



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

April 25, 2011

Vice President, Operations  
Entergy Nuclear Operations, Inc.  
Indian Point Energy Center  
450 Broadway, GSB  
P.O. Box 249  
Buchanan, NY 10511-0249

SUBJECT: INDIAN POINT NUCLEAR GENERATING UNIT NO. 2 – RELIEF REQUEST NO.  
IP2-ISI-RR-12, REACTOR VESSEL SHELL-TO-FLANGE WELD INSPECTION  
FOR THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL  
(TAC NO. ME5180)

Dear Sir or Madam:

By letter dated December 14, 2010, Entergy Nuclear Operations, Inc. (the licensee) submitted Relief Requests IP2-ISI-RR-12, to the U.S. Nuclear Regulatory Commission (NRC) for relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at Indian Point Nuclear Generating Unit Nos. 2 (IP2).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(i), Entergy requested authorization to utilize the alternative requirements in ASME Code, Section XI, 1995 Edition with 1996 Addenda, Appendix VIII, Supplements 4 and 6 as amended by 10 CFR 50.55a in lieu of the requirements of IWA-2232, that requires Ultrasonic Testing (UT) examination of the Reactor Pressure Vessel (RPV) shell-to-flange weld to be in accordance with ASME Code, Article 4 of Section V, as supplemented by Appendix I of Section XI.

The NRC staff has reviewed the licensee's proposed alternative to apply ASME Code, Section XI, Appendix VIII examination requirements when volumetrically examining the IP2 RPV Shell to Flange Weld by UT, and concludes that the procedures, equipment, and personnel qualified to ASME Code, Section XI, Appendix VIII have shown a high probability of flaw detection, and have increased the reliability of examinations of weld configurations within the scope of the PDI program. Therefore, the proposed alternative will provide an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the IP2 fourth 10-year ISI interval, effective from March 2007 through May 2016.

V. P. Operations

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

If you have any questions, please contact the Indian Point Project Manager, John Boska, at (301) 415-2901.

Sincerely,



Nancy L. Salgado, Chief  
Plant Licensing Branch I-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-247

Enclosure:  
As stated

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ON THE FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION

RELIEF REQUEST NO. IP2-ISI-RR-12

ENTERGY NUCLEAR OPERATIONS, INC.

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2

DOCKET NO. 50-247

1.0 INTRODUCTION

By letter dated December 14, 2010 (Agencywide Document Access and Management System (ADAMS) ML103560598), Entergy Nuclear Operations, Inc. (the licensee) submitted the Relief Request IP2-ISI-RR-12, to the U.S. Nuclear Regulatory Commission (NRC) for relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at Indian Point Nuclear Generating Unit No. 2 (IP2).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(i), Entergy requested authorization to utilize the alternative requirements in ASME Code, Section XI, 1995 Edition with 1996 Addenda, Appendix VIII, Supplements 4 and 6 as amended by 10 CFR 50.55a in lieu of the requirements of IWA-2232, that requires Ultrasonic Testing (UT) examination of the Reactor Pressure Vessel (RPV) shell-to-flange weld to be in accordance with ASME Code, Article 4 of Section V, as supplemented by Appendix I of Section XI.

The subject Relief Request is for the Fourth 10-Year Inservice Inspection Interval at IP2, effective March 2007 through May 2016.

2.0 REGULATORY REQUIREMENTS

Inservice inspection (ISI) of the ASME Code, Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by 10 CFR 50.55a(g), except where specific relief has been granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i). 10 CFR 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if: (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements 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 pre-service examination requirements, set forth in the ASME Code, Section XI, "Rules for

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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 ASME Code of Record for the IP2 fourth 10-year ISI interval program is the 2001 Edition through the 2003 Addenda of Section XI of the ASME Code.

### 3.0 EVALUATION

#### RR No. IP2-ISI-RR-12

##### ASME Code Components

Reactor Pressure Vessel (RPV) Shell-to-Flange Weld.

##### ASME Code Requirements

ASME Code, Section XI, Category B-A, Item B1.30, Pressure Retaining Welds in Reactor Vessel specifies that a volumetric examination must be performed once per each 10-year interval. The 2001 Edition, 2003 Addenda of ASME Code, Section XI, Subsection IWA-2232, requires UT examination of the RPV shell-to-flange weld to be in accordance with ASME Code, Section V, Article 4 of, as supplemented by ASME Code, Section XI, Appendix I.

Additionally, Regulatory Guide (RG) 1.150, Revision 1, "Ultrasonic Testing of Reactor Vessel Welds during Pre-service and In-service Examinations," augments the ASME Code, Section V and Section XI requirements.

##### Licensee's Basis for Relief Request (As stated)

Pursuant to 10 CFR 50.55a(a)(3)(ii), relief is requested from the requirements of [ASME Code, Section XI,] Subsection IWA-2232 since the vendor performing the inspection has qualified their equipment, procedures and personnel to the requirements of ASME [Code,] Section XI, 1995 Edition with 1996 Addenda, Appendix VIII, Supplements 4 and 6 as amended by 10 CFR 50.55a. Performing the inspection in accordance with the requirements of [ASME Code, Section XI,] IWA-2232 would require the inspection vendor to also qualify their equipment, procedures and personnel to the requirements of [ASME Code, Section V,] Article 4 of, as supplemented by [ASME Code, Section XI,] Appendix I. Since the inspection methods provided in [ASME Code, Section XI,] Appendix VIII have been proven to be more effective in detecting and sizing flaws, the use of [ASME Code,] Section V techniques would require additional resources and result in a less effective inspection. The [RPV] flange-to-shell drawing<sup>1</sup> that will be developed as part of the examination program plan will be similar to the drawing

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1 The RPV Flange-to-Shell Drawing is not included in this report.

in Enclosure four to Entergy letter NL-09-022, dated February 9, 2009, for the [Indian Point,] Unit 3 relief request RR-3-47(l) (TAC ME0413).

Licensee's Proposed Alternative Examination (As stated)

Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy requests authorization to utilize the alternative requirements in ASME [Code,] Section XI, 1995 Edition with 1996 Addenda, [ASME Code, Section XI,] Appendix VIII, Supplements 4 and 6 as amended by 10 CFR 50.55a in lieu of the requirements of [ASME Code, Section XI,] IWA-2232, that requires UT examination of the RPV shell-to-flange weld to be in accordance with [ASME Code, Section V,] Article 4, as supplemented by [ASME Code, Section XI,] Appendix I.

[ASME Code, Section XI,] Appendix VIII requirements were developed and adopted to ensure the effectiveness of [UT] examinations within the nuclear industry by means of a rigorous, item specific performance demonstration containing flaws of various sizes, locations, and orientations. The performance demonstration process has established with a high degree of confidence, the capability of personnel, procedures, and equipment to detect and characterize flaws that could be detrimental to the structural integrity of the RPV. The [Performance Demonstration Initiative] (PDI) approach has demonstrated that for detection and characterization of flaws in the RPV the [UT] examination techniques are equal to or better than the requirements of the ASME [Code,] Section V, Article 4 [UT] examination requirements.

Though [ASME Code, Section XI,] Appendix VIII is not required for the RPV shell-to-flange weld examination, the use of [ASME Code, Section XI,] Appendix VIII, Supplements 4 and 6 criteria for detection and sizing of flaws in this weld will be equal to or exceed the requirements of ASME [Code,] Section V, Article 4. Therefore, the use of the proposed alternative will continue to provide an acceptable level of quality and safety, and approval is requested pursuant to 10 CFR 50.55a(a)(3)(i).

Staff Evaluation

The 2001 Edition through the 2003 Addenda of the ASME Code, Section XI, IWA-2232 states, "Ultrasonic examination shall be conducted in accordance with Appendix I." ASME Code, Section V, Article 4 provides a prescriptive process for qualifying UT of procedures and the scanning requirements for examinations. The UT performed to ASME Code, Section V, Article 4 uses detailed criteria for setting up and calibrating equipment, calculating coverage, and detecting indications. The capability of an ASME Code, Section V, Article 4 UT examination is demonstrated with calibration blocks made from representative material containing holes and notches.

The licensee proposes, in lieu of the ASME Code, Section V, Article 4 angle beam examination to use an examination that will be performed using examination procedures, personnel, and equipment qualified in accordance with ASME Code, Section XI, Appendix VIII, Supplements 4 and 6, as modified by 10 CFR 50.55a. 10 CFR 50.55a limits the use of ASME Code, Section XI, Appendix VIII to the 2001 Edition of the ASME Code with no Addenda. ASME Code, Section XI, Appendix VIII is a performance-based UT method. Performance-based UT requires that

detailed criteria be used for performance demonstration tests. The results for the tests are compared against statistically developed screening criteria. The tests are performed on representative mockups containing flaws similar to those found in operating plants. The performance-based tests demonstrate the effectiveness of UT personnel and procedures. Examinations are performed with the scanning requirements for Supplements 4 and 6 that are provided in 10 CFR 50.55a(b)(2)(xv)(G), and the scanning volume identified in the ASME Code, Section XI, Figure IWB-2500-4 for the shell-to-flange weld.

The scanning requirements are: (1) for the examination of the inner 15 percent through-wall volume, scanning will be performed in four orthogonal directions to the maximum extent possible with procedures and personnel qualified to ASME Code, Section XI, Appendix VIII, Supplement 4 or; (2) if the inner 15 percent through-wall volume examination is not possible as required above, the inner 15 percent through-wall volume is considered fully examined if coverage is obtained in at least one parallel and one perpendicular direction using personnel and procedures qualified for single side examination in accordance with ASME Code, Section XI, Appendix VIII, Supplement 4 and Supplement 6; and (3) the remaining 85 percent through-wall volume is considered fully examined if coverage is obtained in one parallel and one perpendicular direction using procedures and personnel qualified for single side examination. Single side qualification criteria are provided in 10 CFR 50.55a(b)(2)(xv)(G)(2) and 10 CFR 50.55a(b)(2)(xvi).

The procedures, equipment, and personnel qualified to ASME Code, Section XI, Appendix VIII have shown a high probability of flaw detection, and have increased the reliability of examinations of weld configurations within the scope of the PDI program. Therefore, the proposed alternative will provide an acceptable level of quality and safety.

#### 4.0 CONCLUSION

The NRC staff has reviewed the licensee's proposed alternative to apply ASME Code, Section XI, Appendix VIII examination requirements when volumetrically examining the IP2 RPV Shell to Flange Weld by UT, and concludes that the procedures, equipment, and personnel qualified to ASME Code, Section XI, Appendix VIII have shown a high probability of flaw detection, and have increased the reliability of examinations of weld configurations within the scope of the PDI program. Therefore, the proposed alternative will provide an acceptable level of quality and safety and is authorized pursuant to 10 CFR 50.55a(a)(3)(i) for the IP2 fourth 10-year ISI interval, effective March 2007 through May 2016.

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

Principal Contributor: T. McLellan, NRR/DCI/CVIB

Date: April 25, 2011

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

If you have any questions, please contact the Indian Point Project Manager, John Boska, at (301) 415-2901.

Sincerely,

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Nancy L. Salgado, Chief  
Plant Licensing Branch I-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

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