



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

August 28, 2023

Mr. James Barstow
Vice President, Nuclear Regulatory Affairs
and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – PROPOSED ALTERNATIVE TO THE REQUIREMENTS OF THE ASME BOILER AND PRESSURE VESSEL CODE FOR UPPER HEAD INJECTION DISSIMILAR METAL BUTT WELDS (EPID L-2022-LLR-0082)

Dear Mr. Barstow:

By letter dated November 28, 2022, the Tennessee Valley Authority submitted Alternative Request WBN-2-ISI-01 to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain American Society of Mechanical Engineers (ASME) Code Boiler and Pressure Vessel (BPV) Code requirements at Watts Bar Nuclear Plant (Watts Bar), Unit 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), TVA requested to use the proposed alternative on the basis that complying with the specified requirement would result in hardship or unusual difficulty.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that TVA has adequately addressed all regulatory requirements set forth in 10 CFR 50.55a(z)(2). The NRC staff has determined that Alternative Request WBN-2-ISI-01 provides reasonable assurance that integrity of the upper head injection nozzles will be maintained. Therefore, the NRC staff authorizes Alternative Request WBN-2-ISI-01 until the end of the U2R5 refueling outage, which is currently scheduled to end on December 2, 2023.

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

If you have any questions, please contact Ms. Kimberly Green at 301-415-1627 or via email at Kimberly.Green@nrc.gov.

Sincerely,

David J. Wrona, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosure:
Safety Evaluation

cc: Listserv



UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE WBN-2-ISI-01 TO THE REQUIREMENTS OF THE

ASME BPV CODE FOR THE UPPER HEAD INJECTION BUTT WELDS

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-391

1.0 INTRODUCTION

By letter dated November 28, 2022 (Agencywide Documents Access and Management System Accession No. ML22333A705), the Tennessee Valley Authority (TVA, the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code Case N-770-5, "Alternative Examination Requirements and Acceptance Standards for Class 1 PWR [Pressurized-Water Reactor] Piping and Vessel Nozzle Butt Welds Fabricated with UNS N06082 or UNS W86182 Weld Filler Material with or without Application of Listed Mitigation Activities, Section XI, Division 1," for Watts Bar Nuclear Plant (Watts Bar), Unit 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee proposed alternative WBN-2-ISI-01 for the first inservice inspection (ISI) interval regarding a one-time extension of the volumetric examination frequency of the N-770-5, Table 1, Inspection Item B-1 upper head injection dissimilar metal piping butt welds at Watts Bar, Unit 2, on the basis that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(6)(ii)(F), all licensees of PWRs must augment their ISI program by implementing ASME Code Case N-770-5 subject to the conditions specified in paragraphs (g)(6)(ii)(F)(2) through (16) of 10 CFR 50.55a. ASME Code Case N-770-5, Table 1, Inspection Item B-1 (unmitigated butt welds at cold leg operating temperature), requires that the licensee perform a volumetric examination every second inspection period not-to-exceed 7 years.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements of 10 CFR 50.55a(b) through (h) may be used, when authorized by the NRC, if the licensee demonstrates (1) the proposed alternative would provide an acceptable level of quality and safety; or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request, and the NRC to authorize, the proposed alternative requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 Applicable ASME Code Requirement and Components Affected

The Code of Record for the first ISI interval at Watts Bar, Unit 2 is the 2007 Edition with 2008 Addenda of the ASME BPV Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." The regulation at 10 CFR 50.55a(g)(6)(ii)(F) requires, in part, that licensees of PWRs augment their ISI program by implementing the requirements of ASME Code Case N-770-5. Watts Bar, Unit 2, upper head injection (UHI) dissimilar metal piping butt welds are unmitigated butt welds containing Alloy 82/182 at cold leg operating temperature which are less than nominal pipe size 14. The welds are categorized as Inspection Item B-1 under Table 1 of Code Case N-770-5, which requires that these welds undergo bare-metal visual examinations once per inspection interval and volumetric examinations every second inspection period, not-to-exceed 7 years.

3.2 Reason for Request

The licensee requested a one-time extension of the frequency of the UHI nozzles volumetric examination. This extension would allow the welds to be examined during the Unit 2 Refueling Outage 5 (U2R5) that was rescheduled to commence on November 3, 2023, versus the original date of October 13, 2023, which would have met the not-to-exceed 7 years requirement.

3.3 Licensee's Proposed Alternative and Basis for Use

Proposed Alternative WBN-2-ISI-01 would allow a one-time extension of the required volumetric examinations for the subject welds beyond the 7-year requirement of Code Case N-770-5, Item B-1.

The licensee stated that the Watts Bar, Unit 2 UHI nozzles were last examined as a preservice inspection before Unit 2 startup with no recordable indications observed. It also noted that U2R5 will be the first exam performed in accordance with 10 CFR 50.55a(g)(6)(ii)(F) and Code Case N-770-5, Item B-1. The licensee stated that the similar Watts Bar, Unit 1 UHI nozzles were examined during U1R16 in spring 2020 and U1R12 in spring 2014 with no recordable indications observed.

The licensee stated it would be required to perform a forced, unscheduled outage for Watts Bar, Unit 2 to perform the required volumetric exams of the UHI nozzles within the current 7-year frequency, which would result in unnecessary plant transients and unnecessary radiological dose to plant personnel.

3.4 Duration of Proposed Alternative

This request is applicable to the Watts Bar, Unit 2, ISI program for the first ISI interval. The proposed alternative is applicable until the end of U2R5, which is currently scheduled to commence November 3, 2023, and end on December 2, 2023.

3.5 NRC Staff Evaluation

The NRC staff evaluated the licensee's request on the basis that compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The applicable examination requirements are in accordance with the ASME Code Case N-770-5, as conditioned by 10 CFR 50.55a(g)(6)(ii)(F). The NRC staff confirms that the licensee correctly categorized the welds and identified the appropriate examination requirements.

The licensee provided a hardship basis associated with unnecessary plant transients and unnecessary radiological dose to plant personnel, and would require a forced, unscheduled outage in order to meet the requirements of Code Case N-770-5. The NRC staff reviewed the licensee's hardship basis and finds that the licensee meets the hardship requirement of 10 CFR 50.55a(z)(2).

The NRC staff reviewed the level of quality and safety of the licensee's proposed alternative. The NRC staff finds that the examinations of the Watts Bar, Unit 2, UHI nozzles would only be delayed until the U2R5 that is schedule to commence November 3, 2023. The NRC staff also considered that this will be the first ISI interval and the precedent that no primary water stress corrosion cracking (PWSCC) has been identified on UHI dissimilar metal piping butt welds during the first ISI interval in the PWR fleet. This is consistent with the stages of crack propagation for the PWSCC cracking mechanism, in that it takes some time for initiation and growth of flaws to develop under PWR conditions at the operating temperature of the UHI nozzles. Therefore, the NRC staff determines that the structural integrity of the weld would be maintained throughout the period requested.

Based on the review above, the NRC staff finds that there is an adequate technical basis to extend the volumetric examination of the subject welds. The NRC staff finds the licensee's proposed alternative provides reasonable assurance that the structural integrity of the subject weld will be maintained, and that complying with the current volumetric examination requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that complying with the specified requirements described in the licensee's request referenced above would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of structural integrity of the subject component. Accordingly, the NRC staff concludes that the licensee has adequately addressed all regulatory requirements set forth in 10 CFR 50.55a(z)(2). Therefore, the NRC staff authorizes Alternative Request WBN-2-ISI-01 until the end of U2R5, which is currently scheduled to be completed by December 2, 2023.

All other ASME BPV Code requirements for which an alternative was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributors: K. Sida, NRR

Date: August 28, 2023

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