October 3, 2000

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

SUBJECT: ARKANSAS NUCLEAR ONE, UNITS 1 AND 2, AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 - RELIEF REQUEST NO. CEP-ISI-001, REVISION 0, RELATED TO AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE REQUIREMENTS (TAC NOS. MA8772, MA8787, AND MA8777)

Dear Mr. Krupa:

By letter dated April 24, 2000, as supplemented by letter dated August 21, 2000, Entergy Operations, Inc. (EOI, the licensee), submitted a request for relief (CEP-ISI-001, 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 and Pressure Vessel Code (ASME Code). EOI proposed an alternative to the requirements of ASME Section XI, IWB-2420(a) and Table IWB-2500-1, Examination Category B-A, Note (4).

Specifically, the relief request proposed an alternative to:

(1) Repeating the sequence of examinations as established in the first Inservice Inspection (ISI) interval, as required by IWA-2420(a); and

(2) Performing a 50 percent volumetric examination of the subject weld from the reactor vessel flange face in the first period of the interval, as required by Note (4) of Table IWA-2500-1, Examination Category B-A.

In the proposed alternative to the ASME Code requirements, the reactor vessel-to-flange weld will undergo 100 percent volumetric examinations concurrent with the reactor vessel 10-year examinations at or near the end of the ISI interval. The proposed alternative is on the basis that the requirements of IWB-2420(a) and Note (4) of Table IWA-2500-1, Examination Category B-A, result in a hardship without a compensating increase in the level of quality and safety. The ASME Code requirement became effective for Waterford 3, and ANO-1 and ANO-2, with the implementation of the 1992 ASME Code.

The staff has has reviewed and evaluated the information provided in the submittal and determined that compliance with the requirement would result in hardship without a compensating increase in the level of quality and safety. Therefore EOI's proposed alternative is authorized, pursuant to 10 CFR 50.55a(3)(ii). The basis for this conclusion is described in the enclosed staff's Safety Evaluation.

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

Sincerely,

/RA by David H. 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

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

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF REQUEST FOR RELIEF CEP-ISI-001, 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 and 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. The Entergy Operations, Inc. (EOI or the licensee) ISI program is based on the repair and replacement requirements of Section XI of the ASME Code, 1992 Edition, through the 1993 Addenda.

2.0 CODE REQUIREMENT

ASME Section XI, 1992 Edition, through the 1993 Addenda, IWB-2420(a) states that the sequence of component examinations established during the first inspection interval shall be repeated during each successive inspection interval, to the extent practical.

Table IWB-2500-1, Examination Category B-A, Item B1.30, requires a volumetric examination of essentially 100 percent of the reactor vessel shell-to-flange weld once each 10-year inspection interval. The requirements are modified by Notes (3) and (4) as follows:

1. Note (3) states, "If partial examinations are conducted from flange face, the remaining volumetric examinations required to be conducted from vessel wall may be performed at or near the end of each inspection interval."

2. Note (4) states, "The examination of shell-to-flange welds may be performed during the first and third inspection periods in conjunction with the nozzle examinations of Exam[ination] Cat[egory] B-D (Program B). At least 50 [percent] of shell-to-flange welds shall be examined by the end of the first inspection period, and the remainder by the end of the third inspection period."

3.0 LICENSEE'S REQUESTED AUTHORIZATION

By letter dated April 24, 2000, EOI requested authorization to use an alternative to the requirements of ASME Code, Section XI, Subarticle IWB-2420(a) and Table IWB-2500-1, Examination Category B-A, Note (4). Pursuant to 10 CFR 50.55a(a)(3)(ii), EOI proposes an alternative to :

(1) Repeating the sequence of examinations as established in the first Inservice Inspection (ISI) interval, as required by IWA-2420(a); and

(2) Performing a 50 [percent] volumetric examination of the subject weld from the reactor vessel flange face in the first period of the interval, as required by Note (4) of Table IWA-2500-1, Examination Category B-A.

3.1 PROPOSED ALTERNATIVE EXAMINATION

The licensee's proposed alternative examination states that the reactor vessel shell-to-flange weld will undergo 100 percent volumetric examinations concurrent with the reactor vessel 10-year examinations at or near the end of the ISI interval.

EOI proposes the alternative on the basis that the requirements of Subarticle IWB-2420(a) and Note (4) of Table IWB-2500-1, Examination Category B-A, would result in a hardship without a compensating increase in the level of quality and safety.

4.0 LICENSEE'S BASIS FOR REQUESTED RELIEF

"The reactor vessel shell-to-flange examination may be performed one of two ways: (1) manually or (2) remotely using automated equipment. Performing the exam[ination] manually requires the reactor vessel head to be suspended approximately one foot above the vessel flange. This is done to lower the radiation shine from the reactor vessel internals to a reasonable level. Even with the reactor head suspended, the radiation levels are expected to be 350 - 1,500 mrem/hr [millirem/hour]. With the head suspended, non-destructive examination (NDE) personnel must then place their hands under the head to perform the examination. This method unnecessarily exposes NDE personnel to high radiation doses and hazardous working conditions. Performing the exam[ination] remotely requires using the automated equipment necessary for the vessel shell and nozzle-to-vessel weld examinations. Mobilizing automated equipment to perform a partial examination in the first period would constitute a large economic and schedule impact.

In the previous inspection interval, the reactor vessel shell-to-flange weld was examined twice for both ANO [Arkansas Nuclear One] units and for Waterford 3. The first examination was a partial examination from the flange face performed manually at ANO and remotely with automated equipment at Waterford 3. The second examination was performed from the vessel interior with automated equipment at each facility. This second examination established a new sequence for the shell-to-flange weld allowing it to be performed in conjunction with the reactor vessel nozzle examinations. The nozzle examinations are scheduled to be performed at the end of the interval, in accordance with ASME Code Case N-521, which was approved for use in Regulatory Guide 1.147.

From an industry perspective, two reasons why deferring the vessel shell-to-flange examination to the end of the inspection interval will not decrease the level of quality and safety are discussed below.

1. Similar PWR [pressurized water reactor] reactor vessels have been operating for over 20 years with no recorded inservice-induced flaws or potential degradation mechanisms. Since each PWR reactor vessel in operation is representative of the operating conditions throughout the industry, continued inspection of these vessels ensures that any potential degradation mechanism would be detected.

2. Given the present large population of PWR vessels in operation, the examination of shell-to-flange welds within the industry during any 10-year interval is evenly distributed. This distribution is essentially equivalent, regardless of whether or not a percentage of the shell-to-flange examinations are performed in the first inspection period or performed concurrent with the reactor vessel 10-year examinations at the end of the inspection interval.

In addition to the above reasons, performing the automated reactor vessel examinations during a single refueling outage improves consistency of the examinations by utilizing the same equipment, personnel, and procedures. Moreover, this improves the reliability and reproducibility of the examinations while reducing exposure."

5.0 EVALUATION

Section XI of the ASME Code, 1992 Edition through the 1993 Addenda, Table IWB-2500-1, requires that the reactor pressure vessel (RPV) shell-to-flange weld be volumetrically examined once each inspection interval. The footnotes to Table IWB-2500-1 provide partial deferrals for the subject welds. Footnote (3) specifies that during the first and second period, the examination may be performed from the flange face, and the remaining volumetric examinations required to be conducted from vessel wall may be performed at or near the end of the inspection interval. Footnote (4) provides deferral of the shell-to-flange weld stating that the examinations may be performed during the first and third periods, provided at least 50 % of the shell-to-flange weld be examined by the end of the first period, and the remainder by the end of the third inspection period.

During the first period of the first and second ISI intervals for ANO-1 and ANO-2, and during the first ISI interval at Waterford 3, the RPV shell-to-flange welds received a partial examination from the flange face. This partial examination allowed the licensee to defer the remaining volumetric examination of the shell-to-flange weld until the third period of the respective interval. The licensee states that performing a partial examination of the subject welds from the flange face in the first period of the previous intervals created personnel safety and radiation exposure concerns. Specifically, the manual scanning from the flange face requires personnel to position themselves under a suspended RPV head that is used to shield them from the significant radiation dose. The dose rates were measured to be 350 to 1,500 mrem/hr, with the RPV head as shielding. Therefore, imposition of the ASME Code requirements would result in a hardship.

Examination Category B-A, Item B1.30 of the ASME Code allows licensees to perform the RPV shell-to-flange examination in conjunction with the nozzle examinations of Examination Category B-D. The licensee plans to use ASME Code Case N-521 which allows the deferral of inspection of nozzle-to-vessel welds, inside radius sections, and nozzle-to-safe end welds to the end of the interval. ASME Code Case N-521, which has been approved for use by the NRC in Regulatory Guide 1.147, stipulates that "... (a) [n]o inservice repairs or replacements by welding have ever been performed ..., (b) [n]one of the Nozzle-to-Vessel Welds, Inside Radius Sections, or Nozzle-to Safe End Welds contains identified flaws or relevant conditions that currently require successive inspections in accordance with IWB-2420(b),..." and "(c) [t]he unit is not in the first inspection interval." In addition, the NRC staff has added a provision that the period of time between successive examinations does not exceed 10-year interval requirements. The licensee has committed to perform the nozzle examinations at the end of the interval and in accordance with ASME Code Case N-521.

The licensee proposes to perform 100 percent volumetric examination of the reactor vessel shell-to-flange weld concurrent with the reactor vessel 10-year examination at or near the end of the ISI interval. Similar to ASME Code Case N-521, ASME Code Case N-623 addresses the same three conditions that are to be met prior to allowing the deferral of shell-to-flange welds. The staff requested additional information from the licensee to address the conditions of ASME Code Case N-623. In a letter dated August 21, 2000, the licensee responded that there have been no repairs performed on the shell-to-flange welds at either ANO unit or Waterford 3, and there have been no flaw indications or relevant conditions that currently require successive examinations in accordance with IWB-2420(b). It is also noted that both ANO units and Waterford 3 are not in their first inspection interval. Therefore, the staff finds that the licensee meets the requirements listed in ASME Code Case N-623.

In addition, the staff finds that deferral of the weld examinations to the end of each units respective interval is supported by the operating history of the industry. The industry experience to-date indicates that examinations performed on the RPVs shell-to-flange weld have not identified detrimental flaws or relevant conditions and that changing the schedule for examining this weld to the end of the unit's 10-year ISI interval will provide a suitable frequency for verifying the integrity of the subject welds. The subject welds will still receive the same examinations that have been required by ASME Code, Section XI since the reactors were placed in commercial service. The only change is that the RPV shell-to-flange weld examinations will be deferred to the end of the inspection interval without conducting partial examinations from the flange face earlier in the inspection interval. No changes are being made to the volumes or areas of material that are examined, nor to the NDE personnel qualifications. This relief request does not involve changes to NDE methods or acceptance criteria. In addition, in the previous inspection interval, the reactor vessel shell-to-flange welds were examined twice for both ANO units and Waterford 3. The first examination was a partial examination from the flange face at each unit. The second examination was performed during the third inspection period for each unit obtaining 100 percent coverage. Therefore, no more than 10 years will transpire before the next interval examinations are performed. The subject welds will be examined along with the other RPV shell and nozzle-to-vessel welds using the same automated equipment, personnel, and procedures. The process improves the reliability and reproducibility of the examinations, therefore providing reasonable assurance that the structural integrity of the RPV shell-to-flange is being maintained. Requiring the licensee to manually perform the first period examinations on only the RPV shell-to-flange weld would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, the licensee's proposed alternative contained in Relief Request CEP-ISI-001, Revision 0, is authorized pursuant to 10 CFR 50.55(a)(3)(ii).

6.0 CONCLUSION

The staff has reviewed EOI's submittal, dated April 24, 2000, as supplemented by letter dated August 21, 2000, regarding Relief Request CEP-ISI-001, Revision 0, for ANO-1, ANO-2, and Waterford 3, and has determined that compliance with the requirements of IWB-2420(a) and Note (4) of Table IWB-2500-1, Examination Category B-A, would result in a hardship without a compensating increase in the level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), EOI's proposed alternative contained in its Relief Request CEP-ISI-001, 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.

Principal Contributor: A. Keim and N. Kalyanam

Date: October 3, 2000

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February 2000