

October 13, 2000

Mr. Michael A. Krupa  
Director, Nuclear Safety & Licensing  
Entergy Operations, Inc.  
1340 Echelon Parkway  
Jackson, MS 39213-8298

SUBJECT: RELIEF REQUEST RELATED TO THE REMOVAL OF INSULATION ON AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER & PRESSURE VESSELS CODE CLASS 1, 2, AND 3 SYSTEMS DURING INSERVICE INSPECTION FOR ARKANSAS NUCLEAR ONE, UNIT 1, ARKANSAS NUCLEAR ONE, UNIT 2, AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NOS. MA8773, MA8788, AND MA8778)

Dear Mr. Krupa:

By letter dated April 24, 2000, as amended by letter dated August 24, 2000, Entergy Operations, Inc. (Entergy), submitted a request for relief (CEP-ISI-002, Revision 0) for Arkansas Nuclear One, Unit 1 (ANO-1), Arkansas Nuclear One, Unit 2 (ANO-2), and Waterford Steam Electric Station, Unit 3 (Waterford 3) from certain provisions of Section XI of the American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code (ASME Code). Specifically, EOI requested relief from the requirements of the 1992 Edition of the ASME Code, Section XI, Subarticle IWA-5242(a) for pressure-retaining bolted connections in Class 1, 2, and 3 borated systems.

The staff has completed its review of the relief request and has determined that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(3)(i), Entergy's proposed alternative is authorized for the second inspection interval at Waterford 3, the third inspection interval at ANO-1, and the third inspection interval at ANO-2. The basis for this conclusion is described in the enclosed staff's Safety Evaluation.

M. A. Krupa

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October 13, 2000

If you have questions regarding this response to your request, please contact, Bill Reckley, ANO-1 Project Manager, at (301) 415-1323; Tom Alexion, ANO-2 Project Manager, at (301) 415-1326; and N. Kalyanam, Waterford 3 Project Manager, at (301) 415-1480.

Sincerely,

***/RA D. Jaffe for/***

Robert A. Gramm, Chief, Section 1  
Project Directorate IV & Decommissioning  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Enclosure: Safety Evaluation

Docket Nos. 50-382, 50-313, and 50-368

cc: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF REQUEST FOR RELIEF CEP-ISI-002, REVISION 0

ARKANSAS NUCLEAR ONE, UNIT 1 (ANO-1),

ARKANSAS NUCLEAR ONE, UNIT 2 (ANO-2), AND

WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3)

ENTERGY OPERATIONS, INC.

DOCKET NOS. 50-313, 50-368 AND 50-382

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 & Pressure Vessel Code (ASME Code, or the 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 Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50a(g)(6)(i). Pursuant to 10 CFR 50.55a(a)(3), 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, or (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 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), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. For the third 10-year ISI interval at Arkansas Nuclear One (ANO), Unit 1 (ANO-1) and ANO, Unit 2 (ANO-2), which started in June 1997 and March 2000, respectively, and the second 10-year ISI interval at Waterford Steam Electric Station, Unit 3 (Waterford 3), which started in July 1997, Section XI of the 1992 Edition of the ASME Code with portions of the 1993 Addenda, as specified in their ISI programs, is applicable.

By letter dated April 24, 2000, as amended by letter dated August 24, 2000, Entergy Operations, Inc. (Entergy or the licensee), submitted Relief Request CEP-ISI-002, Rev. 0, proposing alternative examinations from the requirement of the ASME Code, Section XI, which states that insulation shall be removed from pressure retaining bolted connections for VT-2 visual examination during pressure testing of borated systems. The relief request was submitted pursuant to 10 CFR 50.55a(a)(3)(i) for the third 10-year ISI interval at both ANO units, and the second interval at Waterford 3. The NRC staff reviewed and evaluated the licensee's proposed alternative pursuant to 10 CFR 50.55a(3)(i). The staff's evaluation of the subject relief request is contained in the following section.

## 2.0 EVALUATION

The information provided by the licensee in support of the relief request has been evaluated, and the bases for disposition are documented below.

### 2.1 Code Requirement

Subarticle IWA-5242(a) of the ASME Code, Section XI, 1992 Edition states that for borated systems, insulation should be removed from pressure retaining bolted connections for a direct VT-2 visual examination, and the VT-2 examination must be performed at system test pressure in accordance with IWA-5211.

### 2.2 Licensee's Proposed Alternative Examination (as stated)

Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy proposes alternative examinations to removing insulation for VT-2 visual examinations of bolted connections in ASME Code Class 1, 2, and 3 borated systems during system pressure tests, as required by IWA-5242(a).

Entergy proposes alternative examinations utilizing current material control programs and additional inspection activities as discussed below.

1. A system leakage test shall be performed on each insulated bolted connection in systems borated for the purpose of controlling reactivity, as required by IWA-5213(a), 1992 Edition, with the exception that the insulation need not be removed as required by IWA-5242(a). If evidence of leakage is detected either by discovery of active leakage or by evidence of boric acid crystals, the insulation shall be removed and the bolted connection examined in accordance with Entergy Relief Request ISI2-08, which was previously approved by the NRC.<sup>1</sup>

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<sup>1</sup>Letter dated April 7, 1998, "Relief Authorization for Alternative to the Requirements of ASME Section XI, Subarticle IWA-5250 Bolting Examination for Arkansas Nuclear One, Units 1 and 2, Grand Gulf Station, Unit 1, River Bend Station, and Waterford Steam Electric Station, Unit 3 (TAC Nos. MA0825, MA0826, MA0806, MA0824, and MA0809)"

2. Per 1992 Edition Code requirements of IWA-5242(a), insulation at bolted connections in systems borated for the purpose of controlling reactivity shall be removed per the following schedules:
  - a. ASME Code Class 1 systems - once during each refueling outage
  - b. ASME Code Class 2 and Class 3 systems - once during each inspection period

However, the VT-2 visual examination for Class 1, 2, and 3 bolted connections may be performed at ambient conditions. The connection is not required to be pressurized. Any evidence of leakage shall be evaluated in accordance with Relief Request ISI2-08.

### 2.3 Licensee's Basis for Relief Request (as stated)

Entergy proposes alternative examinations to the requirements of IWA-5242(a) during system pressure tests for the following reasons:

1. ASME Code Class 1, 2, and 3 systems borated for the purpose of controlling reactivity are large, extensive systems that extend into multiple plant areas and elevations. A large portion of the system pressure tests is tied to a required surveillance test or plant startup evolution. 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. In order to identify leakage, the preferred time frame to perform this inspection is prior to beginning the surveillance test or at the beginning of the outage. Removing insulation during operation combined with scaffolding requirements result in increased 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 raising temperature during plant startup. During such times, the RCS is at normal operating pressure of approximately 2250 psig with reactor coolant temperature between 350°F and 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 personnel safety hazard. The VT-2 examination can be a critical path activity normally taking six to eight hours to perform. Since the majority of Class 1 piping is inside the containment building secondary 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 [pressurized water reactor] 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, 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.

At both ANO units and Waterford 3, the only carbon steel and low alloy pressure boundary components in systems borated 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 [Electric Power Research Institute] NP-5679, attesting to the resistance of stainless steels to boric acid corrosion.

#### 2.4 Staff Evaluation

The NRC staff has reviewed Relief Request CEP-ISI-002, Rev. 0, submitted in the licensee's letter dated April 24, 2000, as amended by letter dated August 24, 2000, for the third 10-year ISI interval for both ANO units, and for the second 10-year ISI interval for Waterford 3. Article IWA-5242(a) of the ASME Code, Section XI, 1992 Edition requires removal of insulation from pressure-retaining bolted connections in borated systems for VT-2 visual examination during system pressure tests. Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee proposed an alternative to IWA-5242(a). The alternative consists of the following:

1. System pressure tests will be performed in accordance with the hold time requirements specified in IWA-5213(a). The visual examination of the insulated components will be performed as required by IWA-5242(a), with the exception that the insulation need not be removed. If leakage is detected during testing, insulation will be removed for examination, and the effects of the leakage will be evaluated in accordance with the previously NRC-approved Relief Request ISI2-08.
2. VT-2 visual examination with removal of insulation will be performed once during each refueling outage for ASME Class 1 systems, and once during each ISI period for Class 2 and 3 systems. The examination may be conducted at cold ambient temperature and non-pressurized conditions. Any evidence of leakage shall be evaluated per approved Relief Request ISI2-08.

The staff finds that once the Code-specified hold time requirements during pressure tests are followed, significant leakage, if any, will penetrate the insulation and be detected. In addition, periodic removal of the insulation for VT-2 examination, even under cold and non-pressurized conditions, should allow for detection of even minor leakage in a timely manner via the presence of boric acid crystals or residue. Thus the two-phased approach of the licensee's proposed alternative provides an acceptable level of quality and safety for bolted connections in borated systems.

### 3.0 CONCLUSION

The staff has reviewed the licensee's submittal, dated April 24, 2000, as amended by letter dated August 24, 2000, regarding Relief Request CEP-ISI-002, Revision 0, for ANO-1, ANO-2, and Waterford 3, and has determined that the licensee's proposed alternative examinations for pressure-retaining bolted connections in ASME Class 1, 2, and 3 borated systems for the third 10-year ISI interval at ANO-1 and ANO-2, and for the second 10-year ISI interval at Waterford 3, provide an acceptable level of quality and safety for bolted connections in borated systems. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), Entergy's proposed alternative contained in its Relief Request CEP-ISI-002, Revision 0, is authorized for the second inspection interval at Waterford 3, the third inspection interval at ANO-1, and the third inspection interval at ANO-2.

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Date: October 13, 2000

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