



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

October 1, 2015

Mr. Joseph W. Shea
Vice President, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – RELIEF FROM THE
REQUIREMENTS OF THE ASME CODE FOR THE FIRST 10-YEAR INTERVAL
OF THE STEAM GENERATOR INSERVICE INSPECTION (TAC NO. MF6474)

Dear Mr. Shea:

By letter dated July 10, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15196A455), as supplemented by letters dated September 4, 2015, and September 23, 2015 (ADAMS Accession Nos. ML15271A140 and ML15266A457, respectively), Tennessee Valley Authority (the licensee) requested relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, regarding the preservice inspection program for Watts Bar Nuclear Plant (WBN), Unit 2.

Specifically, the licensee submitted Request for Relief WBN-2/PSI-3 requesting relief from performing a volumetric examination of the Class 2 lower shell-to-cone weld SG-4B-5-2 of steam generator number 2, due to inaccessibility caused by the upper steam generator support bracket.

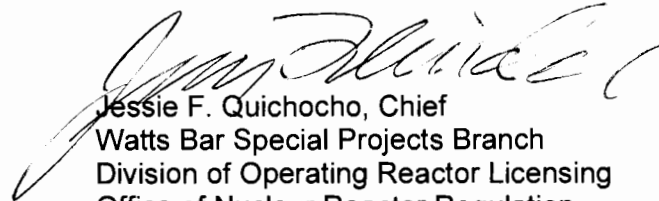
The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed Request for Relief WBN-2/PSI-3 and concludes, as set forth in the enclosed safety evaluation, that granting relief is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest, giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The NRC staff has determined that the volumetric inspection of Class 2 lower shell-to-cone weld SG-4B-5-2 of steam generator number 2 is impractical because it cannot be performed with the current design of WBN, Unit 2.

J. Shea

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If you have any questions, please contact Mr. Justin Poole at (301) 415-2048 or Justin.Poole@nrc.gov.

Sincerely,



Jessie F. Quichocho, Chief
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via Listserv



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST REGARDING THE PRESERVICE INSPECTION PROGRAM

FOR A STEAM GENERATOR WELD

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-391

1.0 INTRODUCTION

By letter dated July 10, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15196A455), as supplemented by letters dated September 4, 2015, and September 23, 2015 (ADAMS Accession Nos. ML15271A140 and ML15266A457, respectively), Tennessee Valley Authority (TVA, the licensee) requested relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, regarding the preservice inspection program for Watts Bar Nuclear Plant (WBN), Unit 2.

Specifically, the licensee submitted Request for Relief WBN-2/PSI-3 requesting relief from performing a volumetric examination of the Class 2 lower shell-to-cone weld SG-4B-5-2 of steam generator (SG) number 2 due to inaccessibility caused by the SG upper lateral restraint support.

2.0 REGULATORY EVALUATION

WBN, Unit 2, received its construction permit in 1973. For plants having a construction permit between January 1, 1971, and July 1, 1974, Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g)(2) requires that their ASME Code Class 1 and 2 components, including supports:

... must be designed and be provided with access to enable the performance of inservice examination of such components (including supports) and must meet the preservice examination requirements set forth in editions and addenda of Section III or Section XI of the ASME Code incorporated by reference ... in effect 6 months before the date of issuance of the construction permit.

Inservice and preservice examinations performed in accordance with Section XI of the ASME Code and applicable addenda are a way to detect anomaly and degradation indications so that structural integrity of these components can be maintained.

The ASME Code, Section XI, IWC-2200, specifies requirements for ASME Code, Class 2, components for the preservice examination, and the detailed inspection requirements in Table IWC-2500-1 apply to both preservice and inservice examinations. If an inservice examination requirement for a component cannot be met, licensees may seek relief from the ASME Code requirements pursuant to 10 CFR 50.55a(g)(5)(iii) for impracticality, or if appropriate, propose an alternative pursuant to 10 CFR 50.55a(z) for acceptable level of quality and safety or for hardship. The detailed preservice inspection requirements are contained in Table IWC-2500-1 of the ASME Code, Section XI, which also governs inservice inspection. As a result, the regulations in 10 CFR 50.55a(g)(5) and (6) that cover licensee impracticality determinations apply to both preservice and inservice inspections. In accordance with 10 CFR 50.55a(g)(5)(iii), determination of impracticality must be based on the demonstrated limitations experienced when attempting to comply with the ASME Code requirements for the inspection. Pursuant to 10 CFR 50.55a(g)(6), the Commission may grant relief and may impose such alternative requirements as it determines are authorized by law, will not endanger life or property or the common defense and security, and are 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.

The ASME Code of record for WBN, Unit 2, for the preservice inspection is the 2001 Edition of the ASME Code, Section XI, with 2003 Addenda.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Request for Relief

The licensee requests relief from the ASME Code, Section XI, Item No. C1.10, of Table IWC-2500-1. Note 1 of Table IWC-2500-1 requires the volumetric inspection to be 100 percent of the weld length. Note 3 of Table IWC-2500-1 allows one weld to be inspected for multiple vessels of similar design, size and service, such as SGs.

For the ASME Code, Section XI, volumetric examination for WBN, Unit 2, TVA examined weld SG-4B-5-2 on SG number 2 only. Due to the SG upper lateral restraint support interference, 76 percent of the weld volume was not examined. The licensee achieved approximately 24 percent weld volume examination coverage. The same welds on the other three SGs were not examined, since they are of similar design and configuration.

The licensee states that both the original WBN, Unit 1, SGs and the existing WBN, Unit 2, SGs were fabricated at approximately the same time in 1975 and contain the same weld configurations. These welds were examined volumetrically by radiography during fabrication in accordance with ASME Code, Section III, requirements.

The licensee requests a one-time relief to address the requirements of the WBN, Unit 2, preservice inspection program.

3.2 NRC Staff Evaluation

The ASME Code, Section XI, Table IWC-2500-1, requires 100 percent volumetric examination of SG circumferential shell welds (listed as Item No. C1.10 in the table). The licensee was unable to obtain the volumetric code coverage of 100 percent of the subject welds due to the upper lateral restraint support interference. The licensee provided further information in its September 4, 2015, supplement that the SG upper lateral support ring configuration presents an annular gap of approximately 1.5 inches between the cone outer surface and the interior of the lateral support ring, restricting access to the weld. As a result, access to the examination volume is limited from only the conical side of the weld joint, and axial ultrasonic testing (UT) scans can only be conducted from the conical side of the joint. Additionally, circumferential scans from the conical shell did not provide for coverage of the required volume.

In the July 10, 2015, submittal, the licensee stated that a total of 24 percent volumetric examination coverage was achieved. In the September 4, 2015, supplement, the licensee stated that the 24 percent coverage was achieved from one axial scan direction only, but the ASME Code required four scan directions (two opposing axial and two circumferential directions). When the four scan directions are considered, the total examination volume achieved is 6.57 percent. The licensee further stated that, "increased coverage can only be realized by the removal or repositioning of the upper lateral supporting ring, which is not practical."

The large size, weight, and design of the upper lateral supporting ring assembly demonstrates to the NRC staff that removal or repositioning of the ring is impractical and would be a burden on the licensee. However, granting relief pursuant to 10 CFR 50.55a(6)(i) relies on the determination that reasonable assurance of structural integrity of the subject weld is maintained. To demonstrate the quality of weld SG-4B-5-2 outside of the inspection coverage area by using the limited UT inspection results, the licensee stated in the September 23, 2015, supplement that no recordable indications were observed during UT inspection of WBN, Unit 2, weld SG-4B-5-2, and all three inspection reports of WBN, Unit 1, found no apparent discrepancies during their examinations of similar welds. The results demonstrate that the burden associated with performing UT examination of additional weld volume would likely result in no recordable indications and, therefore, would not significantly contribute to the determination that reasonable assurance of the structural integrity of weld SG-4B-5-2 is maintained. Additionally, the licensee provided further information that the structural integrity of the subject weld is supported by the industry operating experience (OE) with circumferential shell welds of SGs of the same vintage as the WBN, Unit 2, that indicated no known inservice failures exist of the same SG weld.

Additionally, the SG circumferential shell welds were volumetrically examined by radiograph during fabrication in accordance with ASME Code, Section III, requirements, and both the original WBN, Unit 1, SGs and the existing WBN, Unit 2, SGs were fabricated at approximately the same time in 1975. The successful operation of the WBN, Unit 1, SGs for multiple refueling cycles supports (1) the quality of the SG circumferential shell welds and (2) the effectiveness of the fabrication facility's radiograph examination for detecting defects in these welds. Therefore, reliance on the field UT examination results to determine SG circumferential shell weld quality is significantly reduced.

Finally, the SGs are subject to the hydrostatic pressure test of the ASME Code, Section XI, which provides additional opportunities to detect weld flaws that could result in leakage from the SG shell.

Based on (1) the limited UT inspection results for WBN, Units 1 and 2, showing no weld flaw indications; (2) OE from industry and WBN, Unit 1, showing no inservice safety issues caused by detected flaws in the subject welds; (3) examinations by radiograph during fabrication in accordance with ASME Code, Section III, requirements; and (4) the required hydrostatic pressure test of the ASME Code, Section XI, the NRC staff finds that reasonable assurance of structural integrity of the SG circumferential shell welds has been maintained.

4.0 CONCLUSION

The NRC staff reviewed the licensee's submittals and concludes that complying with the specified ASME Code requirements for the SG circumferential shell welds described in Section 3.1 above is impractical. Furthermore, the NRC staff concludes, based on the four reasons summarized above, that there is reasonable assurance of structural integrity of the subject SG circumferential shell welds.

As set forth above, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) 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. Therefore, the NRC staff grants relief for the subject examination of the components contained in Request for Relief WBN-2/PSI-3 for the preservice inspection.

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

Principal Contributor: S. Sheng

Date: October 1, 2015

J. Shea

- 2 -

If you have any questions, please contact Mr. Justin Poole at (301) 415-2048 or Justin.Poole@nrc.gov.

Sincerely,

/RA/

Jessie F. Quichocho, Chief
Watts Bar Special Projects Branch
Division of Operating Reactor Licensing
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Docket No. 50-391

Enclosure:
Safety Evaluation

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ADAMS Accession No.: ML15273A126

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