October 3, 2005

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 1 - EVALUATION OF THIRD 10-YEAR INTERVAL INSERVICE INSPECTION REQUEST FOR RELIEF RR-17 (TAC NO. MC6259)

Dear Mr. Palmisano:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated February 22, 2005, Nuclear Management Company (NMC) LLC, the licensee submitted a request for relief from certain coverage requirements of the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI at Prairie Island Nuclear Generating Plant, Unit 1.

The NRC staff has reviewed the information provided and concludes that to examine the subject welds as required by the Code, the welds would have to be redesigned and modified resulting in a considerable burden on the licensee. As a result, the NRC staff has determined that compliance with the Code volumetric coverage requirements is impractical for the subject welds. The NRC staff has found the licensee's request for relief acceptable. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval (December 17,1993 to December 20, 2004) at Prairie Island Nuclear Generating Plant, Unit 1. The NRC staff has determined that this grant of relief 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 enclosed safety evaluation contains the basis for granting the requested relief.

Sincerely,

/RA/

Mahesh L. Chawla, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-282

Enclosure: Safety Evaluation

cc w/encl: See next page

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Mahesh L. Chawla, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
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cc w/encl: See next page

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ADAMS ACCESSION NUMBER: **ML052520006**

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DATE	09/19/05	09/16/05	09/19/05	09/29/05	10/3/05

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. 17

PRAIRIE ISLAND NUCLEAR GENERATING PLANT UNIT 1

NUCLEAR MANAGEMENT COMPANY, LLC.

DOCKET NO. 50-282

1.0 INTRODUCTION

The Nuclear Regulatory Commission (NRC) staff has reviewed and evaluated the information provided by Nuclear Management Company, LLC (the licensee), in a letter dated February 22, 2005, which seeks relief from certain coverage requirements of the 1989 Edition of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) Section XI at Prairie Island Nuclear Generating Plant (PINGP), Unit 1.

2.0 REGULATORY REQUIREMENTS

The inservice inspection of the ASME Code Class 1, Class 2, and Class 3 components shall be performed in accordance with Section XI of the ASME Code and applicable editions and 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). Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(a)(3) states in part that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee 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 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 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. The applicable ASME Code of record for the third 10-year inservice inspection (ISI) interval at PINGP, Unit 1, is the 1989 Edition of ASME Section XI, with no addenda.

3.0 TECHNICAL EVALUATION

3.1 Code Requirements for which Relief Is Requested

ASME Section XI (1989 Edition, no addenda) Code requires a full volumetric and surface examination coverage of ISI components in accordance with Categories B-F and B-J of Table IWB-2500-1 and Category C-F-1 of Table IWC-2500-1, and a full volumetric examination coverage in accordance with Categories B-B and B-D of Table IWB-2500-1. NRC Regulatory Guide 1.147 endorses the use of Section XI Code Case N-460, “Alternative Examination Coverage for Class 1 and Class 2 Welds.” This code case allows greater than 90 percent coverage of a weld to meet the “essentially 100 percent” requirement.

3.2 Licensee’s Code Relief Request:

Relief is requested from performing a full Code coverage volumetric examination of the Class 1 and Class 2 welds.

3.3 Components for which Relief Is Requested

ASME Section XI, Class 1, Table IWB-2500-1, Examination Categories B-B, B-D, B-F and B-J; Examination Category C-F-1.

Category	Item	ID No.	Description	Volumetric Coverage (%)	Limitation
B-B	B2.60	W-2 301078	Tubesheet to Head	32.29	Limited due to procedure qualification for cast stainless steel.
B-D	B3.90	N-7 301100	Outlet Nozzle to Vessel Weld Loop A	76.38	Limited due to configuration.
B-D	B3.90	N-10 302979	Outlet Nozzle to Nozzle to Vessel Loop B	78.47	Limited due to configuration.
B-D	B3.90	N-8 301102	Nozzle to Vessel Weld Loop A	59.26	Limited due to configuration.
B-D	B3.90	N-11 302981	Nozzle to Vessel Weld Loop B	59.26	Limited due to configuration.
B-F	B5.40	W-1 300898	Nozzle to Safe End	66.23	Limited due to configuration.

Category	Item	ID No.	Description	Volumetric Coverage (%)	Limitation
B-J	B9.11	W-4A 390102	Elbow to Safe End	85.75	Limited due to OD profile of cast stainless steel elbow.
C-F-1	C5.21	W-1 305202	Reducer Tee to Pipe	50	Limited due to configuration.

3.4 Licensee's Basis for Requesting Relief:

In its submittal, the licensee provided its regulatory basis for requesting relief as stated below.

> 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." Title 10 of the *Code of Federal Regulations* (10 CFR) 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 configurations 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.

The licensee stated that the required surface examination was performed using liquid penetrant tests and was not limited. No relevant indications were detected from the surface examination.

Regarding volumetric examination, limitations such as geometric configuration of the welded areas and procedure qualification restricted coverage of the subject welds and made it impossible to achieve 100 percent of the total examination volume required by IWB-2500-1 and IWC-2500-1 of ASME Section XI. Specific limitations to each item are summarized below.

Part A: Category B-B, "Pressure Retaining Welds in Vessels other than Reactor Vessels"

Chemical & Volume Control (VC) Weld (W-2), Tubesheet to Head:
The required volumetric examination was limited to a single sided examination from the tubesheet side of the weld due to obstruction from the piping connection of the forged tubesheet. The Ultrasonic Testing (UT) examination is further hindered from the head side of the weld for obtaining meaningful ultrasonic data because of the hemispherical head material being cast austenitic stainless steel. The UT of cast stainless steel is extremely difficult due to sound beam attenuation and larger grain size. The ASME Code Committee and the industry Performance Demonstration Initiative (PDI) recognized that such examinations are difficult. ASME Section XI, Appendix VIII, Supplement 9 has been in "course of preparation" for several years, hence, there are no qualified examination procedures or personnel to conduct the required examinations. The credited volumetric examination of the Weld Required Volume (WRV) was limited to 32.29 percent.

Part B: Part B: Category B-D, "Full Penetration Welds of Nozzles in Vessels"
Reactor Vessel (RV) Nozzle (N-7), Outlet Nozzle to Vessel (Loop A):

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplements 4, 6 and 7. The nozzle and vessel materials are SA 508. The examination was limited in both the parallel and perpendicular scans from the vessel inside diameter (ID) to 76.38 percent due to the proximity of the outlet nozzle protrusion to the nozzle to shell weld.   As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to no outside access and weld configuration.

Reactor Vessel Nozzle (N-10), Outlet Nozzle to Vessel (Loop B):

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplements 4, 6, and 7. The nozzle and vessel materials are SA 508. The examination was limited in both the parallel and perpendicular scans from the vessel ID to 78.47 percent due to the proximity of the outlet nozzle protrusion to the nozzle to shell weld. As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to no outside access and weld configuration.

Reactor Vessel Nozzle (N-8), Safety Injection (SI) Nozzle to Vessel (Loop A):

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplements 4, 6, and 7. The nozzle and vessel materials are SA 508. The examination was limited in both the parallel and perpendicular scans from the vessel ID to 59.26 percent due to the proximity of the outlet nozzle protrusion to the nozzle to shell weld. As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to no outside access and weld configuration.

Reactor Vessel Nozzle (N-11), SI Nozzle to Vessel (Loop B):

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplements 4, 6, and 7. The nozzle and vessel materials are SA 508. The examination was limited in both the parallel and perpendicular scans from the vessel ID to 59.26 percent due to the proximity of the outlet nozzle protrusion to the nozzle to shell weld. As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to no outside access and weld configuration.

Part C: Category B-F, "Pressure Retaining Dissimilar Metal Welds"
Reactor Coolant (RC) Weld (W-1), Nozzle to Safe End:

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplement 10. The examination was conducted using 45 and 60-degree transducers. The nozzle and safe end materials are A216 and 316 stainless (this joint contains no Alloy 82/182 or Alloy 600). The examination was limited to 66.23 percent due to the safe end configuration. As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to radiological constraints, weld configuration, and the hardship imposed without offering any commensurate increase in safety.

The required surface examination was performed using liquid penetrant and was not limited. One hundred percent of the required surface area was inspected. One indication was detected and found to be within Code Allowable. The weld is included in the boundary examined by VT-2 during pressure testing. No leakage was identified in the vicinity of the weld.

Part D: Category B-J, "Pressure Retaining Welds in Piping"
Reactor Coolant Weld (W-4A) Elbow to Safe End:

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplement 2 and Appendix III. The examination was conducted using 36, 45, 50 and 60-degree transducers. The elbow and safe end material are 316 stainless and SA 351-CF8 cast austenitic stainless (this joint contains no Alloy 82/182 or 600). The examination was limited to 85.75 percent due to the OD profile of the cast stainless steel elbow. The UT examination is further hindered from the elbow side of the weld for obtaining meaningful ultrasonic data because of the elbow material being cast austenitic stainless steel. Ultrasonic testing of cast stainless steel is extremely difficult due to sound beam attenuation and larger grain size. The ASME Code Committee and the PDI recognized that such examinations are difficult. ASME Section XI, Appendix VIII, Supplement 9 has been “in course of preparation" for several years, hence, there are no qualified examination procedures or personnel to conduct the required examinations. As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to radiological constraints, weld configuration, and the hardship imposed without offering any commensurate increase in safety.

The required surface examination was performed using liquid penetrant and was not limited. One hundred percent of the required surface area was inspected. No relevant indications were detected.

The weld is included in the boundary examined by VT-2 during pressure testing. No leakage was identified in the vicinity of the weld.

Part E: Category C-F-1 "Pressure Retaining Welds in Austenitic Stainless Steel or High Alloy Piping"

Safety Injection Weld (W-1), Reducer Tee to Pipe:

The volumetric examination was performed using personnel and procedures qualified in accordance with Appendix VIII, Supplement 2. The examination was conducted using 45 and 70-degree transducers. The piping material is 316 stainless steel. The credited volumetric examination of the WRV was limited to 50 percent. It should be noted that the volumetric examination was performed through 100 percent of the Code WRV; however, the PDI Appendix VIII procedure used is not qualified for the detection of flaws on the far side of single sided access examinations on austenitic stainless steel piping welds. The techniques employed for the examination provide for a best effort examination. As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to radiological constraints, weld configuration, and the undo hardship imposed without offering any commensurate increase in safety.

The required surface examination was performed using dye penetrant and was not limited. One hundred percent of the required surface area was inspected. No relevant indications were detected.

The weld is included in the boundary examined by VT-2 during pressure testing. No leakage was identified in the vicinity of the weld.

In discussing the above limitations, the licensee stated that the techniques employed for the examination provided for a best effort examination.

3.5 NRC Staff Evaluation

The ASME Code, Section XI (1989 Edition, no addenda) requires a full volumetric and surface examination coverage of ISI components in accordance with Categories B-F and B-J of Table IWB-2500-1, and Category C-F-1 of Table IWC-2500-1, and a full volumetric examination coverage in accordance with Categories B-B and B-D of Table IWB-2500-1.

PINGP Unit 1 was designed and constructed prior to the development of ASME Section XI. In many cases, component configurations and interference cause limitations to ISI inspections. As a result, Code-required volumetric examination of the subject Class 1 and Class 2 welds was limited to less than essentially 100 percent. In addition, ultrasonic testing of cast stainless steel is very difficult due to sound beam attenuation and larger grain size in cast materials. The PDI procedure qualification was limited in examination of welding of cast materials and further restricts full volumetric coverage.

For each of the welds examined, physical limitations due to geometric configuration of the welded areas restricted coverage of the Categories B-B, B-D, B-F, B-J and C-F-1 welds and made it impractical to achieve 100 percent of the total examination volume required by the Code.

As an alternative to the ultrasonic examination, radiography was considered and determined to be an unacceptable substitute due to radiological constraints and weld configuration.
The licensee provided detailed information regarding the specific limitation for each item. To examine these welds as required by the Code, the welds would have to be redesigned and modified which would result in a considerable burden on the licensee. The licensee conducted these examinations to the fullest extent practical, and obtained from 32.29 percent to 85.75 percent of volumetric coverage of the subject welds, and completed 100 percent of the Code-required surface examination. These examinations should have detected any significant degradation, if present, and provide reasonable assurance of structural integrity. In addition, the licensee performed visual examination (VT-2) on three of the subject welds that were included in the planned outage inspection during pressure testing in 2004. No leakage was detected in any of the welds, which indicated that leakage integrity has not been compromised.

4.0 CONCLUSION

The NRC staff has reviewed the information provided and concludes that to examine the subject welds as required by the Code, the welds would have to be redesigned and modified resulting in a considerable burden on the licensee. As a result, the staff has determined that compliance with the Code volumetric coverage requirements is impractical for the subject welds. The licensee conducted these examinations to the extent practical. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at PINGS, Unit 1. The NRC staff has determined that this grant of relief 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.

All other ASME Code Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: Z. B. Fu

Date: October 3, 2005