

July 3, 2006

Mr. Thomas J. Palmisano  
Site Vice President  
Prairie Island Nuclear Generating Plant  
Nuclear Management Company, LLC  
1717 Wakonade Drive East  
Welch, MN 55089

SUBJECT: PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2 - EVALUATION OF RELIEF REQUEST 2-RR-4-6 FOR REDUCED EXAMINATION VOLUME FOR CLASS 2 RESIDUAL HEAT REMOVAL (RHR) HEAT EXCHANGER SHELL-TO-FLANGE WELD (TAC NO. MC8435)

Dear Mr.Palmisano:

By letter dated September 8, 2005, the Nuclear Management Company, LLC (NMC), submitted Relief Request 2-RR-4-6 for a reduced examination volume for the volumetric examination of the specified residual heat removal heat exchanger shell-to-flange weld required by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Article IWC-2500 at Prairie Island Nuclear Generating Plant, Unit 2 (Prairie Island 2).

The licensee provided additional information to support its request in its letter dated April 25, 2006. The staff found that the ASME Code, Section XI requirement for essentially 100 percent volumetric examination coverage of the RHR HX shell-to-flange weld joint, as specified, is impractical for Prairie Island 2, and that the licensee's alternative examination of the subject component provides reasonable assurance of structural integrity. Granting 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.

The relief is granted for the fourth 10-year inservice inspection interval. The staff's evaluation and conclusions are contained in the enclosed safety evaluation.

Sincerely,

*/RA/*

L. Raghavan, Chief  
Plant Licensing Branch III-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-306

Enclosure:  
As stated

cc w/encl : See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELIEF REQUEST 2-RR-4-6 FOR REDUCED EXAMINATION VOLUME FOR  
ASME CODE, SECTION XI-REQUIRED VOLUMETRIC EXAMINATION OF  
RESIDUAL HEAT REMOVAL HEAT EXCHANGER SHELL-TO-FLANGE WELD  
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2  
NUCLEAR MANAGEMENT COMPANY, LLC  
DOCKET NO. 50-306

1.0 INTRODUCTION

The staff has reviewed and evaluated the information provided by Nuclear Management Company, LLC (NMC, the licensee) in its letter dated September 8, 2005, pertaining to Relief Request 2-RR-4-6 for a reduced examination volume for the volumetric examination of the specified residual heat removal (RHR) heat exchanger (HX) shell-to-flange weld required by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Article IWC-2500 at Prairie Island Nuclear Generating Plant, Unit 2 (Prairie Island 2). The licensee provided additional information to support its request in its letter dated April 25, 2006.

2.0 REGULATORY REQUIREMENTS

Title 10 of the Code of Federal Regulations, Section 50.55a, paragraph (g), requires that inservice inspection (ISI) of ASME Code Class 1, 2, and 3 components be performed in accordance with the applicable Edition of Section XI of the ASME Code and applicable Addenda, except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). Section 50.55a(a)(3) states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the applicant 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.

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 ISI 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 the ASME Code, Section XI incorporated by reference in 10 CFR 50.55(b)(2), on the date 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. The applicable Code of record for the Prairie Island 2 ISI program is the 1998 Edition through the 2000 Addenda of the ASME Code, Section XI. The licensee requested relief for the fourth 10-year ISI interval at Prairie Island 2, which began on December 21, 2004, and ends on December 20, 2014.

### 3.0 TECHNICAL EVALUATION

#### ASME Code, Section XI Requirement:

The 1998 Edition through the 2000 Addenda of ASME Code, Section XI, Article IWC-2500 requires that components be examined and tested as specified in Table IWC-2500-1 of the ASME Code, Section XI. Table IWC-2500-1, examination category C-A, Item No. C1.10 requires a volumetric examination of the RHR HX shell-to-flange weld once during each 10-year ISI interval, with essentially 100 percent volumetric coverage of the examination volume specified in Figure IWC-2500-1 of the ASME Code, Section XI.

#### Component for Which Relief is Requested:

<u>Category</u>	<u>Item</u>	<u>Description</u>
C-A	C1.10	RHR HX Shell-to-Flange Weld

The licensee has specifically requested relief for Shell-to-Flange Weld W-2 for the 21 RHR HX at Prairie Island 2.

#### Licensee's Basis for Relief Request (As stated):

This request is submitted pursuant to 10 CFR 50.55a(g)(5)(iv) which states, "Where an examination requirement by the code or addenda is determined to be impractical by the licensee and is not included in the revised inservice inspection program as permitted by paragraph (g)(4) of this section, the basis for this determination must be demonstrated to the satisfaction of the Commission."

The regulation further states in 10 CFR 50.55a(g)(1) that, "For a boiling or pressurized water-cooled nuclear power facility whose construction permit was issued before January 1, 1971, components (including supports) must meet the requirements of paragraphs (g)(4) and (g)(5) of this section to the extent practical." Section 50.55a(g)(4) states, "Throughout the service life of a boiling or pressurized water-cooled nuclear power facility, components (including supports) which are classified as ASME Code Class 1, Class 2, and Class 3 must meet the requirements, except design and access provisions and preservice examination requirements, set forth in Section XI of editions of the ASME Boiler and Pressure Vessel Code...to the extent practical within the limitations of design, geometry, and materials of construction of the components."

Prairie Island was designed and constructed prior to development of ASME XI, therefore design for accessibility and inspection coverage is not in many cases, sufficient to permit satisfying the current Code requirements. Limitations to inspections are primarily due to design obstructions, component configuration and interference. In the case of circumferential welds a limitation from ultrasonic examination may exist simply because of weld joint configuration as with a pipe to valve or fitting weld.

Licensee's Alternative Examination (As stated):

This head to shell weld is subject to be examined by volumetric examination method. The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix III. The examination was conducted using a 45 and 60-degree transducers. The head and shell materials are austenitic stainless steel. The examination is limited in all scan directions due to outlet / inlet nozzle reinforcing rings and two welded supports. The credited volumetric examination of the Weld Required Volume was limited to 54.79%. The techniques employed for the examination provide for a best effort examination. As an alternative to the ultrasonic examination, radiography and liquid penetrant was considered and determined to add no examination area due to limited accessibility.

The weld is included in the boundary examined by VT-2 during pressure testing (SP 2168.10, RHR System Pressure Test, completed 10/7/2003) with no leakage detected.

The license also stated:

System integrity is monitored during normal operation by many direct and indirect methods, e.g., area radiation monitoring, system walk downs, surveillance testing, etc.

Staff Evaluation:

The 1998 Edition through the 2000 Addenda of the ASME Code, Section XI, Article IWC-2500 requires that components be examined and tested as specified in Table IWC-2500-1 of the ASME Code, Section XI. Table IWC-2500-1 requires a volumetric examination of the RHR HX shell-to-flange weld at Prairie Island 2, with essentially 100 percent volumetric coverage of the examination volume specified in Figure IWC-2500-1 of the ASME Code, Section XI. Figure IWB-2500-1 of the ASME Code, Section XI specifies that the total examination volume include the weld and the adjacent reactor vessel base metal material extending to a distance of one-half inch from the extremities of the weld crown at the outside surface of the HX shell.

The licensee conducted a volumetric examination of Shell-to-Flange Weld W-2 for the 21 RHR HX specified in its relief request by conducting ultrasonic scans of the accessible regions using procedures and personnel qualified in accordance with the ASME Code, Section XI, Appendix III. The licensee conducted these examinations using two qualified ultrasonic transducers, scanning in four directions to the extent practical. By using these techniques, the licensee was able to obtain an overall examination volume coverage of 54.79 percent of the ASME Code, Section XI-required examination volume. The licensee provided a detailed description of the conditions which limited examination coverage. The limitation in examination coverage was

attributed to interferences associated with the HX inlet and outlet nozzles and welded supports, which restricted access for scanning.

In proposed Relief Request 2-RR-4-6, the licensee did not indicate whether the limited scope volumetric examination of the specified RHR HX shell-to-flange weld provided any indication of the presence of unacceptable flaws or conditions in accordance with the acceptance criteria of the ASME Code, Section XI, Article IWC-3000. In a request for additional information (RAI), the staff requested that the licensee discuss whether the limited scope volumetric examination of this weld provided any indication of the presence of flaws or other relevant conditions that were determined to be unacceptable according to the acceptance criteria of the ASME Code, Section XI, Article IWC-3000. In addition, the staff requested that the licensee discuss the extent to which the specified RHR HX shell-to-flange weld was volumetrically examined during previous ISI intervals, including the percentage of credible volumetric examination coverage that was achieved during the previous examinations.

In its April 25, 2006, RAI response, the licensee indicated that the limited scope volumetric examination of the subject weld did not provide any indication of the presence of unacceptable flaws or other relevant conditions. All recorded indications were identified as non-relevant due to component geometry. The licensee also indicated in its RAI response that the subject weld was volumetrically examined during the second and third 10-year ISI intervals at Prairie Island 2. Volumetric examination coverage was not calculated for the second 10-year ISI interval examination of the weld. Volumetric examination coverage for the weld was calculated to be 32.5 percent for the third 10-year ISI interval. For both the second and third 10-year ISI intervals, the limited scope volumetric examinations did not provide any indication of the presence of unacceptable flaws or other relevant conditions. Based on this assessment, the staff determined that the above information satisfied resolution of the RAI.

The staff agreed that it would be impractical to satisfy the ASME Code, Section XI requirements for "essentially 100 percent" coverage of this weld due to the interferences discussed above. In order to comply with the ASME Code, Section XI requirements, a design modification of the HX would have to be performed. This would impose a significant burden on the licensee. The examinations were conducted to the extent practical and provide reasonable assurance of structural integrity since any significant pattern of degradation should have been detected during examination of the accessible weld volume. Furthermore, in the event that a service-induced flaw in the weld propagates, it would most likely be detected with the ASME Code, Section XI-required VT-2 visual examinations of the RHR HX during the system leakage test.

Based on the above considerations, the staff concludes that the ASME Code, Section XI requirement to perform the volumetric examination of the specified RHR HX shell-to-flange weld, with essentially 100 percent volumetric coverage of the examination volume specified in Figure IWC-2500-1 of the ASME Code, Section XI, is impractical for Prairie Island 2. The licensee's alternative examination, which includes the reduced examination volume along with the VT-2 visual examinations of the RHR HX and technical specification surveillance requirements for leakage monitoring, provides reasonable assurance of structural integrity for the RHR HX shell-to-flange weld.

#### 4.0 CONCLUSION

The staff concludes that the ASME Code, Section XI requirement to perform the volumetric examination of the specified RHR HX shell-to-flange weld, with essentially 100 percent volumetric coverage of the examination volume specified in Figure IWC-2500-1 of the ASME Code, Section XI, is impractical for Prairie Island 2. Furthermore, the staff concludes that the licensee's alternative examination provides reasonable assurance of structural integrity of the subject component. Therefore, the licensee's request for relief is authorized pursuant to 10 CFR 50.55a(g)(6)(i) for the fourth 10-year ISI interval (December 21, 2004, to December 20, 2014). Granting 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. The relief is granted for the fourth 10-year inservice inspection interval. All other requirements of the ASME Code, Section XI, for which relief has not been specifically requested and approved, remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: C. Sydnor

Date: July 3, 2003

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