July 18, 2006

Mr. John T. Conway
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SUBJECT: MONTICELLO NUCLEAR GENERATING PLANT (MNGP) - FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION (ISI) PROGRAM PLAN, RELIEF REQUEST NO. 13 (TAC NO. MC8882)

Dear Mr. Conway:

By letter dated September 27, 2005, as supplemented on May 17, 2006, Nuclear Management Company (NMC) proposed its Fourth 10-Year Interval ISI Program Plan, Relief Request No. 13 for MNGP. NMC requested relief from the American Society of Mechanical Engineers (ASME) Code, Section XI, requirement which specifies 100 percent volumetric examination coverage of all Class 1 reactor pressure vessel nozzle-to-shell welds.

The Nuclear Regulatory Commission (NRC) staff completed its review of the submittals and concluded that ASME Code requirements are impractical. The NRC staff further concluded that the examinations already performed by NMC would have detected any significant degradation that might have been present, providing reasonable assurance of the continued structural integrity of welds N-1A NV, N-2D NV, N-2E NV, N-2J NV, N-3A NV, N-4C NV, N-5B NV, and N-8A NV. The proposed relief is authorized by law and will not endanger life or property or the common defense or 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. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the MNGP fourth 10-year ISI interval.

Details of the staff's review are set forth in the enclosed safety evaluation. If you have any questions, please call the Project Manager, Mr. Peter Tam at 301-415-1451.

Sincerely,

/RA/

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

Docket No. 50-263

Enclosure:
Safety Evaluation

cc w/encl: See next page

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DATE	7/7/06	6/28/06	6/9/06	7/13/06	7/18/06

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*Safety evaluation transmitted by memo of 6/9/06.

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INTERVAL INSERVICE INSPECTION RELIEF REQUEST NO. 13

MONTICELLO NUCLEAR GENERATING PLANT (MNGP)

NUCLEAR MANAGEMENT COMPANY

DOCKET NO. 50-263

1.0 INTRODUCTION

By letter dated September 27, 2005 (Accession No. ML052760169) Nuclear Management Company (NMC, the licensee) proposed its Fourth 10-Year Interval Inservice Inspection Program Plan Request for Relief (RR) No. 13, for MNGP. The licensee provided additional information in its letter dated May 17, 2006 (Accession No. ML061420153).

The Nuclear Regulatory Commission (NRC) staff's evaluation of the licensee's proposed relief follows.

2.0 REGULATORY EVALUATION

Inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Code and applicable addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the 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: (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 pre-service 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) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

The ASME Code of record for the MNGP fourth 10-year interval ISI program, which ends on May 31, 2012, is the 1995 Edition through the 1996 Addenda of Section XI of the ASME Code.

3.0 TECHNICAL EVALUATION

3.1 ASME Code Components

The components affected by RR No. 13 are ASME Code, Section XI, Class 1, Reactor Vessel Nozzle-to-Vessel Shell welds specified in detail in Table A of the licensee's application:

Recirculation Suction	Nozzle N-1A, Weld N-1A NV
Recirculation Inlet	Nozzle N-2D, Weld N-2D NV
Recirculation Inlet	Nozzle N-2E, Weld N-2E NV
Recirculation Inlet	Nozzle N-2J, Weld N-2J NV
Main Steam Discharge	Nozzle N-3A, Weld N-3A NV
Feedwater Inlet	Nozzle N-4C, Weld N-4C NV
Core Spray Inlet	Nozzle N-58, Weld N-5B NV
Jet Pump Instrumentation	Nozzle N-8A, Weld N-8A NV

3.2 ASME Code Requirement

The ASME Code, Section XI, Examination Category B-D, Item B3.90, requires 100 percent volumetric examination, as defined in Figures IWB-2500-7, a through d, as applicable, of Class 1 reactor pressure vessel (RPV) full penetration nozzle-to-shell welds. The licensee invoked ASME Code Case N-613-1 Ultrasonic Examination of Full Penetration Nozzles to Vessels, Examination Category B-D, Item Nos. B3.10 and B3.90, Reactor Nozzle-In-Vessel Welds, Figures IWB-2500-7(a), (b) and (c), Section XI, Division 1, which was approved in an NRC safety evaluation (SE) dated October 6, 2004. Subsequent to the NRC's October 6, 2004 SE, Regulatory Guide (RG) 1.147, Revision 14, ISI Code Case Acceptability, ASME Section XI, Division 1, was issued in August 2005, in which ASME Code Case N-613-1 has been approved for general use without limitations. ASME Code Case N-613-1 allows the reduction of the examination volume next to the widest part of the weld from half of the vessel wall thickness to one-half (½) inch.

The licensee also invoked ASME Code Case N-460 Alternative Examination Coverage for Class 1 and Class 2 Welds, ASME Section XI, Division 1 which is endorsed by the NRC in RG 1.147. Code Case N-460 states, in relevant part, "when the entire examination volume or area cannot be examined due to interference by another component or part geometry, a reduction in examination coverage on any Class 1 or Class 2 weld may be accepted provided the reduction in coverage for that weld is less than 10 percent."

3.3 Licensee's Proposed Alternative Examination

In the application, the licensee stated:

In accordance with 10 CFR 50.55a(g)(5)(iii), relief is requested for the components listed in Table A on the basis that the required examination coverage of "essentially 100 percent" is impractical due to physical obstructions and the limitations imposed by design, geometry and materials of construction.

NMC performed qualified examinations that achieved the maximum, practical amount of coverage obtainable within the limitations imposed by the design of the components. Additionally, as Class 1 Examination Category B-P components, a VT-2 examination is performed on the subject components of the Reactor Coolant Pressure Boundary [RCPB] during system pressure tests each refueling outage. This was completed during the 2005 refueling outage and no evidence of leakage was identified for these components.

Therefore, pursuant to 10 CFR 50.55a(g)(5)(iii), NMC requests relief from the requirements of ASME [Code] Section XI, Table IWB-2500-1, Category B-D, Item B3.90 and associated [ASME] Code Cases[1], and proposes to utilize these completed exams as an acceptable alternative that provides reasonable assurance of continued structural integrity.

3.4 Licensee's Basis for Relief Request

The licensee based its relief request on the following:

The MNGP Nondestructive Examination (NDE) procedures incorporate improved inspection techniques qualified under Appendix VIII of the ASME Section XI Code by the Performance Demonstration Initiative (PDI) for examination of the subject nozzle-to-shell welds.

Coverage was obtained by following the scan parameters defined by the MNGP specific Electric Power Research Institute (EPRI) computer modeling report [EPRI Internal Report IR-2004-63, "Monticello Nozzle Inner Radius and Nozzle-to-Shell Weld Examinations"] for each nozzle configuration and angle, and as designated within MNGP NDE procedures.

The examinations were performed using a manual contact method from the nozzle outside blend and vessel shell surfaces as discussed in the EPRI modeling report and as stated in MNGP procedures. The shear wave mode of propagation was used for each of the transducer and wedge combinations required for the inner 15 percent of the required parallel scan volume. The refracted longitudinal wave mode of propagation was used for the remaining outer 85 percent of the volume for parallel scans, and all of the perpendicular scans.

1. Relief can not be given for the requirements in an ASME Code Case pursuant to 10 CFR 50.55a(g)(5)(iii). The NRC staff's evaluation of this relief will be evaluated only for the ASME Code, Section XI requirements that are determined to be impractical pursuant to 10 CFR 50.55a(g)(5)(iii).

According to the licensee, due to the design of these welds, a volumetric examination of 100 percent of the volume was not feasible to effectively perform as described in IWB-2500-7(b). The nozzle-to-vessel welds are accessible from the vessel shell side of the weld, but examinations cannot be performed from the nozzle side of the weld because of the forging curvature. In addition, due to component configuration, certain nozzle-to-vessel weld examinations are further limited by the RPV design obstructions (such as appurtenances).

The licensee stated that the subject components received the required examination(s) to the extent practical within the limited access of the component design. For the examinations conducted, the licensee stated that satisfactory results were achieved, and no evidence of unacceptable flaws was detected with the improved inspection techniques.

The licensee stated that additional coverage for the limited areas was not achievable or practical, based on the latest qualified ultrasonic technology, nor by other considered examination methods such as radiography. The licensee has concluded that if significant degradation existed in the subject welds, it should have been identified by the examinations performed. Additionally, as Class 1 examination category B-P components, the licensee performed VT-2 examinations on the subject components in association with the RCPB system pressure test performed during the 2005 refueling outage, and identified no evidence of leakage.

The materials for the subject components are A533 Cl I nozzle forgings welded to A502B Cl II vessel shell plate. The licensee's review of operating experience within the nuclear industry did not reveal any instances of cracking in this location and type of weldment.

The licensee stated that the MNGP reactor vessel water chemistry is controlled in accordance with the 2004 revision to the BWRVIP-130, “BWR [Boiling-Water Reactor] Water Chemistry Guidelines - 2004 Revision” (EPRI Topical Report TR-1008192). Also, a hydrogen water chemistry system is used to reduce the oxidizing environment in the reactor coolant. The licensee stated that these additional measures provide added assurance against the initiation of cracking or corrosion from the inside surface of the reactor vessel for the subject components listed in this relief request. An inerted primary containment environment during operation provides assurance of corrosion protection on the outside surface of the reactor vessel.

3.5 Licensee’s Additional Information

Additional Information was provided by the licensee in its letter dated May 17, 2006, to clarify its reference to the EPRI Internal Report IR-2004-63, "Monticello Nozzle Inner Radius and Nozzle-to-Shell Weld Examinations" regarding computer modeling for each nozzle configuration and angle as designated within MNGP NDE procedures. The licensee stated:

> The Nondestructive Examination (NDE) procedures used at the Monticello Nuclear Generating Plant (MNGP) incorporate examination techniques qualified under Appendix VIII of the ASME Section XI Code by the Performance Demonstration Initiative (PDI) for examination of the subject nozzle-to-vessel shell welds.
>
> The Electric Power Research Institute (EPRI) computer modeling report [EPRI Internal Report IR-2004-63, “Monticello Nozzle Inner Radius and Nozzle-to-Shell Weld Examinations”] was generated to assist NMC in developing and qualifying

Ultrasonic Test (UT) examination techniques for the MNGP nozzle inner corner regions and nozzle-to-vessel shell welds. The examinations were performed using a manual contact method from the nozzle outside blend radius and vessel shell surfaces as discussed in the EPRI modeling report and as stated in MNGP procedures. The UT scanning methodology modeled in the EPRI modeling report was applicable to the coverage for the inner corner regions and for the inner 15 percent volume of the nozzle-to-vessel shell welds when scanning parallel to the weld. The examination of the remaining outer 85 percent volume of the nozzle-to-vessel shell welds was based on a separate qualified technique and procedure which did not require use of the EPRI computer modeling report to validate.

The examinations for which relief was requested were not those modeled in the EPRI report for the inner 15 percent of the nozzle-to-vessel shell welds when scanning parallel to the weld. The UT examinations which were limited in coverage involved the remaining outer 85 percent of the required volume when scanning parallel to the weld, and the exam volume required when scanning normal to the weld. Therefore, the utilization of the EPRI computer modeling report for the MNGP has no bearing on the UT examination limitations included in the requested relief.

3.6 NRC Staff Evaluation

The ASME Code requires 100 percent volumetric coverage of all Class 1 RPV nozzle-to-shell welds. The subject welds are carbon steel-to-carbon steel with a "set-in" nozzle configuration having a short radius of curvature on the nozzle side. This geometry limits scanning from the nozzle side of the weld such that 100 percent of the required examination coverage cannot be completed. For the licensee to achieve the ASME Code-required volumetric coverage, the subject nozzles would have to be redesigned and modified. This would place an undue burden on the licensee. Therefore, based on provided drawings and technical description of the nozzles, the NRC staff determined that the ASME Code requirements are impractical.

Ultrasonic examination of these welds was conducted using personnel, equipment, and procedures qualified through the EPRI PDI Program for ferritic pressure vessel welds. As shown on the sketches and technical descriptions provided by the licensee, a significant amount (approximately 78 percent to 82 percent) of the required volumetric coverage was obtained for nozzle-to-shell welds N-1A NV, N-2D NV, N-2E NV, N-2J NV, N-3A NV, N-4C NV, N-5B NV, and N-8A NV. This aggregate coverage includes greater than 90 percent of the examination volume using both 45- and 60-degree ultrasonic beam angles from the vessel side of the weld.

Round robin tests, as reported in NUREG/CR-5068, “Piping Inspection Round Robin,” have demonstrated that ultrasonic examinations of ferritic material from a single side provide high probabilities of detection (usually 90 percent or greater) for both near- and far-side cracks in blind inspection trials. While the licensee may not have achieved complete examination coverage (from both sides) as required by the ASME Code, the ultrasonic examinations performed by the licensee from the vessel side of the carbon steel weld meet the inspection guidelines documented in NUREG/CR-5068. Additionally, these examinations were performed with personnel, equipment, and procedures that have been demonstrated to meet EPRI PDI Program qualification requirements.

For these reasons, the examinations performed are expected to detect any significant degradation that might have been present, thus providing reasonable assurance of the continued structural integrity of welds N-1A NV, N-2D NV, N-2E NV, N-2J NV, N-3A NV, N-4C NV, N-5B NV, and N-8A NV.

4.0 CONCLUSION

The NRC staff has reviewed the licensee's fourth 10-Year Interval ISI Program Plan, RR No. 13 for MNGP. The NRC staff concluded that ASME Code-requirements are impractical and to require the licensee to perform required ASME Code examinations would be a burden as the nozzles would have to be redesigned or modified. The NRC staff further concluded that the examinations already performed would have detect any significant degradation that might have been present, providing reasonable assurance of the continued structural integrity of welds N-1A NV, N-2D NV, N-2E NV, N-2J NV, N-3A NV, N-4C NV, N-5B NV, and N-8A NV. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted for the MNGP fourth 10-year ISI interval. The NRC staff has determined that 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.

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: T. McLellan

Date: July 18, 2006

TABLE A

Code Category and Item No.	System and Component Description	Component ID	Code Component and Examination Volume Required	Percent* Coverage Obtained	Limitations	Exam Report Number
B-D B3.90	Reactor Vessel Recirculation Suction Nozzles N-1A	N-1A NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	83%	Limited due to nozzle configuration. Also, small reduction due to interference from welded thermocouple attachments.	2005UT041
B-D B3.90	Reactor Vessel, Recirculation Inlet Nozzle N-2D	N-2D NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	82%	Limited due to nozzle configuration. Also, small reduction due to interference from welded thermocouple attachments	2005UT028
B-D B3.90	Reactor Vessel, Recirculation Inlet Nozzle N-2E	N-2E NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	78%	Limited due to nozzle configuration.	2005UT16
B-D B3.90	Reactor Vessel, Recirculation Inlet Nozzle N-2J	N-2J NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	78%	Limited due to nozzle configuration.	2005UT005
B-D B3.90	Reactor Vessel, Main Steam Discharge Nozzle N-3A	N-3A NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	83%	Limited due to nozzle configuration.	2005UT023
B-D B3.90	Reactor Vessel, Feedwater Inlet Nozzle N-4C	N-4C NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	79%	Limited due to nozzle configuration.	2005UT025
B-D B3.90	Reactor Vessel, Core Spray Inlet Nozzle N-5B	N-5B NV	Nozzle-to-Vessel Weld, Code Case N-613-1 Figure 2	81%	Limited due to nozzle configuration. Also, small reduction due to interference from welded thermocouple attachments.	2005UT018
B-D B3.90	Reactor Vessel, Jet Pump Instrumenttion Nozzle N-8A	N-8A NV	Nozzle-to-Vessel Weld Code Case N-613-1 Figure 2	83%	Limited due to nozzle configuration.	2005UT037

* Due to the nozzle design, it was not feasible to effectively examine essentially 100 percent of the required examination volume as defined in figure 2 of Code Case N-613-1. Percentages are conservatively rounded down to the nearest whole number. It should be noted that 100 percent of the inner 15 percent was examined in the parallel scans for all components listed above.

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