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OPA

Mr. Robert E. Link, Vice President
Nuclear Power Department
Wisconsin Electric Power Company
231 West Michigan Street, Room P379
Milwaukee, WI 53201

SUBJECT: POINT BEACH NUCLEAR PLANT, UNIT 2 - THIRD 10-YEAR INTERVAL
INSPECTION REQUEST FOR RELIEF FROM ASME CODE SECTION XI (TAC M88784)

Dear Mr. Link:

By letter dated February 3, 1994, you requested relief from successive inspections of flaws detected in a secondary-side steam generator shell weld. The flaws are to be inspected for the third 10-year inservice inspection (ISI) interval at Point Beach Nuclear Plant, Unit 2 (PBNP-2), which began in November 1993.

The staff, with technical assistance from Idaho National Engineering Laboratory (INEL), has reviewed and evaluated the relief request. The staff has concluded that your alternative contained in Request for Relief RR-2-17, which would permit you to eliminate successive examinations on a steam generator girth weld, would not provide an acceptable level of quality and safety. Reinspection of previously detected indications is necessary to verify continued material integrity and confirm fracture mechanics crack growth predictions. Therefore, the staff has denied your Request for Relief No. RR-2-17.

If you have questions, please call Allen Hansen at (301) 504-1390.

Sincerely,

Original signed by

Cynthia A. Carpenter, Acting Project Director
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-301

Enclosure: Safety Evaluation

cc w/encl: see next page

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Mr. Robert E. Link, Vice President
Wisconsin Electric Power Company

Point Beach Nuclear Plant
Unit Nos. 1 and 2

cc:

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
OF THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION
REQUEST FOR RELIEF FOR
WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH NUCLEAR PLANT, UNIT 2
DOCKET NO. 50-301

1.0 INTRODUCTION

By letter dated February 3, 1994, Wisconsin Electric Power Company (licensee), submitted Relief Request RR-2-17 for the third 10-year inservice inspection (ISI) interval at Point Beach Nuclear Plant, Unit 2 (PBNP-2). The PBNP-2 third 10-year ISI interval began in November 1993. PBNP-2 requested relief from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI concerning successive inspections of flaws detected in a secondary-side steam generator shell weld.

The Technical Specifications for PBNP-2 state that the inservice inspection and testing of the ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Boiler and Pressure Vessel 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). Section 50.55a(a)(3) of 10 CFR Part 50 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) on the date, 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

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ASME Code for the Point Beach Nuclear Plant, Unit 2, third 10-year inservice inspection (ISI) interval is the 1986 Edition. 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.

2.0 EVALUATION

The applicable Code for the third 10-year interval at PBNP-2 is the 1986 Edition of ASME Section XI. The information provided by the licensee in support of Relief Request RR-2-17 has been evaluated and the basis for disposition is documented below.

A. Request for Relief No. RR-2-17: ASME Section XI, Article IWC-2000, Paragraph IWC-2420 (b) Successive Inspections

Code Requirement: Paragraph IWC-2420 (b) states:

"If component examination results require evaluation of flaw indications in accordance with IWC-3000, and the component qualifies as conditionally acceptable for continued service, the areas containing such flaw indications shall be reexamined during the next inspection period listed in the schedules of the inspection programs of IWC-2411 or IWC-2412."

Licensee's Code Relief Request: The licensee requested relief from the Code requirement to successively reexamine flaw indications that have been qualified for continued service through evaluation.

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

"INTRODUCTION

During the Fall 1990 Unit 2 Refueling Outage (U2R16), the "A" steam generator upper shell-to-transition cone girth weld, SG-A-4, was examined. The examination performed by EBASCO revealed eleven (11) embedded indications near the fusion zone of the weld. Six (6) indications were within the acceptance limits of Article IWB-3511. Class 1 acceptance limits were applied to the indications as allowed per Article IWC-3000 in the 1977/S79 Edition/Addenda of ASME XI." [The 1977/S79 Edition was the Code of record for the 1990 examination. In

this Edition, Class 2 acceptance limits were in the course of preparation, therefore, the use of Class 1 limits was authorized.]

"Five (5) indications were found to be outside the acceptance limits of Article IWB-3511 and were evaluated in accordance with IWB-3600, using linear elastic fracture mechanics. Those indications were evaluated and found acceptable for continued operation."

"EXAMINATION METHOD

One hundred percent of Weld SG-A-4 was examined utilizing a 1/2" x 1", 2.25 MHZ transducer for detection. The weld was scanned from both sides using 45° and 60° angles. Beam spread of this transducer was 9.5°."

"Sizing of indications was performed using 1" round, 2.25 MHZ transducers, with 45° and 60° angles. Beam spread for this transducer was 6.5°. All indications that were \geq 50% DAC were sized using 1/2 maximum amplitude technique. Since all indications were $<$ 100% DAC, this sizing method was more conservative than Code techniques which would require sizing indications to 50% of DAC."

"EXAMINATION RESULTS

Eleven (11) indications, as shown on Attachment 1,* were identified within the inner 1/3 of the weld volume. The indications plotted were shown to be subsurface. Attachment 1 lists all the pertinent dimensions associated with each indication for evaluation purposes."

"To confirm that the indications closest to the inside surface were embedded, a visual and magnetic particle examination was performed on the inside surface. No surface indications were noted, nor was there any evidence of pitting. All of the indications can be classified as subsurface and embedded."

"All of the indications noted are acceptable in accordance with Article IWB-3511 with the exception of five (5). Those indications were evaluated by Westinghouse Electric Company and found to be acceptable for continued operation with linear elastic fracture mechanics as permitted by IWB-3600 of ASME."

"In 1983, Southwest Research Institute (SWRI) performed a UT examination of Weld SG-A-4 and had determined that there was no recordable indications at that time. During the 1990 examination of Weld SG-A-4, the examination by SWRI was repeated by EBASCO, utilizing similar techniques and transducers. A 1/2" round, 2.25 MHZ transducer with 45°, and 60° angles were used. All indications could be seen at less than the Code recording level of $<$ 50% DAC. Since the indications were seen at less than 50% DAC, sizing would not be specifically required by the Code. This would explain why no recordable indications were found in 1983."

* Attachment 1 not included in this report.

"CONCLUSION

The indications found in "A" steam generator girth Weld SG-A-4 are embedded and appear to be small areas of embedded slag. Based on an evaluation of the indications in accordance with IWB-3600, "A" steam generator is acceptable for continued operation."

Licensee's Proposed Alternative: The licensee's proposal states:

"PBNP proposes that the successive examination (EXREQ S01-03) scheduled for the Transition Cone to Shell Circumferential Weld SG-A-4 not be performed, because the flaw is not service induced.

- a) The flaw is characterized as subsurface in accordance with IWA-3000.
- b) The flaws are evaluated to be embedded slag.
- c) The NDE technique and evaluation that identified the flaw as originating from vessel fabrication is in the flaw evaluation submitted to the NRC in Wisconsin Electric letter NRC-90-113, dated November 8, 1990.
- d) The Steam Generators are scheduled for replacement approximately one year after the successive examination is scheduled to be performed."

Evaluation: The licensee's basis states that in 1990, five (5) flaws were ultrasonically detected in steam generator girth Weld SG-A-4 that did not meet the acceptance criteria of IWB-3511. At that time, a linear elastic fracture mechanics evaluation was performed on the flaws and all were qualified for continued service. In the Wisconsin Electric letter NRC-90-113, dated November 8, 1990, the licensee provided evaluation information and hypothesized that the flaws were not service-induced, having originated from the welding process during fabrication of the vessel. However, the letter also states that construction radiographs were reviewed, and no indications were observed in the areas of the weld where the ultrasonic reflectors had been detected. Further, during a previous (1983) ultrasonic examination, the flaws had not been reported. It is unclear whether the flaws were observed as "smaller than Code recordable," or simply not observed, during the 1983 examination.

Ultrasonic measurements made during the 1990 volumetric examination, and subsequent inner surface examinations, have shown the flaws to be subsurface, and classified as "embedded" according to Article IWA-3000. However, the licensee has failed to provide satisfactory evidence of their origin. Additionally, no conclusive data was presented to show that these flaws will not propagate, or initiate new flaws, during the service life of the steam generator. Experience with at least one other plant has shown that surprisingly high growth rates can occur for flaws in steam generator transition region welds. While fracture mechanics evaluations have shown the flaws to be acceptable for continued service, ASME Section XI recognizes the uncertainties inherent in the type of

calculations used for these analyses. Therefore, in IWC-3132.3(b), *Acceptance by Evaluation*, the Code states:

"Components containing relevant conditions shall be acceptable for continued service if an evaluation demonstrates the component's acceptability. The evaluation analysis and evaluation acceptance criteria shall be specified by the Owner. Components accepted for continued service based on evaluation shall be subsequently examined in accordance with IWC-2420(b) and (c)."

This requirement supports the premise that a successive examination is intended not only to ensure continued integrity of flawed components, but to provide validation of fracture mechanics evaluations. As of this date, the licensee has not performed a successive, or follow-up, examination of this weld.

The licensee has failed to propose a reasonable alternative to a successive examination that would provide an acceptable level of quality and safety. Furthermore, information to support an evaluation of the relief request based on unusual difficulty, hardship, or impracticality associated with performing the successive examination on Weld SG-A-4 has not been provided.

3.0 CONCLUSION

The licensee proposed eliminating reexamination requirements for weld SG-A-4, the steam generator upper shell to transition cone girth weld. The licensee found the indications in 1990 and has not done any successive examinations to date. The ASME Code, Section XI, requires a successive examination on Class 2 components for flaws evaluated and accepted by fracture mechanics. No conclusive data was presented to show that these flaws will not propagate, or initiate new flaws, during the service life of the steam generator. Experience with another Westinghouse plant has shown that surprisingly high growth rates can occur for flaws in steam generator girth welds. Although the PBNP-2 steam generators are scheduled for replacement in late 1996, in view of the potential high flaw growth rate, and the fact that the flaws have only been examined once, the staff does not find it acceptable to allow 6 years to pass without reexamination of the flaws.

The licensee has failed to propose a reasonable alternative to a successive examination that would provide an acceptable level of quality and safety. Therefore, Request for Relief No. RR-2-17 has been denied.

Principal Contributor: K. Battige

Date: November 1, 1994