January 17, 2003

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 NO. 60 FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND PRESSURE VESSEL CODE, SECTION XI, INDIAN POINT NUCLEAR GENERATING UNIT NO. 2 (TAC NO. MB5834)

Dear Mr. Kansler:

In a letter dated August 14, 2002, Entergy Nuclear Operations, Inc. submitted Relief Request No. 60 from the 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) for the third 10-year inservice inspection (ISI) interval at Indian Point Nuclear Generating Unit No. 2 (IP2). Specifically, the licensee proposed an alternative to the examinations of ASME Code, Section XI, 1989 Edition, Table IWB-2500-1, Categories B-B and B-D, that would require the inspection of the regenerative heat exchanger circumferential welds, tubesheet-to-shell welds, nozzle-to-vessel welds, and nozzle inside radius sections.

The Nuclear Regulatory Commission staff has reviewed the proposed Relief Request No. 60. The results are provided in the enclosed safety evaluation. The staff has concluded that complying with the requirements of Section XI of the ASME Code for the regenerative heat exchanger is impractical. The licensee's proposed alternative provides reasonable assurance of structural integrity of the regenerative heat exchanger, provided the insulation on the exchanger is removed prior to VT-2 examination. Therefore, the licensee is granted relief pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at IP2. The granting of 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 giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

If you should have any questions, please contact Patrick Milano at 301-415-1457.

Sincerely,

/RA/

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

Docket No. 50-247

Enclosure: Safety Evaluation

cc w/encl: See next page

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ACCESSION Number: ML030170509

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUEST FOR RELIEF NO. 60

ENTERGY NUCLEAR OPERATIONS, INC.

INDIAN POINT NUCLEAR GENERATING UNIT NO. 2

DOCKET NO. 50-247

1.0 INTRODUCTION

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code (ASME Code) and applicable addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the Commission 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 the licensee demonstrated 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.

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 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 (10-year) interval, subject to the limitations and modifications listed therein. The Code of record for Indian Point Nuclear Generating Unit No. 2 (IP2) during the third 10-year ISI interval is the 1989 Edition of the ASME Code.

By letter dated August 14, 2002, Entergy Nuclear Operations, Inc. (the licensee) submitted Request for Relief No. 60 from the requirements of the ASME Code, Section XI, 1989 Edition, Table IWB-2500-1, Category B-B and B-D, regarding the inspection of regenerative heat exchanger circumferential welds, tubesheet-to-shell welds, nozzle-to-vessel welds, and nozzle inside radius sections. The Nuclear Regulatory Commission (NRC) staff has reviewed and evaluated the licensee's request for relief pursuant to 10 CFR 50.55a(g)(6)(i).

2.0 DISCUSSION

2.1 Code Requirement

The 1989 Edition of the ASME Code Section XI, Table IWB-2500-1, Category B-B, requires that a volumetric examination be performed on the regenerative heat exchanger circumferential head welds and tubesheet-to-shell welds. Table IWB-2500-1, Category B-D, requires the volumetric examination of the nozzle inside radius sections and the nozzle-to-vessel welds.

In addition to the above-mentioned Code requirements, a surface examination (liquid penetrant) of the affected welds (i.e., Code item #B3.150) is performed as a compensatory measure for weld geometric physical constraints. These constraints preclude coverage of at least 90 percent of the inspection volume as required by the Code requirements. This additional surface examination was a proposed examination alternative contained in previously approved Relief Request No. 8.

2.2 Components Affected

Code Class:	1
Reference:	IWB-2500, Table IWB-2500-1
Examination Category:	B-B, B-D
Item Number:	B2.51, B2.80, B3.150, B3.160
Description:	Regenerative Heat Exchanger Circumferential Welds, Tubesheet-to-Shell Welds, Nozzle-to-Vessel Welds, and Nozzle Inside Radius Sections
Components:	21 Regenerative Heat Exchanger Welds

Welds	Description	Code Item #	Class
RGX C-1-1	Circumferential Head Weld	B2.51	1
RGX C-1-4	Circumferential Head Weld	B2.51	1
RGX C-1-2	Tubesheet-to-Shell Weld	B2.80	1
RGX C-1-3	Tubesheet-to-Shell Weld	B2.80	1
RGX N-1-1	Nozzle-to-Vessel Weld	B3.150	1
RGX N-1-2	Nozzle-to-Vessel Weld	B3.150	1
RGX N-1-3	Nozzle-to-Vessel Weld	B3.150	1
RGX N-1-4	Nozzle-to-Vessel Weld	B3.150	1
RGX N-1-1	Nozzle Inside Radius	B3.160	1
RGX N-1-2	Nozzle Inside Radius	B3.160	1
RGX N-1-3	Nozzle Inside Radius	B3.160	1
RGX N-1-4	Nozzle Inside Radius	B3.160	1
RGX C-2-1	Circumferential Head	B2.51	1
RGX C-2-4	Circumferential Head	B2.51	1
RGX C-2-2	Tubesheet-to-Shell Weld	B2.80	1
RGX C-2-3	Tubesheet-to-Shell Weld	B2.80	1
RGX N-2-1	Nozzle-to-Vessel Weld	B3.150	1
RGX N-2-2	Nozzle-to-Vessel Weld	B3.150	1
RGX N-2-3	Nozzle-to-Vessel Weld	B3.150	1

Welds	Description	Code Item #	Class
RGX N-2-4	Nozzle-to-Vessel Weld	B3.150	1
RGX N-2-1	Nozzle Inside Radius	B3.160	1
RGX N-2-2	Nozzle Inside Radius	B3.160	1
RGX N-2-3	Nozzle Inside Radius	B3.160	1
RGX N-2-4	Nozzle Inside Radius	B3.160	1
RGX C-3-1	Circumferential Head	B2.51	1
RGX C-3-4	Circumferential Head	B2.51	1
RGX C-3-2	Tubesheet-to-Shell Weld	B2.80	1
RGX C-3-3	Tubesheet-to-Shell Weld	B2.80	1
RGX N-3-1	Nozzle-to-Vessel Weld	B3.150	1
RGX N-3-2	Nozzle-to-Vessel Weld	B3.150	1
RGX N-3-3	Nozzle-to-Vessel Weld	B3.150	1
RGX N-3-4	Nozzle-to-Vessel Weld	B3.150	1
RGX N-3-1	Nozzle Inside Radius	B3.160	1
RGX N-3-2	Nozzle Inside Radius	B3.160	1
RGX N-3-3	Nozzle Inside Radius	B3.160	1
RGX N-3-4	Nozzle Inside Radius	B3.160	1

2.3 Licensee's Basis for Relief (as stated)

Background

The regenerative heat exchanger provides preheat for the normal charging water flowing into the reactor cooling system (RCS). Preheat is derived from normal letdown water coming from the RCS. The heat exchanger is actually three heat exchangers or sub-vessels of similar design and function. Each heat exchanger has an outside shell diameter of 9.25 inches. The shells were manufactured from austenitic stainless steel material. Per Table IWB-2500-1, Category B-B, Note 1, examinations of circumferential head welds and tubesheet to shell welds, may be limited to one vessel among a group of vessels performing a similar function. Conversely, all Section XI Class 1 nozzle welds are required to be examined and may not be limited to one vessel.

Dose Considerations

A dose evaluation has been conducted on each activity associated with the examinations of the regenerative heat exchanger. Table 1 [of the licensee's August 14 letter] gives the personnel does expected from these activities. A personnel dose of 9.655 man-rem is estimated to complete the required examinations over the interval. This estimate assumes optimum inspection and preparations times and should be considered conservatively low. If difficulties are encountered a corresponding increase in dose would be expected.

Geometric Restrictions

The regenerative heat exchanger was designed and fabricated to the 1965 Edition of the ASME Section III Code. As indicated in this edition of the Code,

the regenerative heat exchanger is Class C. The Code did not require that there be full access for inservice inspection, as was required by later Code editions. Thus, the heat exchanger was designed before inspection, ample access and weld configuration conducive to examination were required. Estimates of actual coverage (50 to 75 percent available) were previously described in Relief Request Number 8, and approved by the NRC.

The small diameter of the vessel and nozzles prevent a meaningful ultrasonic examination of these components. The joint design of the nozzle weld specifies a 3-inch schedule 160 weldolet joined to a 9.25 inch O.D. x 0.875-inch thick vessel. The configuration of the weldolet precludes axial ultrasonic examination from the nozzle side and circumferential examination in either direction. This limits volumetric examination to single axial scan from the vessel side of the nozzle. Because of these restrictions a meaningful ultrasonic examination cannot be performed on weld or inner radius with a single axial scan, due to the small diameter of the vessel and weldolet. In addition, the change in the surface contour around the joint results in a corresponding change in the ultrasonic beam angle, which makes position measurements unreliable. It would be necessary to extend the beam path to at least two full Vee paths, which would further complicate this examination since there is insufficient distance for this extension. These limitations significantly diminish the ability to accurately detect and characterize flaws. The configuration also precludes performing meaningful radiography of the affected joints due to the surface contour of the joints.

Inspection History

Since the 1995 refueling outage, which encompassed the end of the second interval and the beginning of the third interval, twenty-four (24) of the above listed welds have been volumetric and/or surface examined. No unacceptable flaws were identified during those inspections, supporting the conclusion that eliminating the subject inspections will not have a significant impact on the continued structural integrity of the regenerative heat exchangers. This is attributed to the fact that the heat exchangers are properly designed for their intended service conditions and that no active degradation mechanisms are expected to be present. Even if some minor degradation were present, the difficulties of performing an effective volumetric inspection significantly reduces the potential value of those inspections.

Conclusion

If the Code required examinations are performed, geometric restrictions would severely limit the amount of meaningful information concerning the condition of the heat exchanger. Therefore, the exposure to significant radiation dose would result in hardship without a compensating increase in the level of quality and safety. Considering the alternative requirements discussed herein, relief from the Code required examinations on the regenerative heat exchanger is requested per the provisions of 10 CFR 50.55a(a)(3)(ii).

2.4 Licensee's Proposed Alternative (as stated)

> The purpose of this relief request is to eliminate Category B-B and B-D weld examinations on the regenerative heat exchanger.
>
> Technical Specifications require that the RCS [reactor coolant system] leak rate be limited to 1 gallon per minute unidentified leakage. This value is calculated in accordance with Technical Specification requirements. Additionally, the containment atmosphere particulate radioactivity is monitored per Technical Specification requirements. As a result, new leakage is rapidly identified and located during operation. Upstream valves that may be operated from the control room could isolate leaks identified on the heat exchanger. Check valves are installed on the charging and auxiliary spray lines downstream of the heat exchanger. The letdown isolation valve also receives an automatic control signal to close on inventory loss based on pressurizer level.
>
> The heat exchanger will continue to receive a system leakage test prior to startup after each refueling outage. During this system test, the components receive a visual (VT-2) examination. The corresponding piping and component supports will also continue to be inspected per the requirements of the Code, as they are not affected by this relief request.

3.0 TECHNICAL EVALUATION

The ASME Code requires 100 percent volumetric and/or surface examination of the subject Class 1 regenerative heat exchanger welds listed in the Section 2.2 above. However, examination of these components is restricted due to high radiological conditions and geometric configurations. The licensee proposed to eliminate the required examinations of welds on the regenerative heat exchanger. Instead of volumetric examinations, the licensee proposed to rely on VT-2 visual examinations, Code-required inspections of corresponding piping and component supports, and RCS leakage detection systems with the associated Technical Specification allowable leakage limits to assure system integrity.

The configuration of the heat exchanger and the materials from which it is fabricated restrict ultrasonic examination. Even if examinations were conducted, only 50 to 75 percent of the welds could be inspected. The inlet and outlet piping to this heat exchanger are exempt from Code volumetric and surface examination requirements, based on size (3-inch nominal pipe size). In addition, radiation doses are estimated to be 9.655 man-rem in order to complete the Code-required examinations of the listed components. Therefore, considering the ALARA concerns surrounding the performance of these examinations coupled with the limited access to the subject welds, imposition of the Code requirements for volumetric examination would be impractical.

To provide reasonable assurance of structural integrity, the licensee proposed doing a VT-2 visual examination during a system leakage test. However, relying on VT-2 visual examinations with the insulation still in place increases the probability that small amounts of leakage could go undetected. With the insulation removed, small leaks that would not be capable of penetrating the insulation could be discovered. Therefore, for this alternative examination, the licensee

must remove the insulation on the regenerative heat exchanger prior to the VT-2 visual examination.

The VT-2 visual examinations for evidence of leakage (to be performed during the system leakage test prior to start up after each refueling outage) with the exchanger insulation removed, RCS leakage detection systems with the associated Technical Specification allowable leakage limits to assure system integrity, and subsequent Code-required inspections of corresponding piping and component supports provide reasonable assurance of the structural integrity of the regenerative heat exchanger.

4.0 CONCLUSION

The staff concludes that, for Request for Relief No. 60, imposition of the Code requirements on the licensee would be impractical, and that the licensee's proposed alternative provides reasonable assurance of structural integrity of the regenerative heat exchanger, provided the insulation on the exchanger is removed prior to the VT-2 examination. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval of IP2. The granting of 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 giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility.

Principal Contributor: N. Sanfilippo

Date: January 17, 2003