



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF REQUEST FOR RELIEF 3-ISI-1

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT UNIT 3

DOCKET NO. 50-296

1.0 INTRODUCTION

The Technical Specifications (TS) for Browns Ferry Nuclear Plant (BFN), Unit 3 states that the inservice inspection of the 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 as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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 difficulties 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) shall meet the requirements, except the design and access provisions and the pre-service 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 ten-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 applicable edition of Section XI of the ASME Code for the BFN Unit 3, second ten-year inservice inspection (ISI) interval is the 1989 Edition.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not

ENCLOSURE 1

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BROWNS FERRY NUCLEAR PLANT

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endanger life, 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.

In a letter dated January 22, 1997, Tennessee Valley Authority (licensee), submitted to the NRC its Second Ten-Year Inservice Inspection Interval Program Plan Request for Relief 3-ISI-1, regarding successive examination requirements for BFN Unit 3.

2.0 EVALUATION

The staff, with technical assistance from its contractor, the Idaho National Engineering and Environmental Laboratory (INEEL), has evaluated the information provided by the licensee in support of its Second Ten-Year Inservice Inspection Interval Program Plan Request for Relief 3-ISI-1 for BFN Unit 3. Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the enclosed Technical Letter Report (TLR).

For Request for Relief 3-ISI-1, Section XI, IWB-2420(b), *Successive Inspections When Flaw or Relevant Conditions are Evaluated and Qualify for Continued Service*, requires that if flaw indications or relevant conditions are evaluated in accordance with IWB-3132.4 or IWB-3142.4, respectively, and the component qualifies for continued service, the areas containing such flaw indications or relevant conditions shall be reexamined during the next three inspection periods listed in the schedules of the inspection programs of IWB-2410.

The licensee requested relief from the successive examination requirements for ten shell weld indications and five shell-to-flange indications exceeding the acceptance criteria of the Code. The flaws were qualified for continued service in accordance with IWB-3132.4. The licensee has proposed to perform ultrasonic examination of the areas containing the subject indications during the third period of the second interval (Cycle 11) in conjunction with the required RPV shell weld examination.

During the reactor pressure vessel examinations at the end of the first inspection interval, ten rejectable subsurface flaws in the reactor shell welds and five rejectable subsurface flaws in the flange-to-shell weld were identified. As allowed by the Code, the licensee performed fracture analyses on these flaws, which showed them to be acceptable for continued service. In conjunction with the fracture analysis calculations, the licensee determined that continued operation is justified for up to 12 effective full power years. Based on this calculation, the licensee proposes to reexamine the subject flaws in the third period of the next 10-year inservice inspection, i.e., the Cycle 11 outage.

IWB-2420, *Successive Inspections*, requires that when flaws are evaluated and qualified as acceptable for continued service, the areas containing such flaw indications or relevant conditions be reexamined during the next three inspection periods. This reexamination must confirm flaw stability and verifies that the assumptions used in the fracture analysis were valid.

Based on the information the licensee has presented, the staff has concluded the following:

- 1) The number of rejectable flaws is significant and the flaws require continued surveillance.
- 2) The licensee has not validated the fracture analysis by subsequent examinations to verify that the subject flaws are not growing beyond calculated projections.
- 3) An operating window of 12 effective full power years, as determined by calculation, is not an acceptable margin for quality and safety.
- 4) Implementation of proposed Code Case N-526, *Alternate Rules for Successive Inspections of Class 1 and 2 Vessels*, which was included in the licensee's discussion on justification for granting relief, is not acceptable because this Code case has not been reviewed and approved by the staff.

3. CONCLUSIONS

The staff has reviewed the information provided by the licensee in support of Relief Request 3-ISI-1. Based on its review, the staff concludes that the licensee does not have a sufficient basis for relief from the Code-required successive examinations. Therefore, relief is not authorized.

Principal Contributor: T. McLellan

Dated: July 8, 1997

TECHNICAL LETTER REPORT
ON THE SECOND 10-YEAR INSERVICE INSPECTION INTERVAL
RELIEF REQUEST 3-ISI-1
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT, UNIT 3
DOCKET NUMBER 50-296

1.0 INTRODUCTION

By letter dated January 22, 1997, the licensee submitted the Browns Ferry Nuclear Plant, Unit 3, second 10-year interval inservice inspection program. This Technical Letter Report contains the expedited evaluation of Relief Request 3-ISI-1. The Idaho National Engineering and Environmental Laboratory (INEEL) staff has evaluated the subject request for relief in the following section.

2.0 EVALUATION

The Code of record for the Browns Ferry Nuclear Plant, Unit 3, second 10-year interval is the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1989 Edition. The information provided by the licensee in support of the request has been evaluated and the basis for disposition is documented below.

2.1 Request for Relief 3-ISI-1, Section XI, IWB-2420(b), Successive Inspections When Flaw or Relevant Conditions are Evaluated and Qualify for Continued Service

Code Requirement: Section XI, IWB-2420(b) requires that "If flaw indications or relevant conditions are evaluated in accordance with IWB-3132.4 or IWB-3142.4, respectively, and the component qualifies for continued service, the areas containing such flaw indications or relevant conditions shall be reexamined during the next three inspection periods listed in the schedules of the inspection programs of IWB-2410."

ENCLOSURE 2

Licensee's Code Relief Request: The licensee requested relief from the successive examination requirements for ten shell weld indications and five shell-to-flange indications exceeding the acceptance criteria of the Code. The flaws were qualified for continued service in accordance with IWB-3132.4.

Licensee's Basis for Requesting Relief (as stated):

"Accessible RPV shell welds were ultrasonically examined from the vessel inside surface utilizing the General Electric (GE) reactor inspection GERIS 2000 automated scanning system and from accessible areas on the vessel outside surface using manual techniques in areas with limited or no accessibility from the inside surface. The examination identified fifteen (15) subsurface indications which exceeded IWB-3500 criteria, but were evaluated to meet the criteria of IWB-3600 for continued operation. Calculation MD-Q3001-940005 evaluated the RPV indications and determined that operation was justified for up to 12 effective full power years (EFPY). The 12 EFPY corresponds with the performance of the re-examination of these indications during the Unit 3 cycle 11 outage. It was also determined that the margin of safety, based on the maximum IWB-3600 allowable, is greater than 5:1.

"The BWR Vessel and Internals Project Beltline Team, "BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations (BWR VIP-05)", EPRI #TR-105697, Section 11, submitted to NRC for review on September 28, 1995, summarizes the probability for growth of extensive subsurface cracking as negligible. The referenced evaluation recommended the inspection scope be reduced from essentially 100% of the circumferential and longitudinal seam welds to 50% of the longitudinal seam welds and no required examination of circumferential shell welds (Item #1.10). This reduction of inspection scope is achieved while maintaining a failure probability two orders of magnitude below the NRC stated safety goal for reactor failure of 4×10^{-5} in 40 years.

The cost associated with each of the successive examinations is estimated to be in the range of \$1.5 to \$2.0 million dollars. The combined cost for performance of successive examinations would be approximately \$3.0 to \$4.0 million dollars.

Licensee's Proposed Alternative Examination (as stated):

"Perform ultrasonic examination of the areas containing the subject indications during the third period of the second interval (cycle 11) in conjunction with the required RPV shell weld examination.

Evaluation: During the reactor pressure vessel examinations at the end of the first inspection interval, ten rejectable subsurface flaws in the reactor shell welds and five rejectable subsurface flaws in the flange-to-shell weld were identified. As allowed by the Code, the licensee performed fracture analyses on these flaws, which showed them to be acceptable for continued service. In conjunction with the fracture analysis calculations, the licensee determined that continued operation is justified for up to 12 effective full power years. Based on this calculation, the licensee proposes to reexamine the subject flaws in the third period of the next 10-year inservice inspection, i.e., the cycle 11 outage.

IWB-2420, *Successive Inspections*, requires that when flaws are evaluated and qualified as acceptable for continued service, the areas containing such flaw indications or relevant conditions be reexamined during the next three inspection periods. The reexamination confirms flaw stability and verifies that the assumptions used in the fracture analysis were valid.

Based on the information the licensee has presented, the INEFL has concluded the following:

- 1) The number of rejectable flaws is significant and the flaws require continued surveillance.
- 2) The licensee has not validated the fracture analysis by subsequent examinations to verify that the subject flaws are not growing beyond calculated projections.
- 3) An operating window of 12 effective full power years, as determined by calculation, is not an acceptable margin for quality and safety.
- 4) Implementation of proposed Code Case N-526, *Alternate Rules for Successive Inspections of Class 1 and 2 Vessels*, which was included in the licensee's discussion on justification for granting relief,

is not acceptable because this Code case has not been reviewed and approved by the NRC Staff.

3.0 CONCLUSION

The INEEL staff has reviewed the information provided by the licensee in support of Relief Request 3-ISI-1. Based on this review, it has been determined that the licensee does not have a sufficient basis for relief from the Code-required successive examinations. Therefore, it is recommended that relief be denied.