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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

OF THE SECOND 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM PLAN

REQUEST FOR RELIEF NO. RR-16

FOR

NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

1.0 INTRODUCTION

The Technical Specifications for Millstone Nuclear Power Station, Unit 2 state that the inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 components shall be 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). The Code of Federal Regulations at 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 difficulties 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 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. 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 applicable edition of Section XI of the ASME Code for the Millstone Nuclear Power Station, Unit 2 Second 10-Year Inservice Inspection (ISI) Interval is the 1980 Edition through Winter 1981 Addenda. The components (including supports) may meet the requirements set forth in subsequent editions and addenda of the ASME Code incorporated by reference in 10 CFR 50.55a(b) subject to the limitations and modifications listed therein and subject to Commission approval.

Pursuant to 10 CFR 50.55a(g)(5), if the licensee determines that conformance with an examination requirement of Section XI of the ASME Code is not practical for its facility, information shall be submitted to the Commission in support of that determination and a request made for relief from the ASME Code requirement. After evaluation of the determination, pursuant to 10 CFR 50.55a(g)(6)(i), the Commission may grant relief and may impose alternative requirements that are determined to be authorized by law, will not endanger life, 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. In a letter dated August 4, 1995, Millstone Nuclear Power Station, Unit 2 submitted to the NRC its Second 10-Year Interval Inservice Inspection Program Plan, Request for Relief No. RR-16 regarding Section XI, Examination Category B-F, Item B5.40 Nozzle-to-Safe End Welds and Item B5.130, Piping-to-Safe End Welds for Millstone Nuclear Power Station, Unit 2.

2.0 EVALUATION AND CONCLUSIONS

The staff, with technical assistance from its contractor, the Idaho National Engineering Laboratory (INEL), has evaluated the information provided by the licensee in support of its Second 10-Year Interval Inservice Inspection Program Plan, Request for Relief No. RR-16 regarding Section XI, Examination Category B-F, Item B5.40 Nozzle-to-Safe End Welds and Item B5.130, Piping-to-Safe End Welds for Millstone Nuclear Power Station, Unit 2.

Based on the information submitted, the staff adopts the contractor's conclusions and recommendations presented in the Technical Letter Report attached. The staff concludes:

(1) Geometry and materials (cast stainless steel) made the volumetric examinations impractical to perform to the extent required by the Code for the subject welds;

(2) To have performed the required ultrasonic examination of the entire volume of the welds, the piping and safe ends would have required design modification to sufficiently improve the geometry and material acoustic properties to allow a complete examination;

(3) Significant degradation, if present, would have been detected based on the 50 to 86% coverage with multiple mode ultrasonic scans and the 100% surface examinations that were performed on the subject dissimilar metal welds, in combination with examinations performed on similar items; and

(4) The past exams provided reasonable assurance of operational readiness of the subject Nozzle-to-Safe End Welds and Piping-to-Safe End Welds.

Therefore, relief is granted for the Second 10-Year Inservice Inspection Interval pursuant to 10 CFR 50.55a(g)(6)(i) provided that examinations using refracted longitudinal waves on the cast piping sides of the welds continue to be performed, until such time as new techniques are developed to enhance overall examination effectiveness. The relief granted and the alternatives imposed are authorized by law, will not endanger life, 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.

Principal Contributor: T. McLellan

Date: November 6, 1995

Attachment: Technical Evaluation Letter Report

TECHNICAL EVALUATION LETTER REPORT
SECOND 10-YEAR INTERVAL ISI
RELIEF REQUEST RR-16
NORTHEAST NUCLEAR ENERGY COMPANY
MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2
DOCKET NO. 50-336

1.0 INTRODUCTION

In a letter dated August 4, 1995, the licensee, Northeast Nuclear Energy Company, submitted Relief Request RR-16 for the Second 10-Year Inservice Inspection (ISI) Interval at Millstone Nuclear Power Station, Unit 2. The Idaho National Engineering Laboratory (INEL) staff has evaluated the subject relief request in the following section.

2.0 EVALUATION

The Code of record for the Millstone Nuclear Power Station, Unit 2, Second 10-Year ISI Interval is the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XI, 1980 Edition with the Winter 1981 Addenda. The information provided by the licensee in support of the request for relief has been evaluated and the basis for disposition is documented below.

Relief Request RR-16, Examination Category B-F, Item B5.40, Nozzle-to-Safe End Welds and Item B5.130, Piping-to-Safe End Welds

Code Requirement: Table IWB-2500-1, Examination Category B-F, Items B5.40 and B5.130 require 100% volumetric and surface examinations, as defined in Figure IWB-2500-8, for dissimilar metal welds with a nominal pipe size greater than or equal to 4 inches.

Licensee's Code Relief Request: The licensee requested relief from the examination coverage required by Table IWB-2500-1, Examination Category B-F, for the following dissimilar metal welds:

Code Item	Number of Welds	Description
B5.40	1	12-inch pressurizer vessel surge nozzle to safe end butt weld
B5.40	1	12-inch safety injection reactor coolant system (RCS) nozzle to safe end butt weld
B5.40	1	12-inch shutdown cooling RCS nozzle to safe end butt weld
B5.130	8	30-inch reactor coolant piping system (RCS) to reactor coolant pump nozzle safe end butt welds

Licensee's Basis for Requesting Relief (as stated):

"The subject welds can be separated into two categories. The first category (Code Item B5.40) are Safe Ends to Nozzle welds where the outside diameters are approximately 13 inches and the thickness is less than 1.5 inches. These welds are Carbon Steel (C/S) Nozzles with Stainless Steel (S/S) inside diameter cladding welded to Cast Stainless Steel (CSS) Safe Ends. As shown in Matrix #2*, 3 of the total population of 11 welds have geometric limitations which preclude obtaining the 90% Weld Required Volume (WRV) coverage as required per Code Case N-460.

These welds were inspected with refracted longitudinal (RL) waves to the maximum extent possible, using a procedure specifically developed for Millstone Unit No. 2 B-F welds and qualified under the provisions of IWA-2240. This procedure (NU-UT-17) is included for information as Attachment 2*. Matrix #2* lists the welds and the percentages of coverage for each scan performed including the total coverage per N-460. Scanning from the CSS side is considered "effective" for these welds. Thus, effective coverage is the same as the "theoretical" coverage.

The second category of welds (Code Item B5.130) is the Safe End to Reactor Coolant System (RCS) pipe welds at the reactor coolant pumps. These welds are over 30 inches in diameter and over 3 inches thick. The base materials are C/S pipe with S/S inside diameter cladding and CSS Safe Ends.

These welds were also ultrasonically scanned with RL waves to the maximum extent possible, using NU-UT-17. Scanning was performed from both the C/S and S/S sides and on the weld crown. In addition to the RL examination, the C/S side of the welds were also examined both perpendicular and parallel to the weld crown to the maximum extent possible with Shear Waves per NU-UT-26, UT procedure. This procedure was developed and used on B-J Category welds in accordance with Relief Request RR-4. This procedure is provided as Attachment 3* and Relief Request RR-4 is provided as Attachment 4*.

Five of the eight welds in this category have geometric limitations to UT scanning which preclude obtaining 90% WRV coverage per Code Case N-460. NNECO does not have confidence that UT is reliable when the sound must travel more than 1 or 2 inches through CSS. Therefore, the coverage listed in the attached matrix #1*, when scanning from the CSS side can only be considered as "theoretical."

Matrix #1*, lists the scans performed as well as the theoretical percentage of coverage achieved for each scan. The theoretical WRV coverage is also shown as calculated in accordance with Code Case N-460. The percentage of what we believe is "Effective Coverage" is also provided.

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*Not included with this evaluation.

The weld geometry and/or configuration of the welds listed in the matrices, prevents a complete volumetric examination from being performed. Detailed sketches*, Number 1 through 5, are also included identifying the examination coverage and typical configurations of these nozzle safe end welds. Attachment 5* is a report, "Ultrasonic Examination Capabilities for Welds In Cast Stainless Steel Components," and other industry information is the basis for this relief."

Licensee's Proposed Alternative (as stated):

"In lieu of performing the volumetric examination, the Code required surface examinations have been performed in accordance with code requirements. In addition, the code required volumetric examinations have been performed to the extent possible as described and depicted in Attachment 2*. Finally, a system leak test was performed during system heat-up from the current refueling outage with satisfactory results."

Evaluation: The Code requires 100% volumetric examination of the subject dissimilar metal welds. For the Code Item B5.40 safe end to nozzle welds, review of the supporting information showed that the scanning surface geometry prevents full examination coverage.

In the case of the Code Item B5.130 safe end to reactor coolant system piping welds at the reactor coolant pumps, the licensee has provided information regarding the limited effectiveness of examinations conducted from the cast piping side (greater than 3 inch wall thickness). Matrix 1 includes both "theoretical" and "effective" coverage columns. In determining the effective coverage, no credit is taken for the refracted longitudinal (RL) wave examinations on the cast stainless steel sides of the welds. Based on review of the tables, drawings, procedures, and test report provided by the licensee, it has been determined that these RL examinations on the cast stainless steel sides should be continued to be performed, until such time as new techniques are developed to enhance overall examination effectiveness.

The geometry and materials (cast stainless steel) make the volumetric examinations impractical to perform to the extent required by the Code for the subject welds. To perform the required ultrasonic examination of the entire volume of the welds, the piping and safe ends would require design modification to sufficiently improve the geometry and material acoustic properties to allow a complete examination. Imposition of this requirement would cause a considerable burden on the licensee.

Based on the 50 to 86% coverage with multiple mode ultrasonic scans and the 100% surface examinations that were performed on the subject dissimilar metal welds, in combination with examinations performed on similar items, it is concluded that significant degradation, if present, would have been detected. As a result, reasonable assurance of operational readiness has been provided. Therefore, it is recommended

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*Not included with this evaluation.

that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i) provided that examinations using refracted longitudinal waves on the cast piping sides of the welds continue to be performed, until such time as new techniques are developed to enhance overall examination effectiveness.

3.0 CONCLUSION

The INEL staff has reviewed the licensee's request for relief and determined that the Code examination requirements for the subject dissimilar metal welds are impractical for the Millstone Nuclear Power Station, Unit 2. Therefore, it is recommended that relief be granted pursuant to 10 CFR 50.55a(g)(6)(i) for Relief Request RR-16 with the condition discussed above.