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

August 16, 2016

Vice President, Operations
Arkansas Nuclear One
Entergy Operations, Inc.
1448 S.R. 333
Russellville, AR 72802

SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 2 – RELIEF REQUEST NOS. ANO2-ISI-018 AND ANO2-ISI-019, RELIEF FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS SECTION XI VOLUMETRIC EXAMINATION REQUIREMENTS (CAC NOS. MF7271 AND MF7272)

Dear Sir or Madam:

By letter dated January 14, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16015A276), as supplemented by letter dated May 24, 2016 (ADAMS Accession No. ML16147A091), Entergy Operations, Inc. (Entergy, the licensee), submitted to the Nuclear Regulatory Commission (NRC) requests for relief from certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), for Section XI volumetric examination requirements at Arkansas Nuclear One (ANO), Unit 2.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(6)(i), the licensee requested relief and to use alternative requirements (if necessary), for inservice inspection (ISI) items on the basis that the code requirement is impractical. Specifically, in Relief Request Nos. ANO2-ISI-018 and ANO2-ISI-019, Entergy requests relief from certain ASME Code Section XI volumetric examination requirements for several pressurizer nozzle welds and shutdown cooling heat exchanger welds. The NRC notes that in the supplement dated May 24, 2016, Entergy stated that it has decided to pursue a complete replacement of the shutdown cooling heat exchangers, the subject components of Relief Request No. ANO2-ISI-019, and is therefore withdrawing Relief Request No. ANO2-ISI-019 from further review by the NRC. By way of this letter, the NRC acknowledges the withdrawal of Relief Request No. ANO2-ISI-019.

The NRC staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that Entergy has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the staff grants Relief Request No. ANO2-ISI-018 for the ANO, Unit 2, fourth 10-year ISI interval.

If you have any questions, please contact Stephen Koenick at (301) 415-6631 or by e-mail at Stephen.Koenick@nrc.gov.

Sincerely,

Shaun M. Anderson, Acting Chief
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

Enclosure:
Safety Evaluation

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UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST NOS. ANO2-ISI-018 AND ANO2-ISI-019 REGARDING THE

PRESSURIZER AND SHUTDOWN COOLING HEAT EXCHANGERS

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

ENTERGY OPERATIONS, INC

ARKANSAS NUCLEAR ONE, UNIT 2

DOCKET NO. 50-368

1.0 INTRODUCTION

By letter dated January 14, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16015A276), as supplemented by letter dated May 24, 2016 (ADAMS Accession No. ML16147A091), Entergy Operations, Inc. (Entergy, the licensee), requested relief from certain American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), for Section XI volumetric examination requirements at Arkansas Nuclear One (ANO), Unit 2.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(g)(6)(i), the licensee requested relief and to use alternative requirements (if necessary), for inservice inspection (ISI) items on the basis that the code requirement is impractical. Specifically, in Relief Request Nos. ANO2-ISI-018 and ANO2-ISI-019, Entergy requests relief from certain ASME Code Section XI volumetric examination requirements for several pressurizer nozzle welds and shutdown cooling heat exchanger welds, respectively.

The NRC notes that in the supplement dated May 24, 2016, Entergy stated that it has decided to pursue a complete replacement of the shutdown cooling heat exchangers, the subject components of Relief Request No. ANO2-ISI-019, and is therefore withdrawing Relief Request No. ANO2-ISI-019 from further review by the NRC. Thus, the NRC determined that evaluation of Relief Request No. ANO2-ISI-019 is not required, and will not be discussed further in the safety evaluation.

2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the ASME Code and applicable edition and addenda, as required by 10 CFR 50.55a(g). When conformance to these requirements are determined to be impractical, relief may be granted by

Enclosure

not endanger life or 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 on the facility.

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, 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(a)(1)(ii), 12 months prior to the start of the 120-month interval, subject to the limitations and modifications in 10 CFR 50.55a(b)(2). The Code of record for ANO, Unit 2, for the fourth 10-year ISI interval is the 2003 Addenda to the 2001 Edition of the ASME Code, Section XI.

Section 50.55a(g)(5)(iii) of 10 CFR states, in part:

> Determinations of impracticality in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the [ASME] Code requirements during the inservice inspection interval for which the request is being submitted. Requests for relief made in accordance with this section must be submitted to the NRC no later than 12 months after the expiration of the initial or subsequent 120-month inspection interval for which relief is sought.

The licensee submitted Relief Request No. ANO2-ISI-018 for ANO, Unit 2 on January 14, 2016, for the fourth 10-year ISI interval, first period, which began on March 26, 2010, and ended on March 25, 2013.

The specific examination requirement for the subject welds is volumetric examination of nozzle-to-vessel welds as defined by Figures IWB-2500-7(a) through IWB-2500-7(d), "Nozzle in Shell or Head" of the ASME Code, Section XI, as specified in Table IWB-2500-1, "Examination Categories" of the ASME Code, Section XI, Examination Category B-D, Item No. B3.110. When 100 percent of the required volume cannot be examined due to interferences, obstructions, or geometrical configuration, ASME Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," allows reduction of the examination volume to 90 percent of the required volume. ASME Code Case N-460 has been approved for use by the NRC in Regulatory Guide 1.147, Revision 17, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1" (ADAMS Accession No. ML13339A689).

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request and the Commission to grant relief requested by the licensee.

3.0 TECHNICAL EVALUATION

3.1 The Licensee's Relief Requests

The proposed relief request relates to ASME Code, Section XI, volumetric evaluation requirements for ANO Unit 2. The relief request is for the pressurizer, specifically the Pressurizer Spray Nozzle-to-Head Weld (05-010) and Pressurizer Safety Valve Nozzle-to-Head Welds (05-011, 05-012, and 05-013) for the fourth 10-year ISI interval, first period that started on March 26 2010 and ended on March 25, 2013 for ANO Unit 2.

For the subject welds, the licensee achieved less than 90 percent coverage of the required examination volume, due to the nozzle-to-head configuration of the components. This restriction makes the ASME Code required examination coverage impractical. Plant modifications or replacement of components to allow for complete coverage would be needed to meet the ASME Code requirements. The licensee is not proposing alternative testing, rather, they have examined these welds to the extent practical and will continue to perform pressure testing on the subject components as required by the ASME Code.

3.2 NRC Staff Evaluation

The information provided by the licensee in support of Relief Request No. ANO2-ISI-018 has been evaluated and the bases for disposition are documented below. By electronic correspondence dated April 26, 2016 (ADAMS Accession No. ML16118A043), the NRC staff issued a request for additional information (RAI) to support the evaluation of Relief Request No. ANO2-ISI-018.

The examination coverages achieved for the Pressurizer Nozzle Welds 05-010, 05-011, 05-012, and 05-013 are less than 90 percent of the required volume and are limited due to the nozzle-to-head configuration of the components. As such, obtaining the ASME Code required examination volume would require significant modification of the pressurizer vessel and nozzles, which imposes a burden upon the licensee.

The licensee stated that the examinations of the Pressurizer Nozzle Welds 05-010, 05-011, 05-012, and 05-013 were performed with manual ultrasonic testing (UT) examination. In its response to the NRC staff's RAI 2 by letter dated May 24, 2016, the licensee stated that the UT examinations in Relief Request No. ANO2-ISI-018 comply with Article 4 to Section V of the ASME Code as specified in Appendix I to Section XI of the ASME Code. The licensee also listed the applicable supplements from Appendix I to Section XI of the ASME Code. The NRC staff accepts the licensee's response and thus, RAI 2 is resolved with respect to Relief Request No. ANO2-ISI-018.

Pressurizer Nozzle Welds 05-010, 05-011, 05-012, and 05-013 were examined to the maximum extent possible from both sides of the weld, using 0-degree, 45-degree, and 60-degree shear and longitudinal wave search units, scanning both parallel and perpendicular to the weld. In RAI 1a, RAI 1b, and RAI 1c the NRC staff requested the licensee to clarify the coverage diagrams provided in the submittal. In its response to RAI 1a by letter dated May 24, 2016, the licensee provided separate axial (perpendicular) and circumferential (parallel) scan diagrams.

These separate diagrams and the supporting information in the licensee's responses to RAI 1b and RAI 1c regarding the diagrams, enabled the NRC staff to confirm the examination coverages achieved. Therefore, RAI 1a, RAI 1b, and RAI 1c are resolved. The examination volumes included the weld and base materials near the inside surface of the weld joint, which are regions of high stress, and where one would expect degradation to be manifested should it occur.

For Pressurizer Nozzle Weld 05-010, the UT examinations revealed no recordable indications. For Pressurizer Nozzle Welds 05-011, 05-012, and 05-013, the UT examinations revealed intermittent geometric indications at the interface of the nozzle bore. As stated in Supplement 11 of Appendix I to Section XI of the ASME Code, geometric indications need not be characterized as originating from flaws. In its response to RAI 3 by letter dated May 24, 2016, the licensee stated that the ANO, Unit 2 pressurizer was replaced in 2006 and that there has been no degradation identified in the pressurizer welds thus far. Thus, RAI 3 with respect to Relief Request No. ANO2-ISI-018 weld, is resolved. Based on the examination coverage obtained for the subject welds, if significant service-induced degradation were occurring, the NRC staff concluded that there is reasonable assurance that evidence of degradation would be detected by the examination coverage achieved.

Based on the above discussion, the NRC staff determined that obtaining the ASME Code required examination volume is impractical because of the nozzle-to-head configuration of the subject welds. Significant modification of the pressurizer vessel and nozzles would be needed for ASME Code compliance, which imposes a burden upon the licensee. The staff also determined that the volumetric UT examination performed to the maximum extent possible provides reasonable assurance of the structural integrity of the subject pressurizer nozzle welds in Relief Request No. ANO2-ISI-018. The licensee will continue to perform the required pressure testing, which includes visual examination for evidence of leakage.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that granting relief pursuant to 10 CFR 50.55a(g)(6)(i) is authorized by law and will not endanger life or property, or the common defense and security, and is otherwise in the public interest given due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Furthermore, the staff concludes that the licensee's examinations were performed to the maximum extent possible and provide reasonable assurance of the structural integrity of the subject ANO, Unit 2 pressurizer nozzle welds. Accordingly, the staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(g)(6)(i). Therefore, the staff grants Relief Request No. ANO2-ISI-018 for the ANO, Unit 2, fourth 10-year ISI interval.

All other requirements of Section XI of the ASME Code for which relief was not specifically requested and approved in the subject relief requests remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: David Dijamco, NRR/DE/EVIB

Date: August 16, 2016

If you have any questions, please contact Stephen Koenick at (301) 415-6631 or by e-mail at Stephen.Koenick@nrc.gov.

Sincerely,

/RA/

Shaun M. Anderson, Acting Chief
Plant Licensing IV-2 and Decommissioning
Transition Branch
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-368

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Safety Evaluation

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