October 2, 2003

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

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 (ANO-2) AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3) - RELAXATION REQUEST FROM U.S. NUCLEAR REGULATORY COMMISSION (NRC) ORDER EA-03-009 FOR THE VESSEL HEAD PENETRATION VENT LINE NOZZLE (TAC NOS. MB9882 AND MB9883)

Dear Mr. Krupa:

By letter dated July 1, 2003, as supplemented by letters dated July 24 and August 27, 2003, you submitted a relaxation request from NRC Order EA-03-009. Specifically, you requested authorization to inspect the vessel head penetration vent line nozzle and J-groove weld at ANO-2 and Waterford 3 using the eddy current testing technique.

Pursuant to the procedure specified in Section IV, Paragraph F of the Order, you requested relaxation from the requirement specified in Section IV, Paragraph C, Item (1)(b), to perform either ultrasonic testing of each vessel head penetration nozzle, or a wetted surface examination using eddy current testing or dye penetrant testing of each head penetration nozzle. You plan to use the ultrasonic testing technique described in Section IV, Paragraph C, Item (1)(b)(i) to inspect all head penetration nozzles, except for the head vent line nozzle. You requested relaxation from the Order to allow a wetted surface examination using eddy current testing to inspect the head vent line nozzle.

The NRC staff has completed its review and concludes that you have demonstrated good cause for the requested relaxation in that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to Section IV, Paragraph F, of Order EA-03-009, the staff authorizes the proposed relaxation and alternative inspection at ANO-2 and Waterford 3 during the period that NRC Order EA-03-009 is in effect. The staff's related Safety Evaluation is enclosed.

Be aware that when vessel head inspections are performed using American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) requirements,

acceptance criteria, or qualified personnel, those activities and all related activites fall within the jurisdiction of the ASME Code. Therefore, Order-related inspection activities may be subject to third party review, including those by the Authorized Nuclear Inservice Inspector.

Sincerely,

/RA/

Herbert N. Berkow, Director
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-368 and 50-382

Enclosure: Safety Evaluation

cc w/Encl: See next page

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Sincerely,

/RA/

Herbert N. Berkow, Director
Project Directorate IV
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Enclosure: Safety Evaluation

cc w/Encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FACILITY OPERATING LICENSE NOS. NPF-6 AND NPF-38

ENTERGY OPERATIONS, INC.

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

WATERFORD STEAM ELECTRIC STATION, UNIT 3 (WATERFORD 3)

DOCKET NOS. 50-368 AND 50-382

1.0 INTRODUCTION

U.S. Nuclear Regulatory Commission (NRC) Order EA-03-009 (the Order), issued on February 11, 2003, requires specific examinations of the reactor pressure vessel (RPV) head and vessel head penetration (VHP) nozzles of all pressurized water reactor plants. Section IV, Paragraph F, of the Order states that requests for relaxation of the Order associated with specific penetration nozzles will be evaluated by the NRC staff using the procedure for evaluating proposed alternatives to the American Society of Mechanical Engineers Boiler and Pressure Vessel Code in accordance with 10 CFR 50.55a(a)(3). Section IV, Paragraph F, of the Order states that a request for relaxation regarding inspection of specific nozzles shall address the following criteria: (1) the proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety, or (2) compliance with this Order for specific nozzles would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

For ANO-2, Waterford 3, and similar plants determined to have a high susceptibility to primary water stress corrosion cracking (PWSCC), in accordance with Section IV, Paragraphs A and B, of the Order, the following inspections are required to be performed every refueling outage in accordance with Section IV, Paragraph C.(1) of the Order:

a. Bare metal visual examination of 100% of the RPV head surface (including 360° around each RPV head penetration nozzle), AND

b. Either:

   (i) Ultrasonic testing of each RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, OR

   (ii) Eddy current testing or dye penetrant testing of the wetted surface of each J-Groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.

Footnote 3 of the Order provides specific criteria for examination of repaired VHP nozzles.

By letter dated August 27, 2003 (CNRO-2003-00034), Entergy Operations, Inc. (Entergy, the licensee) requested relaxation to implement alternatives to the requirements of Section IV, Paragraphs C.(1)(b)(i) and C.(1)(b)(ii), for ANO-2 and Waterford 3. In particular, the licensee requested to use the requirements of Section IV, Paragraphs C.(1)(b)(ii) to inspect the RPV head penetration vent line nozzle and the requirements of Section IV, Paragraphs C.(1)(b)(i) to inspect the remainder of the VHP nozzles. The August 27, 2003, letter superceded a request dated July 24, 2003, which superceded a request dated July 1, 2003.

2.0 RELAXATION REQUEST FOR PROPOSED ALTERNATIVE INSPECTION FOR RPV HEAD NOZZLES, ORDER EA-03-009

2.1 Order Requirements for which Relaxation is Requested

Section IV.C.(1)(b) of Order EA-03-009 requires, in part, that the following inspections be performed during every refueling outage for high susceptibility plants similar to ANO-2 and Waterford 3:

> Either:
>
> (i) Ultrasonic testing of each RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, OR
>
> (ii) Eddy current testing or dye penetrant testing of the wetted surface of each J-Groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.

The licensee has requested relaxation from Section IV.C.(1)(b) of the Order. The licensee requests to use a combination of inspection methods using Section IV.C.(1)(b)(ii) to inspect the RPV head vent line nozzle, and Section IV.C.(1)(b)(i) to inspect the control element drive mechanism (CEDM) nozzles and the incore instrument (ICI) nozzles.

2.2 Licensee's Proposed Alternative for ANO-2 and Waterford 3

The licensee states that ANO-2 RPV head has ninety (90) penetration nozzles that include eighty-one (81) CEDM nozzles, eight (8) ICI nozzles, and one (1) vent line nozzle. The licensee also states that Waterford-3 RPV head has one hundred-two (102) penetration nozzles that include ninety-one (91) CEDM nozzles, ten (10) ICI nozzles, and one (1) vent line nozzle. Entergy requests relaxation from and proposes an alternative to the requirements of the Order for inspections at ANO-2 and Waterford 3 as discussed below.

The August 27, 2003, letter states that it is understood that the Order requires that the same technique, specified in Section IV.C.(1)(b), be used to inspect the entire population of RPV head penetration nozzles; combining techniques or using one technique on one or more nozzles and the other technique on the remaining nozzles is not permitted.

Entergy states that it plans to inspect the CEDM and ICI nozzles using the ultrasonic testing (UT) inspection technique as specified in Section IV.C.(1)(b)(i) of the Order or in accordance with approved relaxation requests. In lieu of using the UT inspection technique on every RPV head penetration nozzle, the licensee requests authorization to inspect the vent line nozzle and J-groove weld using the eddy current testing (ECT) technique per Section IV.C(1)(b)(ii) of the Order.

The licensee states that as required by the Order, a 60-day post-outage report for ANO-2 and Waterford 3 will be submitted and will include specific inspection information, i.e., type, extent, and results of inspections performed.

2.3 Licensee's Basis for Proposed Alternatives for ANO-2 and Waterford-3

The licensee states that because the Order requires inspecting the entire population of RPV head penetration nozzles using only one of the techniques specified in Section IV.C.(1)(b), the licensee's options are limited without measurably increasing the level of quality or safety. Entergy believes that using either inspection technique is sufficient to detect the PWSCC phenomena, and that no significant benefit is gained by requiring the same technique to be used on all nozzles.

The licensee contends that conditions at ANO-2 and Waterford 3 warrant using a different technique on different nozzles due to nozzle configuration. Specifically, the licensee states that the UT inspection probe used to examine the CEDM and ICI nozzles is not suitable for the leakage assessment required by Section IV.C.(1)(b)(i) of the Order due to the lack of an interference fit on the smaller vent line nozzle; therefore, Entergy proposes to use a different technique (i.e., ECT) to perform this inspection.

3.0 EVALUATION

The NRC staff's review of this relaxation request is based on Criterion (1) of Section IV, Paragraph F of the Order which states:

> *The proposed alternative(s) for inspection of specific nozzles will provide an acceptable level of quality and safety.*

The licensee's proposed alternative will allow the use of the requirements prescribed in Section IV.C.(1)(b)(ii) of the Order to inspect the vent line nozzle while using the requirements prescribed in Section IV.C.(1)(b)(i) of the Order to inspect the CEDM and ICI nozzles. The NRC staff has reviewed the licensee's proposed combination of inspection techniques and finds that the proposed inspection of the VHP nozzles will be sufficient to detect PWSCC phenomena and provide reasonable assurance of structural integrity. Therefore, the proposed alternative will provide an acceptable level of quality and safety.

4.0 CONCLUSION

The staff concludes that the licensee's proposed alternative to allow the use of the requirements of Order Section IV.C.(1)(b)(ii) for inspection of the RPV head penetration vent line and use of the requirements of Section IV.C.(1)(b)(i) for inspection of the remainder of the VHP nozzles is sufficient to detect PWSCC and provides reasonable assurance of the structural integrity of the

RPV head. Thus, the staff concludes that the licensee has demonstrated good cause for the requested relaxation in that the proposed alternative provides an acceptable level of quality and safety. Therefore, pursuant to Section IV, Paragraph F, of Order EA-03-009, the staff authorizes the proposed relaxation and alternative inspection of the RPV head penetration nozzles at ANO-2 and Waterford 3 during the period that NRC Order EA-03-009 is in effect.

Principal Contributor: R. Davis

Date: October 2, 2003

Arkansas Nuclear One and Waterford Steam Electric Station, Unit 3

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