May 3, 2004

Mr. Joseph M. Solymossy
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 RELIEF REQUEST NO. 14 FOR THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION PROGRAM (TAC NO. MB7975)

Dear Mr. Solymossy:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated March 6, 2003, the Nuclear Management Company, LLC (NMC), submitted Relief Request (RR) No. 14 for the Prairie Island Nuclear Generating Plant (PINGP), Unit 1. NMC revised RR-14 by letter dated December 12, 2003, in response to a Request for Additional Information from the NRC. In RR-14, NMC requested relief for "limited examinations" associated with the PINGP Unit 1, third 10-year inservice inspection (ISI) interval due to the impracticality of obtaining 100 percent examination coverage for the affected items. These examinations are required by American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (Code), Section XI.

The licensee performed the Code-required weld examinations to the fullest extent practical and obtained from 41.75 percent to 86.55 percent of volumetric coverage of the subject welds. The licensee also completed 100 percent of the Code-required surface examinations. These examinations should detect any significant degradation, if present, and provide reasonable assurance of structural integrity.

The enclosure provides the NRC staff's safety evaluation (SE) for RR-14. As noted in the SE, the NRC staff concludes that compliance with the Code volumetric coverage requirements is impractical for the subject welds. Therefore, pursuant to 10 CFR 50.55a(a)(g)(6)(i), the NRC staff grants relief as described in RR-14 for the third 10-year ISI interval.

Sincerely,

/RA/

L. Raghavan, Chief, 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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Docket No. 50-282

Enclosure: Safety Evaluation

cc w/encl: See next page

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Prairie Island Nuclear Generating Plant, Units 1 and 2

cc:

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INTERVAL INSERVICE INSPECTION

REQUEST FOR RELIEF NO. 14

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 1

NUCLEAR MANAGEMENT COMPANY

DOCKET NO. 50-282

1.0 INTRODUCTION

By letter to the U.S. Nuclear Regulatory Commission (NRC, Commission) dated March 6, 2003, the licensee, Nuclear Management Company, LLC (NMC), submitted Request for Relief (RR) No. 14 for the third 10-year inservice inspection (ISI) interval for Prairie Island Nuclear Generating Plant (PINGP), Unit 1. The submittal requested approval of relief to the 1989 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code), Section XI ISI requirements. In response to a Request for Additional Information from the NRC, NMC revised the request and provided further information in a letter dated December 12, 2003. In RR-14, NMC requested relief for “limited examinations” associated with the PINGP, Unit 1, third 10-year ISI interval due to the impracticality of obtaining 100 percent examination coverage for the affected items.

2.0 REGULATORY EVALUATION

ISI of the ASME Code Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the 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 regulation at 10 CFR 50.55a(g)(6)(i) states, in part, that the Commission will evaluate determinations that Code requirements are impractical and may grant relief and may impose alternative requirements as it determines 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.

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 (ISI) 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, which was 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 Code of record for the third 10-year ISI for PINGP, Unit 1, is the 1989 Edition of the ASME Code, Section XI, with no 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.

3.0 TECHNICAL EVALUATION

Code Requirements:

ASME Code, Section XI (1989 Edition, no addenda) requires full examination coverage of ISI components per Category B-A and B-J of Table IWB-2500-1, and Category C-F-1 of Table IWC-2500-1. NRC Regulatory Guide 1.147 endorses the use of ASME Code, 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.

Licensee's Code Relief Request:

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

Components for which Relief Is Requested:

ASME Code, Section XI, Class 1, Table IWB-2500-1, Examination Category B-A, reactor vessel head to flange weld (W-6); Examination Category B-J; and Examination Category C-F-1.

Category	Item	ID No.	Description	Coverage (%)	Limitation
B-A	B1.40	W-6 301095	Head to Flange	54.2	Limited to flange configuration (lifting lugs).
B-J	B9.11	W-2 300900	Safe-End to 45° Elbow	50	Limited due to safe end configuration and proximity of adjacent safe end to nozzle weld.
B-J	B9.31	W-21 300656	Nozzle to Pipe	50	Limited due to configuration and material attenuation.
B-J	B9.11	W-18 300654	Valve to Elbow	50	Limited due to upstream valve.

Category	Item	ID No.	Description	Coverage (%)	Limitation
B-J	B9.31	W-1 300159	Nozzle to Pipe	50	Limited due to weld configuration and material attenuation.
B-J	B9.31	W-9 300136	Nozzle to Pipe	50	Limited due to material attenuation and weld configuration.
B-J	B9.11	W-2 300148	Nozzle to Pipe	75	Limited on nozzle side due to configuration.
B-J	B9.11	W-1 300649	Valve to Pipe	48.15	Limited due to 1” drain line at BDC.
B-J	B9.11	W-1 300171	Elbow to Pipe	86.55	Limited due to welded supports at 90^{o} and 270^{o}.
B-J	B9.10	W-6LS2U 300527	Elbow to Pump	70	Limited due on pump side due to configuration
B-J	B9.11	W-5 300543	Elbow to Nozzle	66.15	Limited on upstream side due to taper configuration and downstream side due to configuration.
B-J	B9.11	W-6 300926	Bent Pipe to Safe End	75.38	Limited due to joint configuration and proximity of safe-end taper from weld toe.
C-F-1	C5.21	W-10 305081	Pipe to valve	50	Limited on valve side due to configuration.
C-F-1	C5.11	W-20 301445	Pipe to valve	50	Limited on valve side due to configuration.
C-F-1	C5.21	W-14 305015	Pipe to Valve	50	Limited on valve side due to configuration.
C-F-1	C5.21	W-18 303060	Pipe to Valve	41.75	Limited on valve side due to configuration.

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 ISI 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." 10 CFR 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 component." The construction permit for PINGP Unit 1 was issued on June 25, 1968.
>
> PINGP Unit 1 was designed and constructed prior to development of ASME Code, Section 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 either magnetic particle or liquid penetrant tests and was not limited. One hundred percent or essentially 100 percent of the required surface area was inspected. No relevant indications were detected from the surface examination.

Regarding volumetric examination, physical limitations due to geometric configuration of the welded areas restrict coverage of the category B-A, B-J, and C-F-1 welds and make 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:

Reactor Vessel Weld (W-6), Head to Flange:

The required volumetric examination of the weld required volume (WRV) was limited from the flange side of the weld due to weld joint configuration and close proximity of the flange to the intersecting radius of the reactor head. In addition, there are three 5.5 inch wide lifting lugs located approximately 120 degrees apart and 3 inches from the toe of the weld on the head that prevent 100 percent scanning and axial coverage from the head side of the weld; however, coverage of the WRV was approximately 94 percent. Due to the ramp radius from the flange

side of the weld, axial scanning of the WRV was limited to approximately 38.9 percent using a 45 degree shear wave and 23.6 percent using a 60 degree shear wave. Circumferential scanning in the clockwise and counterclockwise direction of the WRV was limited to 50 percent again by the flange and could only be performed on the head side of the weld.

Reactor Coolant Weld (W-2), Safe-End to 45° Elbow:

The examination was limited to 50 percent in the axial and circumferential directions due to the safe-end to elbow weld joint configuration and proximity of the adjacent safe end to nozzle weld. The credited volumetric examination of the WRV was limited to 50 percent in that only a single-sided examination could be performed. It should be noted that the volumetric examination was performed through 100 percent of the Code WRV; however, the Performance Demonstration Initiative (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.

Reactor Coolant Weld (W-21), Nozzle to Pipe:

The branch nozzle connection to the reactor coolant piping material is austenitic stainless steel. The examination was limited to 50 percent in both the axial and circumferential directions from the nozzle side of the weld due to the weld joint configuration of the branch connection to the process pipe. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Reactor Coolant Weld (W-18), Valve to Elbow:

The examination was limited to 50 percent in both the axial and circumferential directions from the piping elbow side of the weld due to the weld joint configuration connection to the valve. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Reactor Coolant Weld (W-1), Nozzle to Pipe:

The branch nozzle connection to the reactor coolant piping material is austenitic stainless steel. The examination was limited to 50 percent in both the axial and circumferential directions from the nozzle side of the weld due to the weld joint configuration of the branch connection to the process pipe. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Reactor Coolant Weld (W-9), Nozzle to Pipe:

The branch nozzle connection to the reactor coolant piping material is austenitic stainless steel. The examination was limited to 50 percent in both the axial and circumferential directions from the nozzle side of the weld due to the weld joint configuration of the branch connection to the process pipe. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Reactor Coolant Weld (W-2), Nozzle to Pipe:

The nozzle and piping material is austenitic stainless steel. The examination was limited to 50 percent in the axial direction from the piping side of the weld due to the weld joint configuration connection to the nozzle. One hundred percent of the required circumferential scanning was performed. The credited volumetric examination of the WRV was limited to 75 percent and only a single-sided axial examination could be performed. 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.

Residual Heat Removal Weld (W-1), Valve to Pipe:

The valve and piping material is austenitic stainless steel. The examination was limited to 48.15 percent in both the axial and circumferential directions from the piping elbow side of the weld due to the weld joint configuration connection to the valve and the interference of a 1-inch drain line. The credited volumetric examination of the WRV was limited to 48.15 percent and only a single-sided examination could be performed. It should be noted that the volumetric examination was performed through 92.6 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.

Residual Heat Removal Weld (W-1), Elbow to Pipe:

The piping material is austenitic stainless steel. The examination was limited to 86.55 percent in both the axial and circumferential directions from the piping downstream side of the weld due to two welded trunnions with one at 90 degrees and the other being at 270 degrees. Axial scanning on the downstream side of the weld was limited for 5 inches in the location of each trunnion and for 4.5 inches at each location for the circumferential scanning. The total credited volumetric examination of the WRV was limited to 86.55 percent and only a single-sided examination could be performed. It should be noted that the volumetric examination was performed through 86.55 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.

Reactor Coolant Weld (W-6LS2U), Elbow to Pump:

The use of Appendix VIII, Supplement 10 was not required at the time the examination was performed. The examination was conducted using a 45-degree refracted longitudinal transducer. The pump and piping elbow material is cast austenitic stainless steel. The examination was limited to 50 percent in the axial direction and 90 percent in the circumferential direction from the piping elbow side of the weld due to the weld joint configuration connection to the pump. The credited volumetric examination of the WRV was limited to 70 percent and only a single-sided examination could be performed. In addition, the attenuation of the cast stainless material of the pump and elbow impedes the examination and use of other angles. The techniques employed for the examination provide for a best effort examination.

Reactor Coolant Weld (W-5), Elbow to Nozzle:

The use of Appendix VIII, Supplement 10 was not required at the time the examination was performed. The examination was conducted using a 45-degree refracted longitudinal transducer. The piping elbow material is cast austenitic stainless steel and the nozzle of the steam generator is cast WG 216 carbon steel joined by a 308L stainless weld. The examination was limited to 42.3 percent in the axial direction and 90 percent in the circumferential direction from the piping elbow side of the weld due to the weld joint configuration connection to the nozzle. The credited volumetric examination of the WRV was limited to 66.15 percent and only a single-sided examination could be performed. In addition, the attenuation of the cast stainless material of the elbow impedes the examination and use of other angles. The techniques employed for the examination provide for a best effort examination.

Reactor Coolant Weld (W-6), Bent Pipe to Safe End:

The safe-end material and piping are austenitic stainless. The examination was limited to 64 percent in the upstream axial direction, 37.5 percent in the downstream axial direction. The required circumferential scans were not limited. The axial scanning limitation is due to the safe end to pipe weld joint configuration. The credited volumetric examination of the WRV was limited to 75.375 percent in that only a single-sided examination could be performed. 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.

Safety Injection Weld (W-10), Pipe to Valve:

The valve and piping material is austenitic stainless steel. The examination was limited to 50 percent in both the axial and circumferential directions from the piping elbow side of the weld due to the weld joint configuration connection to the valve. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Safety Injection Weld (W-20), Pipe to Valve:

The valve and piping material is austenitic stainless steel. The examination was limited to 50 percent in both the axial and circumferential directions from the piping elbow side of the weld due to the weld joint configuration connection to the valve. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Safety Injection Weld (W-14), Pipe to Valve:

The valve and piping material is austenitic stainless steel. The examination was limited to 50 percent in both the axial and circumferential directions from the piping elbow side of the weld due to the weld joint configuration connection to the valve. The credited volumetric examination of the WRV was limited to 50 percent and only a single-sided examination could be performed. 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.

Safety Injection Weld (W-18), Pipe to Valve:

The valve and piping material is austenitic stainless steel. The examination was limited to 33.5 percent in the axial and 50 percent in the circumferential directions from the piping side of the weld due to the weld joint configuration connection to the valve. The credited volumetric examination of the WRV was limited to 41.75 percent and only a single-sided examination could be performed. It should be noted that the volumetric examination was performed through 83.5 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.

NRC Staff Evaluation:

The ASME Code, Section XI, 1989 Edition, no addenda, Category B-A and B-J of Table IWB-2500-1, and Category C-F-1 of Table IWC-2500-1 require surface and volumetric examination of pressure-retaining welds in Class 1 and Class 2 systems.

PINGP, Unit 1 was designed and constructed prior to the development of ASME Code, 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.

For each of the welds examined, physical limitations due to geometric configuration of the welded areas restricted coverage of the category B-A, 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 41.75 percent to 86.55 percent of volumetric coverage of the subject welds and completed 100 percent of the Code-required surface examinations. These examinations should have detected any significant degradation, if present, and provided reasonable assurance of structural integrity.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's submittal 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 licensee conducted these examinations to the full extent practical. Therefore, relief is granted pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at PINGP, 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: May 3, 2004