

July 7, 2004

Mr. Michael R. Kansler, President
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

SUBJECT: RELIEF REQUEST (RR) NOS. RR-67 AND RR 3-36, INDIAN POINT NUCLEAR
GENERATING UNIT NOS. 2 AND 3 (TAC NOS. MC1698 AND MC1699)

Dear Mr. Kansler:

By letter dated December 30, 2003, as supplemented April 27, 2004, Entergy Nuclear Operations, Inc. (the licensee), requested relief from the inservice inspection (ISI) requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for the reactor vessel nozzle to vessel welds for the Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and 3). Specifically, the licensee proposed to use the alternative requirements in ASME Code Case N-613-1, "Ultrasonic Examination of Full Penetration Nozzles in Vessels, Examination Category B-D, Item Nos. B3.10 and B3.90, Reactor Nozzle-To-Vessel Welds."

The Nuclear Regulatory Commission (NRC) has reviewed the proposed alternative in the subject relief requests. The results are provided in the enclosed safety evaluation.

The NRC staff has concluded that the proposed alternative to the ASME Code requirements in RR Nos. RR-67 and RR 3-36 provides an acceptable level of quality and safety and is acceptable. Pursuant to Title 10 of the *Code of Federal Regulations*, Section 50.55a(a)(3)(i), the proposed alternative is authorized for the remainder of the third 10-year ISI interval, which is until April 3, 2006, for IP2, until July 20, 2009, for IP3, unless during those intervals Code Case N-663 is published in a future version of Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability--ASME Section XI, Division 1." At that time, if the licensee intends to continue implementing this code case, it must follow all provisions of Code Case N-613-1 with limitations or conditions specified in RG 1.147, if any.

July 7, 2004

M. Kansler

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If you have any questions regarding this approval, please contact the IP2 and IP3 Project Manager, Patrick Milano, at 301-415-1457.

Sincerely,

/RA/

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

Docket Nos. 50-247 and 50-286

Enclosure: Safety Evaluation

cc w/encl: See next page

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DISTRIBUTION:

PUBLIC	P. Milano	B. McDermott, R-I	ACRS
PDI-1 Reading	T. Chan	C. Bixler, R-I	OGC
C. Holden	E. Andruszkiewicz	J. Jolicoeur, EDO	G. Hill (4)
R. Laufer	S. Little		

ACCESSION NUMBER: ML041890154

*No substantive changes made

OFFICE	PDI-1/PM	PDI-1/LA	EMCB*	OGC	PDI-1/SC
NAME	PMilano	SLittle	SE dtd	McGurren	RLaufer
DATE	06/30/04	07/02/04	05/19/2004	07/06/04	07/07/04

OFFICIAL RECORD COPY

Indian Point Nuclear Generating Unit Nos. 2 & 3

cc:

Mr. Gary J. Taylor
Chief Executive Officer
Entergy Operations, Inc.
1340 Echelon Parkway
Jackson, MS 39213

Mr. John T. Herron
Senior Vice President and
Chief Operating Officer
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

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

Mr. Christopher Schwarz
General Manager, Plant Operations
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
295 Broadway, Suite 2
P.O. Box 249
Buchanan, NY 10511-0249

Mr. Danny L. Pace
Vice President Engineering
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. Brian O'Grady
Vice President, Operations Support
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. John McCann
Director, Nuclear Safety Assurance
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Ms. Charlene D. Faison
Manager, Licensing
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. Michael J. Columb
Director of Oversight
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Mr. James Comiotes
Director, Nuclear Safety Assurance
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
295 Broadway, Suite 1
P.O. Box 249
Buchanan, NY 10511-0249

Mr. Patric Conroy
Manager, Licensing
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
295 Broadway, Suite 1
P. O. Box 249
Buchanan, NY 10511-0249

Mr. John M. Fulton
Assistant General Counsel
Entergy Nuclear Operations, Inc.
440 Hamilton Avenue
White Plains, NY 10601

Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Senior Resident Inspector's Office
Indian Point 2
U. S. Nuclear Regulatory Commission
P.O. Box 59
Buchanan, NY 10511-0038

Indian Point Nuclear Generating Unit Nos. 2 & 3

cc:

Senior Resident Inspector's Office
Indian Point 3
U. S. Nuclear Regulatory Commission
P.O. Box 337
Buchanan, NY 10511-0337

Mr. Peter R. Smith, President
New York State Energy, Research, and
Development Authority
17 Columbia Circle
Albany, NY 12203-6399

Mr. Paul Eddy
Electric Division
New York State Department
of Public Service
3 Empire State Plaza, 10th Floor
Albany, NY 12223

Mr. Charles Donaldson, Esquire
Assistant Attorney General
New York Department of Law
120 Broadway
New York, NY 10271

Mayor, Village of Buchanan
236 Tate Avenue
Buchanan, NY 10511

Mr. Ray Albanese
Executive Chair
Four County Nuclear Safety Committee
Westchester County Fire Training Center
4 Dana Road
Valhalla, NY 10592

Ms. Stacey Lousteau
Treasury Department
Entergy Services, Inc.
639 Loyola Avenue
Mail Stop: L-ENT-15E
New Orleans, LA 70113

Mr. William DiProfio
PWR SRC Consultant
139 Depot Road
East Kingston, NH 03827

Mr. Dan C. Poole
PWR SRC Consultant
20 Captains Cove Road
Inglis, FL 34449

Mr. William T. Russell
PWR SRC Consultant
400 Plantation Lane
Stevensville, MD 21666-3232

Mr. Alex Matthiessen
Executive Director
Riverkeeper, Inc.
25 Wing & Wing
Garrison, NY 10524

Mr. Paul Leventhal
The Nuclear Control Institute
1000 Connecticut Avenue NW
Suite 410
Washington, DC, 20036

Mr. Karl Coplan
Pace Environmental Litigation Clinic
78 No. Broadway
White Plains, NY 10603

Mr. Jim Riccio
Greenpeace
702 H Street, NW
Suite 300
Washington, DC 20001

Indian Point Nuclear Generating Unit Nos. 2 & 3

cc:

Mr. Robert D. Snook
Assistant Attorney General
State of Connecticut
55 Elm Street
P.O. Box 120
Hartford, CT 06141-0120

Mr. David Lochbaum
Nuclear Safety Engineer
Union of Concerned Scientists
1707 H Street NW, Suite 600
Washington, DC 20006

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM

REQUESTS FOR RELIEF RR-67 AND RR 3-36 FOR

INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3

ENTERGY NUCLEAR OPERATIONS, INC.

DOCKET NOS. 50-247 AND 50-286

1.0 INTRODUCTION

By letter dated December 30, 2003, as supplemented April 27, 2004, Entergy Nuclear Operations, Inc. (Entergy), the licensee for Indian Point Nuclear Generating Unit Nos. 2 and 3, submitted requests for relief (RRs) RR-67 and RR 3-36 addressing the requirements of Section XI of the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for defining the ultrasonic testing (UT) examination volume of reactor pressure vessel (RPV) nozzle-to-vessel welds. In response to a request for additional information, the licensee, by letter dated April 27, 2004, submitted revision 1 to these RR. The licensee requested relief to incorporate reduced UT examination volume requirements for Class 1 RPV nozzle-to-vessel welds. This relief is requested for the duration of the third 10-year Inservice Inspection (ISI) interval.

2.0 BACKGROUND

Inservice inspection of 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 Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g), except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The requirements of 10 CFR 50.55a(a)(3) state, in part, 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 Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of

Enclosure

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. For IP2 and 3, the applicable edition of Section XI of the ASME Code for the third 10-year ISI interval is the 1989 Edition, without Addenda.

3.0 TECHNICAL EVALUATION

Components for which Relief is Requested:

For IP2, relief is being requested for the following ASME Section XI, Class 1, RPV nozzle-to-vessel welds:

Nozzle-to-Vessel Weld RPVN1 @ 22° Azimuth
Nozzle-to-Vessel Weld RPVN2 @ 67° Azimuth
Nozzle-to-Vessel Weld RPVN3 @ 113° Azimuth
Nozzle-to-Vessel Weld RPVN4 @ 158° Azimuth
Nozzle-to-Vessel Weld RPVN5 @ 202° Azimuth
Nozzle-to-Vessel Weld RPVN6 @ 247° Azimuth
Nozzle-to-Vessel Weld RPVN7 @ 293° Azimuth
Nozzle-to-Vessel Weld RPVN8 @ 338° Azimuth

For IP3, relief is being requested for the following ASME Section XI, Class 1, RPV Nozzle-to-Vessel welds:

Nozzle-to-Vessel Weld 21 @ 113° Azimuth
Nozzle-to-Vessel Weld 22 @ 158° Azimuth
Nozzle-to-Vessel Weld 23 @ 202° Azimuth
Nozzle-to-Vessel Weld 24 @ 247° Azimuth
Nozzle-to-Vessel Weld 25 @ 293° Azimuth
Nozzle-to-Vessel Weld 26 @ 338° Azimuth
Nozzle-to-Vessel Weld 27 @ 22° Azimuth
Nozzle-to-Vessel Weld 28 @ 367° Azimuth

Applicable Code Requirements from which Relief is Requested:

Pursuant to 10 CFR 50.55a(a)(3)(i), Entergy is requesting relief from ASME Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1989 Edition with No Addenda, Table IWB-2500-1 Code Item B3.90, Figures IWB-2500-7 (a) through (d) for defining the examination volume of the reactor vessel nozzle-to-shell welds.

Licensee's Proposed Alternative:

In accordance with 10 CFR 50.55a(a)(3)(i), Entergy requests relief from the $t_s/2$ (t_s is equal to the vessel wall thickness) examination volume requirement and proposes to use Code Case N-613-1 in its entirety for the inspection of the reactor vessel nozzle-to-vessel welds. The

examination volume is defined in detail within Code Case N-613-1 and as represented in the WesDyne sketches attached to the RRs.

Licensee's Basis for Proposed Alternative:

The examination (exam) volumes for the reactor vessel nozzle-to-vessel welds are unnecessarily large. For the IP2 and 3 reactor vessels, the nozzle-to-vessel weld examination volume would extend about 5 inches into the nozzle forging and the same distance into the upper shell course forging. This proposed alternative would redefine the examination volume boundary (in accordance with Code Case N-613-1). This reduction in base metal inspection will not affect the ability of the inspection to detect flaws in the weld and heat affected zone. Compliance with these requirements will assure the requisite level of quality and safety is maintained.

The proposed reduction in exam volume is for base metal only, which was extensively interrogated by ultrasonic examination during fabrication, preservice examinations and in the last inservice examinations performed in 1995 for IP2 and 1999 for IP3 (at the end of the second interval). In 1995 for IP2 and 1999 for IP3, the data was acquired, archived and analyzed using automated ultrasonic systems. Entergy is confident that reasonable comparisons can be made between the past and present, if necessary. During the 1995 examination for IP2 and 1999 examination for IP3, there were no unacceptable indications found in the eight reactor vessel nozzle-to-vessel examination volumes, including the base metal areas proposed for exclusion from examination in this request. The 1995 results for IP2 and 1999 results for IP3 were based on examinations performed in accordance with the ASME Code, Section XI, Section V and Regulatory Guide (RG) 1.150, Rev. 1.

The Section XI examination volume for the pressure retaining nozzle-to-vessel welds extends from the edge of the weld to include a significant portion of the nozzle forging body (inward) and reactor vessel upper shell course (outward) which is a forged ring. The large volume results in a significant increase in examination time with no corresponding increase in safety as the greatest portion of the volume is base material not prone to inservice cracking.

The implementation of this request for relief would reduce the examination volume as outlined in Code Case N-613-1 and the attached WesDyne sketches. This reduction applies only to the base metal and not the weld metal.

The weld volume and the adjacent base metal volume will be examined in accordance with Code Case N-613-1. The examinations shall consist of techniques and procedures qualified in accordance with the ASME Code, Section XI, Appendix VIII, Supplements 4, 6, and 7. The weld and base metal volumes (in accordance with Code Case N-613-1) will be interrogated from the nozzle bore using techniques and procedures specifically qualified to inspect the nozzle-to-vessel weld from the nozzle bore. These procedures were qualified in January 2003 in accordance with Appendix VIII, Supplement 7 as administered by the Performance Demonstration Initiative (PDI).

The nozzle-to-vessel examination volume is also accessible from the vessel inside diameter (ID) surface and will be examined in four orthogonal directions for the first 15 percent of weld thickness with respect to the vessel ID surface using Appendix VIII, Supplement 4 qualified techniques. The remaining 85 percent of weld volume accessible from the vessel ID surface

will be examined in two opposing circumferential scanning directions using Appendix VIII, Supplement 6 qualified techniques to interrogate for transverse defects.

This combination of scans addresses the requirements set forth by the ASME Code, Section XI, 1995 Edition with 1996 Addenda as modified by 10 CFR 50.55a and assures that current qualified technology will be applied to the redefined examination volume specified herein to the maximum extent practical. Compliance with these requirements will assure the requisite level of quality and safety is maintained.

Staff Evaluation:

Entergy has requested relief from the UT Examination volume requirements specified in Table IWB-2500-1, Examination Category B-D, Code Item B3.90, Figures IWB-2500-7 (a) through (d) pertaining to UT Examination of Full Penetration Nozzles in Vessels. Entergy proposes to use a reduced examination volume, extending to $\frac{1}{2}$ inch from each side of the widest part of the nozzle-to-vessel weld in lieu of an examination volume extending to a distance equal to one-half the through-wall thickness from each side of the widest part of the nozzle-to-vessel weld, as required by Figures IWB-2500-7 (a) through (d).

Entergy has provided a supplemental sketch showing the configuration of the nozzle-to-vessel weld and the revised examination volume, as well as a listing of all nozzle-to-vessel welds included within the scope of these RRs. The specific weld configurations and revised examination volumes are depicted in ASME Code Case N-613-1 and the WesDyne sketches attached to the RRs. The revised examination volume depicted in these sketches extends to $\frac{1}{2}$ inch from each side of the widest part of the nozzle-to-vessel weld and is therefore consistent with licensee's request for the reduced UT examination volume. All other aspects of the UT examination volumes for RPV nozzle-to-vessel welds remain unchanged in the licensee's request.

The acceptability of the reduced UT examination volume is based on prior full volumetric examinations of the welds and base metal, as well as the internal stress distribution near the weld. Prior full volumetric examinations of the nozzle-to-vessel welds included within the scope of these RRs cover the full volume of base metal, extending to a distance equal to one-half the through-wall thickness from each side of the widest part of the nozzle-to-vessel weld, as required by the Code. This base metal region included in the original ASME Code volume was extensively examined during construction, preservice inspection, and prior inservice inspections. These examinations all show the ASME Code volume to be free of unacceptable flaws. The creation of flaws during plant service in the volume excluded from the proposed reduced examination volume is unlikely because of the low stress in the base metal away from the weld. The stresses caused by welding are concentrated at or near the weld. Cracks, should they initiate, occur in the highly-stressed area of the weld. The highly-stressed areas are within the volume included in the reduced examination volume proposed by Entergy. The prior full volume examinations of the base metal in addition to the examinations of the highly-stressed areas of the weld provide an acceptable level of quality and safety.

The weld volume and the adjacent base metal volume will be examined in accordance with Code Case N-613-1. The examinations shall consist of techniques and procedures qualified in accordance with the ASME Code, Section XI, Appendix VIII, Supplements 4, 6, and 7. The weld and base metal volumes will be interrogated from the nozzle bore using techniques and

procedures specifically qualified to inspect the nozzle-to-vessel weld from the nozzle bore. These procedures were qualified in January 2003 in accordance with Appendix VIII, Supplement 7 as administered by the PDI.

The nozzle-to-vessel examination volume is accessible from the vessel ID surface and will be examined in four orthogonal directions for the first 15 percent of weld thickness with respect to the vessel ID surface using Appendix VIII, Supplement 4 qualified techniques. The remaining 85 percent of weld volume accessible from the vessel ID surface will be examined in two opposing circumferential scanning directions using Appendix VIII, Supplement 6 qualified techniques to interrogate for transverse defects.

Due to a question from staff regarding how the licensee can determine the width of the weld if repairs were made to that weld, Entergy has stated that the examination volume sketches duplicate the depiction of the weld nugget as it is shown in the reactor vessel nozzle design detail drawing. IP2 and 3 are dimensionally identical in this regard. This is the most reliable source of dimensional data for defining the examination volume. A records check for the IP2 and 3 reactor nozzle welds was conducted. There is no evidence of repairs being conducted on the nozzle-to-shell welds for either reactor vessel. Documentation checked included manufacturing deviations, supplier correspondence and supplier certifications. The weld volume is defined using this dimensional data from design detail drawings. To ensure the extremities of the weld are included in the examination volume, a margin of 1/2 inch is conservatively added to the scanning path of all transducers in all directions as allowed by component geometry. This is standard practice for nozzle-to-shell, shell welds, and nozzle-to-pipe weld examinations. The sketches included in the RRs reflect this additional conservatism. Based on this review of the documentation and associated drawings for all RPV nozzle-to-vessel welds, Entergy determined that no weld repairs are encapsulated within the existing nozzle-to-vessel welds. Therefore, since there are no repairs in the area to be examined which could extend past the original weld boundaries, the examination will encompass the entire weld and the examination will provide an acceptable level of quality and safety.

4.0 CONCLUSION

The Nuclear Regulatory Commission staff finds that the proposed alternative to reduce the UT examination volume to 1/2 inch, from the widest part of the nozzle-to-vessel weld on each side of the weld crown, in lieu of one-half the through-wall thickness from the widest part of the nozzle-to-vessel weld on each side of the weld crown will provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the proposed alternative is authorized for ASME Code, Section XI, Class 1, RPV nozzle-to-vessel welds for the duration of the third 10-year ISI interval at IP2 and 3, unless during those intervals Code Case N-663 is published in a future version of RG 1.147, "Inservice Inspection Code Case Acceptability--ASME Section XI, Division 1." At that time, if the licensee intends to continue implementing this code case, it must follow all provisions of Code Case N-613-1 with limitations or conditions specified in RG 1.147, if any. All other requirements of the ASME Code, Sections III and XI for which relief has not been specifically requested remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: E. Andruszkiewicz

Date: July 7, 2004