

June 17, 2003

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 2 - EVALUATION OF
RELIEF REQUEST NO. 9 FOR THE THIRD 10-YEAR INTERVAL INSERVICE
INSPECTION PROGRAM (TAC NO. MB6802)

Dear Mr. Solymossy:

By letter dated November 16, 2002, the Nuclear Management Company, LLC (NMC), submitted Relief Request No. 9 (RR-9) for the Prairie Island Nuclear Generating Plant, Unit 2. In RR-9, NMC requested relief from certain ultrasonic testing (UT) coverage requirements pertaining to the third 10-year inservice inspection (ISI) interval at the Prairie Island Nuclear Generating Plant, Unit 2. Specifically, the licensee requested relief from the 100-percent weld coverage requirement and proposed examining the subject welds to the maximum extent practical and continuing to use the normal pressure tests, visual inspections, and surface examinations required by the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." The inspections were performed during the spring 2000 refueling outage.

The Nuclear Regulatory Commission (NRC) staff has evaluated RR-9 and concludes that full compliance with the ASME Code coverage requirements for the examination of the stated components is impractical because in order for the licensee to comply with the ASME Code requirements, significant design changes and component replacements would be required. The NRC staff concludes that the licensee's volumetric and surface examinations performed provide reasonable assurance of structural integrity of the subject components. Therefore, the NRC staff grants the licensee's relief requested in RR-9 (Parts A through E) pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at Prairie Island Unit 2, which began December 21, 1994.

J. Solymossy

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The NRC staff's granting 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 given 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 authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Sincerely,

/RA/

L. Raghavan, Chief, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-306

Enclosure: Safety Evaluation

cc w/encl: See next page

J. Solymossy

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The NRC staff's granting 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 given 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 authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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cc w/encl: See next page

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May 2003

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING THE THIRD 10-YEAR INTERVAL INSERVICE INSPECTION

RELIEF REQUEST NO. 9

PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNIT 2

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-306

1.0 INTRODUCTION

By letter dated November 16, 2002, the Nuclear Management Company, LLC (the licensee), submitted Relief Request No. 9 (RR-9) for the Prairie Island Nuclear Generating Plant, Unit 2. In RR-9, the licensee requested relief from certain ultrasonic testing (UT) coverage requirements pertaining to the third 10-year inservice inspection (ISI) interval at Prairie Island Nuclear Generating Plant, Unit 2. Specifically, the licensee requested relief from the 100-percent weld coverage requirement and proposed examining the subject welds to the maximum extent practical and continuing to use the normal pressure tests, visual inspections, and surface examinations required by the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code), Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." The inspections were performed during the spring 2000 refueling outage.

The ISI of the ASME Code Class 1, 2, and 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). The regulation at 10 CFR 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, 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 ISI Code of record for Prairie Island Unit 2 is the 1989 edition of the ASME Code, Section XI. The third 10-year interval for Prairie Island Unit 2 began December 21, 1994.

2.0 REGULATORY EVALUATION

2.1 Code Requirements For Which Relief Is Requested (as stated)

- Part A: Category B-B, "Pressure retaining Welds in Vessels other than Reactor Vessels."
Chemical and Volume Control (VC) Weld (W-2), Cap-Integral Tube-sheet: Volumetric coverage limited, due to cap to tube-sheet configuration, to 48.75% for UT examination.
- Part B: Category B-F, "Pressure retaining dissimilar Metal Welds in Vessels Nozzles."
Reactor Coolant (RC) Weld (W-1) Nozzle to Safe-End: Volumetric coverage limited, due to nozzle-to-safe-end configuration, to 62.5% for UT examination.
- Part C: Category B-J, "Pressure Retaining Welds in Piping"
Reactor Coolant (RC) Weld (W-13) Nozzle to Pipe: Volumetric coverage limited, due to nozzle to pipe configuration, to 53.75%.
- Part D: Category C-A, "Pressure retaining Welds in Pressure Vessels"
Steam Generator #21 (SG) Weld (W-E) Shell to transition Cone: Volumetric coverage limited, due to ring support at weld junction, to 11.4%.
- Part E: Category C-C "Integral attachments for Vessels, Piping, Pumps and Valves"
Safety Injection Pump 22 Supports A (H-1), B (H-2), C (H-3), D (H-4): Surface examination (MT) coverage limited to 83.0% due to inaccessibility of the bottom of support because of concrete pad interference.
- Residual Heat Exchanger 21, Support A (H-1), and Support B (H-2): Surface examination (PT) coverage limited to 85.2% due to the configuration of the support and concrete pedestal.

2.2 Code Requirements for which Relief is Requested

The ASME Code, Section XI, 1989 edition, requires full examination of ISI components, per Table IWB-2500-1 and IWC-2500-1. Regulatory Guide 1.147, Revision 12, "Inservice Inspection Code Case Acceptability ASME Section XI Division 1," endorses Code Case N-460, "Alternative Examination Coverage for Class 1 and Class 2 Welds," which accepts coverage greater than 90 percent as complete coverage. The specific examination categories from the tables are:

- B-B (pressure-retaining welds in vessels other than reactor vessels), Item B2.51
- B-F (pressure-retaining dissimilar metal welds in vessel nozzles), Item B5.40
- B-J (pressure-retaining welds in piping), Item B9.31
- C-A (pressure-retaining welds in pressure vessels), Item C1.10
- C-C (integral attachments for vessels, piping, pumps and valves), Item C3.30

2.3 Licensee's Proposed Alternative (as stated)

"In-service inspections at Prairie Island Unit 2 have been performed to the maximum extent practical. When examination limitations are encountered, M&MR [metals and materials resource] procedure ISI-LTS-1, "Limitations to NDE [non-destructive examination]," is applied.... It requires a review of the procedures to obtain maximum coverage and documentation of the limitation. The procedure also considers whether an alternative method could be used to obtain improved examination coverage required by the Code...."

2.4 Licensee's Bases for Requested Relief (as stated)

"Prairie Island was designed and most components constructed and installed 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 obstructions, interferences, and weld joint configurations."

3.0 TECHNICAL EVALUATION

For the components mentioned in Section 2.1 above, the Code requires 100-percent volumetric or surface examination (coverage) of the subject welds. The licensee examined these welds to the maximum extent practical during the Summer 2000 refueling outage and achieved the stated coverage. The NRC staff reviewed the drawings and examination coverage provided by the licensee in its November 16, 2002, letter.

3.1 Part A, Examination Category B-B, Item No. B2-51, Chemical and Volume Control System, Drawing 2-ISI-34, Revision 3, Weld W-2

Weld W-2 is required to be UT-examined according to the cross sectional volume defined in IWB-2500-1, Item No. B2.51, "Heat Exchangers (Primary Side) -- Head - Head Welds - Circumferential." For the carbon-steel-to-carbon-steel weld, ASME Code, Section XI, Appendix III, Paragraph III-4420 states, "the examination shall be performed from two sides of the weld, where practicable, or from one side of the weld, as a minimum," and Paragraph III-4430 states, "...examination for reflectors transverse to the weld shall be performed on the weld crown on the single scan path to examine the weld root by one half V path in two directions along the weld." The licensee was only capable of examining 62.5 percent of the volume because of the curvature of the cap with the tubesheet. The licensee was able to interrogate 100 percent of the accessible volume in two circumferential directions and 56 percent in two axial directions. Therefore, the total weld coverage (volume x direction) is 48.75 percent. The examination is limited in the axial directions by two nozzles and an identification tag on the tubesheet side of the weld. In order for the licensee to achieve essentially 100-percent coverage, the weld configuration would have to be redesigned and replaced. The rework would place an unnecessary burden on the licensee, and is therefore, impractical.

The unexamined weld volume was in the base metal furthest from the weld which is an area least susceptible to generating flaws. The NRC staff believes that if there were any service-induce flaws present, the limited examinations achieved would have detected their existence. Therefore, the NRC staff has determined that the limited volumetric examinations

performed and the Code-required VT-2 visual examinations routinely performed during system leakage tests provide reasonable assurance of structural integrity of the subject weld.

3.2 Part B, Examination Category B-F, Item No. B5.40, Reactor Coolant Nozzle-to-Safe-End Weld, Drawing 2-ISI-30A, Weld W-1

Weld W-1 is required to be UT-examined according to the cross sectional volume defined in IWB-2500-1, Item No. B5.40, "Pressurizer - NPS [nominal pipe size] 4 or Larger - Nozzle-to-Safe End Butt Welds." For the carbon-steel-to-austenitic-steel weld, ASME Code, Section XI, Appendix III, Paragraph III-4420 states, "the examination shall be performed from two sides of the weld, where practicable, or from one side of the weld, as a minimum," and Paragraph III-4430 states, "...examination for reflectors transverse to the weld shall be performed on the weld crown on the single scan path to examine the weld root by one half V path in two directions along the weld." The licensee was only capable of examining 75 percent of the volume in the both circumferential directions, 46 percent of the volume in the axial direction toward the nozzle, and 52 percent of the volume in the axial directions toward the safe-end. Therefore, the total weld coverage (volume x direction) is 62.5 percent. The radius blending of the safe-end to the nozzle and the radius blending of the nozzle to the vessel limited the transducer movements. In order for the licensee to achieve essentially 100-percent coverage, the weld configuration would have to be redesigned and replaced. The rework would place an unnecessary burden on the licensee, and is therefore, impractical.

The unexamined weld volume was in the base metal furthest from the weld which is an area least susceptible to generating flaws. The NRC staff believes that if there were any service-induced flaws present, the limited examinations achieved would have detected their existence. Therefore, the NRC staff has determined that the limited volumetric examinations performed and the Code-required VT-2 visual examinations routinely performed during system leakage test provide reasonable assurance of structural integrity of the subject weld.

3.3 Part C, Examination Category B-J, Item No. B9.31, Reactor Coolant Nozzle-to-Pipe Weld, Drawing 2-ISI-5, Weld W-13

Weld W-13 is required to be UT-examined according to the cross sectional volume defined in IWB-2500-1, Item No. B9.31, "Branch Pipe Connection Welds - NPS 4 or Larger." For the austenitic-steel-to-austenitic-steel weld, ASME Code, Section XI, Appendix III, Paragraph III-4420 states, "the examination shall be performed from two sides of the weld, where practicable, or from one side of the weld, as a minimum," and Paragraph III-4430 states, "...examination for reflectors transverse to the weld shall be performed on the weld crown on the single scan path to examine the weld root by one half V path in two directions along the weld." The licensee was only capable of examining 11 percent of the volume in the both circumferential directions, 95 percent of the volume in the axial direction from the branch connection toward the cold leg, and 73 percent of the volume in the axial directions from the cold leg toward the branch connection. Therefore, the total weld coverage (volume x direction) is 47.5 percent. The blend radius above the saddle weld configuration limited the circumferential scans to the branch connection side of the weld, and axial scans in the cold leg piping. In order for the licensee to achieve essentially 100-percent coverage, the weld configuration would have to be redesigned and replaced. The rework would place an unnecessary burden on the licensee, and is therefore, impractical.

The NRC staff believes that if there were any service-induced flaws present, the limited examinations achieved would have detected their existence. Therefore, the NRC staff has determined that the limited volumetric examinations performed and the Code-required VT-2 visual examinations routinely performed during system leakage test provide reasonable assurance of structural integrity of the subject weld.

3.4 Part D, Examination Category C-A, Item No. C1.10, Steam Generator No. 21, Shell-to-Transition Cone, Weld W-E

Weld W-E is required to be UT-examined according to the cross sectional volume defined in IWC-2500-1, Item No. C1.10, "Shell Circumferential Welds" (vessel greater than 2 inches in wall thickness). For the carbon-steel-to-carbon-steel weld, ASME Code, Section V, Article 4, T441.4.1 states, "...volumes shall be scanned by straight and angle beam techniques as described in T-441.5, T-441.6, and T-441.7." Angle-beam scanning is according to T441.5, which states, "...The examination volume shall be scanned with angle beam search units directed both at right angles to the weld axis and along the weld axis. Wherever feasible, each examination shall be performed in two directions..." The licensee was unable to scan in the circumferential directions and scan with a straight beam transducer because the weld is covered by a vessel support ring. The licensee was able to interrogate the volume and root portion of the weld in the axial directions from the side opposite (diameter transition segment) the support ring and between the support ring bolting. The coverage achieved with the 45° and 60° transducers were 30.5 percent and 53.7 percent toward the weld and 27.4 percent and 34.7 percent away from the weld, respectively. The coverage is the total of all of the required directions and angles, which is 11.44 percent. In order for the licensee to achieve essentially 100-percent coverage, the support ring would have to be redesigned and moved. The rework would place an unnecessary burden on the licensee, and is therefore, impractical.

The examination that was performed is capable of detecting circumferential flaws generating from the inside surface of the heat affected zone and weld root. The examined volume is the most likely location for flaws. Flaws generating from the outside surface would be detected with normal Code-required visual examinations and axial flaws would be restrained by the support ring. Therefore, the NRC staff has determined that the limited volumetric examinations performed and the Code-required VT-2 visual examinations routinely performed during system leakage test provide reasonable assurance of structural integrity of the subject weld.

3.5 Part E, Examination Category C-C, Item No. C3.30, Safety Injection Pump 22, Supports A, B, C, and D, Welds H-1, H-2, H-3, H-4

Welds H-1, H-2, H-3, H-4 are required to be surface-examined according to the examination requirements defined in IWC-2500-1, Item No. C3.30, "Pumps - Welded Attachments." The licensee was only capable of examining 83 percent of the surface. If the integrity of the welds was being compromised, flaws would be randomly dispersed in the welds and detectable in the examined surfaces of the weld. The noninspectable portion of these welds is located in a narrow space between a concrete pad and pump body. In order for the licensee to achieve essentially 100-percent surface coverage, the concrete pad and support bracket would have to be redesigned and replaced, which is impractical. The NRC staff believes that if there were any service-induced flaws present, the limited examinations achieved would have detected their

existence. Therefore, the NRC staff has determined that the limited volumetric examinations performed and the Code-required VT-2 visual examinations routinely performed during system leakage test provide reasonable assurance of structural integrity of the subject welds.

3.5 Part E, Examination Category C-C, Item No. C3.10, Residual Heat Exchanger 21, Supports A and B, Welds H-1 and H-2

Welds H-1 and H-2 are required to be surface-examined according to the examination requirements defined in IWC-2500-1, Item No. C3.10, "Pressure Vessels - Welded Attachments." The licensee was only capable of examining 83 percent of the surface that attaches a support bracket to the heat exchanger. The configuration of the bracket is such that the attachment welds would have to fail in shear. If the integrity of the welds was being compromised, flaws would be randomly dispersed in the welds and detectable in the examined surfaces of the welds. The noninspectable portion of these welds is located in a narrow space between a concrete pedestal and heat exchanger body. In order for the licensee to achieve essentially 100 percent surface coverage, the concrete pedestal and support bracket would have to be redesigned and replaced, which is impractical. The NRC staff believes that if there were any service-induced flaws present, the limited examinations achieved would have detected their existence. Therefore, the NRC staff has determined that the limited volumetric examinations performed and the Code-required VT-2 visual examinations routinely performed during system leakage tests provide reasonable assurance of structural integrity of the subject welds.

3.0 CONCLUSION

The NRC staff has evaluated RR-9 and concludes that full compliance with the ASME Code coverage requirements for the examination of the stated components is impractical because in order for the licensee to comply with the ASME Code requirements, significant design changes and component replacements would be required. The NRC staff concludes that the licensee's volumetric and surface examinations performed provide reasonable assurance of structural integrity of the subject components. Therefore, the NRC staff grants the licensee's relief requested in RR-9 (Parts A through E) pursuant to 10 CFR 50.55a(g)(6)(i) for the third 10-year ISI interval at Prairie Island Unit 2, which began December 21, 1994.

The NRC staff's granting 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 given 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 authorized herein by the NRC staff remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

The information in RR-9, as well as the NRC staff's disposition of the request, is summarized in Table 1.

Attachment: Summary of Relief Request No. 9, Parts A through E

Principal Contributor: R. Hernandez

Date: June 17, 2003

SUMMARY OF RELIEF REQUEST NO. 9, PARTS A THROUGH E

System or Component	Exam. Cat. Item No.	Examination Vol. & Location	NDE Method	Proposed Alternative	Relief Request Disposition by NRC staff
Chemical and Volume Control, Cap-Integral Tube-Sheet	B-B, B2.51	100% of weld W-2 DWG: 2-ISI-34 R3,	UT	Use achieved 48.75% Coverage	Granted per 10 CFR 50.55a(g)(6)(i)
Reactor Coolant, Nozzle-to-Safe-End	B-F, B5.40	100% of weld W-1 DWG: 2-ISI-30A	UT	Use achieved 62.5% Coverage	Granted per 10 CFR 50.55a(g)(6)(i)
Reactor Coolant, Nozzle-to-Pipe	B-J, B9.31	100% of weld W-13 DWG: 2-ISI-5	UT	Use achieved 53.75% Coverage	Granted per 10 CFR 50.55a(g)(6)(i)
Steam Generator No. 21	C-A, C1.10	100% of weld W-E DWG: 2-ISI-37A	UT	Use achieved 11.4% Coverage	Granted per 10 CFR 50.55a(g)(6)(i)
Safety Injection Pump 22 Supports: A, B, C, and D	C-C, C3.30	100% of welds H-1, H-2, H-3, and H-4 DWG: 2-ISI-60B	MT	Use achieved 83.0% Coverage	Granted per 10 CFR 50.55a(g)(6)(i)
Residual Heat Exchanger 21 Supports: A and B	C-C, C3.30	100% of welds H-1 and H-2 DWG: 2-ISI-69A	PT	Use achieved 86.2% Coverage	Granted per 10 CFR 50.55a(g)(6)(i)