NMC
Committed to Nuclear Excellence

Prairie Island Nuclear Generating Plant
Operated by Nuclear Management Company, LLC

JUL 2 3 2004

L-PI-04-094
10 CFR 50.55a

U S Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Prairie Island Nuclear Generating Plant Units 1 and 2
Dockets 50-282 and 50-306
License Nos. DPR-42 and DPR-60

Subject: Response to Request for Additional Information Regarding Request for Relief No. 19, Revision 0, for Units 1 and 2 3rd Ten Year Inservice Inspection Interval (TAC Nos. MC2543/MC2544)

Reference: Letter from NMC to NRC, "Request for Relief No. 19, Revision 0, for Units 1 and 2 3rd Ten Year Inservice Inspection Interval," dated March 30, 2004 (ADAMS Accession Number ML040970458).

Nuclear Management Company, LLC (NMC) submitted an Inservice Inspection request for relief pursuant to 10 CFR 50.55a on March 30, 2004 (referenced above). The Nuclear Regulatory Commission (NRC) staff subsequently requested additional information via email, dated May 27, 2004. This letter provides the requested information.

Please contact Jack Leveille with any questions at 651-388-1121, ext. 4142.

Summary of Commitments

In the attached response, we are making the following new commitment, indicated in italics: "To ensure the extremities of the weld are included in the examination volume, a margin of 0.5 inches will be conservatively added to the scanning path of all transducers in all directions as allowed by component geometry."

Joseph M. Solymossy
Site Vice President, Prairie Island Nuclear Generating Plant
Nuclear Management Company, LLC

Enclosure: Response to Request for Additional Information

cc: (next page)

1717 Wakonade Drive East • Welch, Minnesota 55089-9642
Telephone: 651.388.1121

A047

cc: Administrator, Region III, USNRC
Project Manager, Prairie Island, USNRC
Resident Inspector, Prairie Island, USNRC

ENCLOSURE
L-PI-04-094

Response to Request for Additional Information

Pages 1 through 3
Sketch – Inlet Nozzle to Shell Exam
Sketch – Outlet Nozzle to Shell Exam
Sketch – Safety Injection Nozzle to Shell

1. Under the Basis for Relief Request, NMC states that the required examination volume for the RPV nozzle-to-vessel welds extends far beyond the weld into the base metal, and is unnecessarily large. This proposed alternative would redefine the examination volume boundary to one-half (1/2) inch of base material on each side of the widest portion of the weld.

a. Please provide a supplemental sketch showing the specific configuration nozzle-to-vessel weld and revised examination volume (including dimensions).

The examination volume sketches, attached, depict specific nozzle-to vessel weld configurations as taken from the fabrication drawings. Prairie Island Units 1 and 2 are dimensionally identical in this regard. The vendor will conservatively add an additional safety margin of 0.5 inches to the scanning path of all transducers in all directions as allowed by component geometry.

b. Identify the type of ultrasonic technique (manual or automated), nominal pipe diameters, and weldment material (ferritic, austenitic, Inconel) that NMC is proposing to inspect.

Fully qualified Appendix VIII automated ultrasonic techniques applicable to the materials and nozzle geometries will be applied from the nozzle bore and from the vessel shell inside diameter surface to accomplish the examination. The following table includes the nominal pipe diameters and weldment material of each nozzle-to-vessel weld within the scope of this request:

Unit No.	ISI Summary Number	Component Identification	Component Description	Nominal Pipe Diameter	Weldment Material
1	301098	N-6	Inlet Nozzle to Vessel Weld Loop A	27.5"	Ferritic
1	301100	N-7	Outlet Nozzle to Vessel Weld Loop A	29"	Ferritic
1	301102	N-8	SI Nozzle to Vessel Weld Loop A	4"	Ferritic
1	302977	N-9	Inlet Nozzle to Vessel Weld Loop B	27.5"	Ferritic
1	302979	N-10	Outlet Nozzle To Vessel Weld B Loop	29"	Ferritic

Unit No.	ISI Summary Number	Component Identification	Component Description	Nominal Pipe Diameter	Weldment Material
1	302981	N-11	SI Nozzle To Vessel Weld Loop B	4"	Ferritic
2	501129	N-6	Inlet Nozzle to Vessel Weld Loop A	27.5"	Ferritic
2	505018	N-7	Outlet Nozzle to Vessel Weld Loop A	29"	Ferritic
2	500726	N-11	SI Nozzle to Vessel Weld Loop A	4"	Ferritic
2	501150	N-9	Inlet Nozzle to Vessel Weld Loop B	27.5"	Ferritic
2	505020	N-10	Outlet Nozzle to Vessel Weld Loop B	29"	Ferritic
2	500727	N-8	SI Nozzle to Vessel Weld Loop B	4"	Ferritic

c. It is not clear how NMC personnel will be able to locate the widest portion of the nozzle-to-vessel weld precisely. It is unclear how repaired areas extending beyond the ideal weld cross-sectional area are identified and how these areas will be examined. If personnel are to identify the widest sections of the nozzle-to-vessel welds, please specify what positive means of examination will be used to identify the weld extremities. Also, will the extremities be identified on both the inside and outside diameters of the nozzle to ensure complete coverage of the welds?

A records check for Prairie Island Unit 1 and 2 reactor nozzles was conducted. The reactor vessel shop order files were reviewed to identify any deviations, which included all of the Procurement Advisory Releases and any associated Deviation Notice/Disposition Reports. The review found that none of the deviations identified involved repairs to the reactor vessel primary nozzles. Review of the in-service inspections of these welds revealed no indications requiring repairs.

The weld volume is defined on the attached sketches. *To ensure the extremities of the weld are included in the examination volume, a margin of 0.5 inches will be*

conservatively added to the scanning path of all transducers in all directions as allowed by component geometry.

2. Under the Basis for Relief Request, NMC also states that crack initiation during plant service in the examination volume excluded from the proposed reduced examination volume is highly unlikely because of the low stresses encountered in the base material outside of the heat affected zone of the weld. Please provide your technical basis and analyses in order to support this statement.

The stresses in the nozzle to shell weld derive from two primary sources; operational stresses and weld residual stresses.

The operational stresses derive from internal pressure in the vessel, and temperature changes which occur during operational transients. These stresses are limited by the design to ensure that ASME Code stress limits are met. Also, a fatigue analysis is required by Section III to ensure that the component is unlikely to initiate flaws during operation from this source. The fatigue usage in the nozzle to shell weld region is typically less than 0.1, as compared to the code limit of 1.0.

The total stresses in the nozzle to shell weld region are highest at the weld, and drop off as a function of distance away from the weld. Stresses caused by welding are concentrated at and near the weld. The vessel is stress relieved through post-weld stress relief heat treatment. The weld residual stresses are significantly reduced, and those stresses that remain after the heat treatment decrease significantly as a function of distance from the weld boundary.

Since operational and residual stresses are limited by the design requirements and the stress relief heat treatment, creation of flaws during plant service is unlikely due to the low stresses in the base metal away from the weld.

The ASME code inspection requirements are concentrated on the weld regions, because the welding process itself was thought to have a higher potential to result in cracks than the forging or plate rolling process used for the adjacent base metal. The only reason for including areas of the base metal in the examination volume was to ensure that the entire weld was included. The extent of the weld region for the reactor vessel nozzle to shell weld region is very well known, since the fabrication process was very tightly controlled. The affected areas were previously examined in the previous two inspection intervals, with acceptable results, using the larger examination volume requirements specified in ASME Section XI.

In summary, the stresses in the nozzle-to-shell region of the reactor vessel are all within the code allowable values, and the usage factor is small (less than ten percent of the code limit). Therefore the inspection requirements proposed in the relief request are sufficient to ensure that potential indications are found, and that the structural integrity of the reactor vessel is maintained.