

October 24, 2002

Mr. Michael R. Kansler
Senior Vice President and
Chief Operating Officer
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: RELIEF REQUEST NOS. 59 AND 3-30 FROM AMERICAN SOCIETY OF
MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE
SECTION XI, INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3
(TAC NOS. MB5503 AND MB5504)

Dear Mr. Kansler:

In a letter dated July 1, 2002, you submitted Relief Request Nos. 59 and 3-30 for Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and 3), respectively. Relief was requested from the repair requirements of Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) in order to use electric discharge machining (EDM) for contingency repairs on reactor pressure vessel (RPV) head penetration nozzles. Specifically, you requested authorization to use the alternative requirements of later editions of the ASME Code to qualify the EDM process should repairs on the RPV head nozzles or J-groove welds become necessary. You stated that the EDM process would be used, if necessary, to excavate cracks from primary water stress corrosion or other defects and to remove weld crown surfaces of repair welds to facilitate performance of final nondestructive examination (NDE).

The NRC staff reviewed the proposed alternative in Relief Request Nos. 59 and 3-30. The results are provided in the enclosed safety evaluation. The NRC staff has concluded that the proposed alternative to the ASME Code requirements in Relief Request Nos. 59 and 3-30, is acceptable. Pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for the remainder of the third inservice inspection interval that is for IP2 until April 3, 2006, and for IP3 until July 20, 2009.

M. Kansler

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If you should have any questions, please contact Patrick Milano at 301-415-1457. This completes the NRC staff's action on TAC No. MB1564.

Sincerely,

/RA/

Richard J. Laufer, Chief, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-247

Enclosure: Safety Evaluation

cc w/encl: See next page

M. Kansler

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR RELIEF NOS. 59 AND 3-30

ENTERGY NUCLEAR OPERATIONS, INC.

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

DOCKET NOS. 50-247 AND 5-286

1.0 INTRODUCTION

By letter dated July 1, 2002, Entergy Nuclear Operations, Inc. (ENO or the licensee), submitted Relief Request Nos. RR-59 and RR-3-30 for Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and 3), respectively. The licensee requested authorization from the U.S. Nuclear Regulatory Commission (NRC) to use an electrical discharge machining (EDM) process for repairs of reactor pressure vessel (RPV) head penetration nozzles or J-groove welds. Specifically, the licensee requested authorization to use the alternative requirements of later editions of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) to qualify the EDM process should repairs be necessary. The RPV head penetration nozzles at IP2 and IP3 are considered to be susceptible to primary water stress corrosion cracking (PWSCC). These nozzles are manufactured from Inconel Alloy 600 with ASME Code Section II material designations of SB-166 or SB-167, which are in base material grouping P-No. 43. The licensee plans to utilize the EDM process to excavate PWSCC cracks or defects and remove weld crown surfaces of repair welds to facilitate performance of final non-destructive examination (NDE). The licensee proposes to qualify the EDM process in accordance with IWA-4461.4 of the 1995 Edition, 1997 Addenda of ASME Section XI to allow the use of thermal methods for metal removal without further mechanical processing.

2.0 REGULATORY EVALUATION

Part 50.55a, "Codes and standards," of Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a) requires licensees to comply with the ASME Code requirements for inservice inspections. 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. Also, 10 CFR 50.55a(a)(3) states, in part, that alternatives to the requirements may be used provided the licensee demonstrates that (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. As part of the licensing basis for IP2 and IP3, the licensee must comply with the 1989 Edition of the ASME Code, with no Addenda.

2.1 Code Requirement

In the 1989 Edition of the ASME Code, Subsection IWA-4120(a) of Section XI states that repairs shall be performed in accordance with the owner's Design Specification and the original Construction Code (i.e., ASME Section III) of the component or system. Later editions and addenda of the ASME Code, either in their entirety or portions thereof, and code cases may be used.

When performing defect removal on P-No. 43 material, Subsection IWA-4322 states that "[i]f thermal processes are used on P-No. 8 and P-No. 43 materials, a minimum of 1/16 in. material shall be removed from the thermally processed area."

3.0 TECHNICAL EVALUATION

3.1 Identification of Applicable Components:

Code Class:	1
Examination Category:	B-E
Item Numbers:	B4.12, B4.13
Description:	Reactor Pressure Vessel (RPV) Head Penetration Nozzles
Weld Identification Number:	CH-101-101 (Closure Head)

3.2 Licensee's Code Relief Request:

Pursuant to 10 CFR 50.55a(a)(3)(i), the licensee requested relief to conduct an alternative thermal removal requirements of IWA-4322 applicable to P-No. 43 materials due to the adverse effects of machining Alloy 600.

3.3 Licensee's Proposed Alternative:

In lieu of the Code requirement of mechanically removing 1/16" of material from all thermally processed areas as required by IWA-4322, the licensee proposed to remove the material using the EDM process. The licensee proposed to qualify the EDM process in accordance with the qualification requirements from IWA-4461.4 of the 1995 Edition, 1997 Addenda of ASME Code, Section XI. The qualification requirements of IWA-4451.4 are summarized below:

- a. The qualification test shall consist of 2 coupons of the same P-No. Material to be cut in production.
- b. The qualification coupons shall be cut using the maximum heat input to be used in production.
- c. The thermally cut surface of each coupon shall be visually examined at 10X and shall be free of cracks. The owner shall specify the acceptable surface roughness for the application and shall verify that the qualification coupon meets the criterion.
- d. Each qualification test coupon shall be cross-sectioned, and the exposed surfaces shall be polished, etched with a suitable etchant, and visually examined at 10X. All sectioned surfaces shall be free of cracks.
- e. Corrosion testing of the thermally cut surface and heat-affected zone shall be performed if the cut surface is to be exposed to a corrosive media. Alternatively, corrosion

resistance of the thermally cut surface may be evaluated. The owner shall specify the acceptance criteria.

In addition to the requirements of IWA-4461.4, the licensee stated that it will perform the following:

1. Determine the thickness of the heat affected zone (oxide) layer on the cut surface by metallographic examination during EDM process qualification.
2. Based upon the heat affected zone (oxide) thickness measurements obtained during the EDM qualification process, remove the heat affected zone (oxide) layer from cut or excavated surfaces when performing repair activities on RPV head penetration nozzles or J-welds.

Based on this proposal, the licensee concluded that its alternative process would provide for an acceptable level of quality and safety with respect to the repair of the RPV head penetration nozzles and welds.

3.4 Staff Evaluation

The NRC staff has evaluated the licensee's request and supporting information to use Relief Request Numbers RR-59 and RR 3-30, for the EDM process for metal removal should repairs of RPV head penetration nozzles or J-groove welds become necessary at IP2 and IP3.

Although considered a thermal process for removing metal, since it uses an electrical arc, EDM leaves an extremely small oxide layer on the cut surface of the metal remaining after the removal process. The licensee has committed to removing that oxide layer by mechanical means (polishing) after metal removal by the EDM process. The amount of metal removed will be determined by the qualification requirements of Subsection IWA-4461.4 of ASME Code Section XI, 1995 Edition, 1997 Addenda, with the additional requirement that the licensee will determine the thickness of the resultant oxide layer on the cut surfaces as part of the EDM qualification. The thickness of the resultant oxide layer will be determined by metallographic examination. Based on the oxide thickness measurements obtained during the EDM process qualification, post-EDM polishing operations will be performed to ensure that the oxide surface layer is removed. Since Subsection IWA-4461.4 requires the thermally cut surface of each of the two test coupons to be free of cracks, and since the licensee has committed to remove the

oxide surface layer, the NRC staff concludes that the proposed alternative provides an acceptable method of weld removal.

4.0 CONCLUSION

On the basis of the above evaluation, the NRC staff concludes that the use of the EDM process is acceptable as an alternative method of metal removal for weld repair or removal of weld crown surfaces of repair welds to facilitate performance of final NDE, should repairs of the RPV head penetration nozzles or J-welds at IP2 and IP3 be necessary. The proposed alternative

provides an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the relief requests are authorized for the remainder of the third inservice inspection interval that is for IP2 until April 3, 2006, and for IP3 until July 20, 2009.

Principal Contributor: C. Long

Date: October 24, 2002