10 CFR 50.55a(g)(4), the basis for this determination must be demonstrated to the satisfaction of the Commission not later than 12 months after the expiration of the initial 120-month period of operation from start of facility commercial operation and each subsequent 120-month period of operation during which the examination is determined to be impractical.

Pursuant to 10 CFR 50.55a(g)(6)(i), the Commission will evaluate determinations under paragraph 10 CFR 50.55a(g)(5) that code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines is authorized by law and will not endanger life or 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 on the facility.

### 3.0 TECHNICAL EVALUATION

#### 3.1 System/Component(s) for which Relief is Requested

Pressurizer surge line Nozzle-to-Vessel Weld, Weld Identifier WP-10

#### 3.2. Applicable Code Requirement

ASME Code, Section XI, 1989 Edition, no addenda, Table IWB-2500-1, Examination Category B-D, Item Number B3.110, Pressurizer Nozzle-to-Vessel Welds, examination requirement as defined by Figure IWB-2500-7(b).

#### 3.3 Licensee's Request

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee has determined that conformance with certain code requirements is impractical for its facility. Specifically, the licensee has submitted a request for relief from performing the required volumetric examination on essentially 100 percent of the pressurizer surge line nozzle-to-vessel weld.

### 4.0 EXAMINATION LIMITATION FOR THE COMPONENT

#### 4.1 Code Requirements for which relief is requested

ASME Code, Section XI, 1989 Edition, Table IWB-2500-1, Examination Category B-D, Item Number B3.110, Pressurizer Nozzle-to-Vessel Welds, examination requirement as defined by Figure IWB-2500-7(b). Relief is requested from performing the required volumetric examination on essentially 100 percent of the pressurizer surge line nozzle-to-vessel weld.

#### 4.2 Licensee's Proposed Alternative to Code

The licensee proposed the following alternative:

In lieu of the code required 100 percent volumetric examination, perform an ultrasonic examination on accessible areas to the maximum extent practical given the physical limitations of the nozzle-to-vessel weld.

#### 4.3 Licensee's Basis for Relief

The design configuration of the pressurizer surge line nozzle precludes a volumetric examination of the required volume for the pressurizer surge line nozzle-to-vessel weld from either the pressurizer side or the nozzle side. Examination of the nozzle-to-vessel weld is obstructed from the pressurizer side by the proximity of the heater assemblies and from the nozzle side by curvature of the nozzle. The design configuration allows for ultrasonic testing (UT) of approximately 55 percent of the required volume.

#### 4.4 Staff Evaluation

The ISI code of record for WBN Unit 1 is the 1989 Edition of the ASME Code, Section XI with no addenda. This request is made for the first 10-year inservice inspection interval, which started on May 27, 1996, and ended on May 26, 2007, and included the one year extension permitted by the ASME Code, Section XI.

The ASME Code, Section XI requirements for reflectors oriented parallel and transverse to the weld stipulate that the angle beam search units shall be aimed, with the search unit manipulated, so that the ultrasonic beams pass throughout the entire volume of weld metal. The required examination volume A-B-C-D-E-F-G-H is depicted on ASME Code, Section XI, Figure IWB-2500-7(b).

The nozzle-to-vessel weld examination was performed using manual UT equipment. The licensee examined approximately 55 percent of the code required volume as defined by ASME Code, Section XI, Figure IWB-2500-7(b) depicted by points A-B-C-D-E-F-G-H. The licensee used 0, 45, and 60-degree transducers during the UT examination. Examination Summary and Resolution Sheet, Report Number R-1178, included with the April 5, 2007 letter, depicts the limitations created by the proximity of the pressurizer heaters and the curvature of the surge line nozzle.

With these limitations, the licensee was able to examine 72 percent of the volume with the 0 degree transducer, which included the weld area, but not all of the nozzle forging; 50 percent of the volume with the 45-degree transducer scanning from the vessel side, covering portions of the vessel base material, the weld, and nozzle forging; 32 percent of the volume with the 45-degree transducer scanning from the nozzle side, covering portions of the weld and vessel base material; 33.7 percent of the volume with the 60 degree transducer scanning from the vessel side, covering portions of the vessel base material, the weld, and nozzle forging; 16.6 percent of the weld volume with the 60-degree transducer scanning from the nozzle side, covering portions of the weld and vessel base material, 73 percent of the volume with the 45-degree and 60-degree transducers scanning both clockwise and counterclockwise around the weld, covering portions of the nozzle forging, the entire weld, and the entire vessel base

material within the required examination volume. The average of these scan volumes resulted in approximately 55 percent of the code required volume being scanned.

In order to examine the pressurizer surge line nozzle-to-vessel weld in accordance with the code requirement, the licensee has stated the pressurizer would require extensive modification and that this modification would be impractical to implement. The licensee has also stated that other examination techniques were also determined to be impractical for this configuration. For example, due to the design configuration of the surge line nozzle-to-vessel weld and the pressurizer, UT from inside surface of the pressurizer is impractical, and radiographic examination as an alternative volumetric examination method was also determined to be impractical.

As stated by the licensee, by letter dated April 5, 2007, no reportable indications were identified based on the scans performed. Based on the extent of coverage obtained and the fact that no reportable indications were observed, there is reasonable assurance of structural integrity of the subject weld. The staff concludes, from the information provided by the licensee, that the examination coverage obtained would have identified any pattern of degradation should one have developed, and that a change of component design would be necessary to obtain the increased coverages. Requiring the licensee to redesign the subject component in order to obtain the ASME Code-required volumetric coverage would result in a significant burden.

## 5.0 CONCLUSION

Based on the above discussion, the staff concludes that compliance with the ASME Code coverage requirements is impractical for the configuration identified in the subject relief request. Pursuant to 10 CFR 50.55a(g)(5)(iv), the request was submitted within 12 months after the expiration of the initial 120-month period of operation from start of facility commercial operation during which the examination is determined to be impractical. Also, there is reasonable assurance of structural integrity. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the first 10-year ISI interval at WBN Unit 1. This granting of relief is authorized by law and will not endanger life or 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 on the facility.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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Date: August 29, 2007

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## **WATTS BAR NUCLEAR PLANT**

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