



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF REQUEST FOR RELIEF ISI2-09

WATERFORD STEAM ELECTRIC STATION, UNIT 3

ARKANSAS NUCLEAR ONE, UNIT 2

ENTERGY OPERATIONS, INC.

DOCKET NOS. 50-382 AND 50-368

1.0 INTRODUCTION

Title 10 of the Code of Federal Regulations (10 CFR), Section 50.55a, requires that inservice inspection (ISI) of certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code) Class 1, 2, and 3 components shall be performed in accordance with Section XI of the applicable Edition and Addenda as required by 10 CFR 50.55a(g), except where relief has been requested by the licensee and granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). In 10 CFR 50.55a(a)(3), it states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if: (1) the proposed alternatives provide an acceptable level of quality and safety, (2) compliance 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) 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 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 Entergy Operations, Inc. (EOI) ISI program is based on the repair and replacement requirements of Section XI of the ASME Code, 1992 Edition.

By letter dated January 14, 1998, EOI requested approval to use an alternative to the requirements of the ASME Code, Section XI, Subarticle IWA-5242(a) for the removal of insulation from Class 1 and 2 systems, borated for the purposes of controlling reactivity, prior to performing the Code-required VT-2 visual examinations on pressure-retaining bolted connections, for Waterford 3 and ANO-2. EOI based its requests on its belief that the alternative provides an acceptable level of quality and safety.

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ENCLOSURE

## 2.0 RELIEF REQUEST

This relief request (ISI2-09) for Waterford 3 and ANO-2 requests relief from the requirements of Section XI, Subarticle IWA-5242(a) of the 1992 Edition of the Code, for insulated Code Class 1 and 2 bolted connections bolated for the purposes of controlling reactivity.

### 2.1 Licensee's Basis and Justification for Requested Relief

EOI requested relief from the requirements of IWA-5242(a) during system pressure tests for the following reasons:

1. Code Class 1 and 2 systems bolated for the purpose of controlling reactivity are large, extensive systems which extend into multiple plant areas and elevations. Scaffolding is required to access many of the bolted connections. In addition, many of these connections are located in difficult to access areas and in medium to high radiation areas. Insulation removal combined with scaffolding requirements results in increase personnel exposure, additional radwaste, and increased financial cost.
2. Visual VT-2 examinations of Class 1 systems, primarily the Reactor Coolant System (RCS) piping and components, are performed while ascending in power from Mode 3 to Mode 2 during plant startup. During such times, the RCS is at normal operating pressure of approximately 2250 psig with reactor coolant temperature at approximately 550°F. (These parameters are controlled by each plant's specific Technical Specifications and procedures for this condition.) Performing a visual VT-2 examination, installing insulation, and removing scaffolding at bolted connections under these operating conditions represents a personnel safety hazard. Since the majority of Class 1 piping is inside the containment building bio-shield wall, removing and reinstalling insulation along with disassembly of scaffolding may substantially increase the outage duration.
3. In response to NRC Generic Letter 88-05, "Boric Acid Corrosion Of Carbon Steel Reactor Pressure Boundary Components In PWR Plants," Entergy established a program to inspect boric acid leaks discovered in the containment building and to evaluate the impact of those leaks on carbon steel or low alloy steel components. Per this program, evidence of leaks, including boric acid crystals or residue, is inspected and evaluated regardless of whether the leak was discovered at power or during an outage. Based on the evaluation, appropriate corrective actions are initiated to prevent recurrence of the leak and to repair, if necessary, any degraded materials or components.
4. To ensure that degradation mechanisms in stainless steels are mitigated, Entergy maintains a program for controlling materials (insulation, thread lubricant, boron, etc.) that may come in contact with safety-related components, including bolting. This program ensures impurities are not present in concentrations that would promote development of stress corrosion cracking in stainless steel bolted connections.

The only carbon steel and low alloy pressure boundary components at Entergy plants in systems bolated for the purpose of controlling reactivity are clad with stainless steel. Specifically, these clad components are the reactor vessel, steam generators (primary

side), pressurizer, and portions of the reactor coolant system piping. Other pressure boundary piping and components in borated systems within inservice inspection boundaries are constructed of stainless steel. There is substantial information, such as EPRI NP-5679, attesting to the resistance of stainless steels to boric acid corrosion.

EOI believes that this request is justifiable under 10 CFR 50.55a(a)(3)(i) because the alternative examinations given in the relief request provide an acceptable level of quality and safety for Class 1 and 2 bolted connections.

## 2.2 Evaluation

The staff has evaluated the following information provided by EOI in support of its requests for relief for Waterford 3 and ANO-2.

**Request for Relief ISI2-09:** For systems borated for the purpose of controlling reactivity, the 1992 Edition of ASME Code Section XI, Subarticle IWA-5242(a), requires the removal of insulation from pressure-retaining bolted connections for VT-2 visual examination during system pressure tests. Pursuant to 10 CFR 50.55a(a)(3)(i), EOI has proposed an alternative to the provisions of IWA-5242(a). EOI's alternative is stated below:

1. Bolted connections in systems borated for the purpose of controlling reactivity shall receive a VT-2 visual examination without removing the insulation following a 4-hour hold time at required test conditions. If evidence of leakage is detected either by discovery of active leakage or evidence of boric acid crystals, the insulation shall be removed and the bolted connection shall be re-examined. If necessary, the connection shall be evaluated in accordance with the corrective measures of IWA-5250.
2. Insulation at bolted connections in systems borated for the purpose of controlling reactivity shall be removed during each refueling outage and a VT-2 visual examination performed at cold conditions. The connection is not required to be pressurized. Any evidence of leakage shall be evaluated in accordance with IWA-5250.

The Code requires the removal of all insulation from pressure-retaining bolted connections in systems borated for the purpose of controlling reactivity when performing VT-2 visual examinations during system pressure tests. As an alternative, EOI has proposed to remove insulation and to perform VT-2 visual examination at cold conditions for insulated pressure-retaining bolted connections at each refueling outage for Class 1 and 2 components. EOI will also perform a separate VT-2 visual examination following a 4-hour hold time at required test conditions with the insulation in place.

EOI's proposed alternative for Class 1 systems is essentially the same as that contained in Code Case N-533, *Alternative Requirements for VT-2 Visual Examination of Class 1 Insulated Pressure-Retaining Bolted Connections, Section XI, Division 1*, which is currently under review by the staff and has not yet been approved for use by incorporation into Regulatory Guide 1.147, *Inservice Inspection Code Case Acceptability*. However, the staff finds the use of the

Code Case acceptable since EOI proposes to use a 4-hour hold time on Class 1 insulated systems, as is provided in ISI2-09.

EOI's proposed alternative for Code Class 1 systems provides a reasonable approach for ensuring the leak-tight integrity of systems borated for the purpose of controlling reactivity. The proposed alternative applies a 4-hour hold time during the pressure test to allow time for any leakage to penetrate the insulation. This provides a means of detecting any significant leakage with the insulation in place. Secondly, by removing the insulation each refueling outage, EOI will be able to detect minor leakage that could occur by the presence of boric acid crystals or residue. This two-phase approach provides an acceptable level of quality and safety for bolted connections in borated systems.

Even though Code Case N-533 does not include Class 2 systems, EOI has proposed the alternative which is similar to Class 1 systems. The proposed alternative provides acceptable level of quality and safety for Class 2 systems.

### 3.0 CONCLUSIONS

The staff has reviewed Entergy's submittal and has determined that for request for relief ISI2-09, for Waterford 3 and ANO-2, the EOI's proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the EOI's proposed alternative contained in request for relief ISI2-09 is authorized for the Waterford 3 and ANO-2.

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Date: December 1, 1998