

February 24, 2003

Mr. Jeffrey S. Forbes
Site Vice President
Monticello Nuclear Generating Plant
Nuclear Management Company, LLC
2807 West County Road 75
Monticello, MN 55362-9637

SUBJECT: MONTICELLO NUCLEAR GENERATING PLANT - ISSUANCE OF AMENDMENT
REVISION TO PRESSURE-TEMPERATURE CURVES (TAC NO. MB4976)

Dear Mr. Forbes:

The U.S. Nuclear Regulatory Commission (the Commission or NRC) has issued the enclosed Amendment No. 133 to Facility Operating License No. DPR-22 for the Monticello Nuclear Generating Plant. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated April 22, 2002, as supplemented on September 16, 2002.

The amendment changes the TSs by revising the curves for minimum pressure-temperature for the reactor pressure vessel. On February 21, 2003, the Commission granted an exemption to the Nuclear Management Company, LLC, from the requirements of 10 CFR Part 50, Section 50.60(a) and Appendix G, to allow the use of American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (ASME Code), Code Case N-640, "Alternative Reference Fracture Toughness for Development of P-T Limit Curves," as the basis for the revised P-T curves. The P-T curves addressed by this amendment were developed in accordance with (1) the 1989 edition of the ASME Code, Section XI, Appendix G, (2) 10 CFR Part 50, Appendix G, and (3) ASME Code Case N-640.

A copy of our related safety evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Darl Hood, Senior Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-263

Enclosures: 1. Amendment No. 133 to DPR-22
2. Safety Evaluation

cc w/encls: See next page

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PDIII-1 Reading ACRS
LRaghavan WBeckner
DHood GHill(2)
RBouling BBurgess, RGN-III

*Provided SE input by memo

**Previously Concurred

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OFFICE	PDIII-1/PM	PDIII-1/LA	EMCB/SC*	OGC**	PDIII-1/SC
NAME	DHood	RBouling	SCoffin	BSmith	LRaghavan
DATE	02/24/03	02/24/03	10/28/02	2/24/03	02/24/03

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Monticello Nuclear Generating Plant

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March 2002

NUCLEAR MANAGEMENT COMPANY, LLC

DOCKET NO. 50-263

MONTICELLO NUCLEAR GENERATING PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 133
License No. DPR-22

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Nuclear Management Company, LLC (the licensee), dated April 22, 2002, as supplemented on September 16, 2002, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
 - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
 - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
 - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.2 of Facility Operating License No. DPR-22 is hereby amended to read as follows:

Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 133 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

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

Attachment: Changes to the Technical Specifications

Date of Issuance: February 24, 2003

ATTACHMENT TO LICENSE AMENDMENT NO. 133

FACILITY OPERATING LICENSE NO. DPR-22

DOCKET NO. 50-263

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

134
135
136

INSERT

134
135
136

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 133 TO FACILITY OPERATING LICENSE NO. DPR-22
NUCLEAR MANAGEMENT COMPANY, LLC
MONTICELLO NUCLEAR GENERATING PLANT
DOCKET NO. 50-263

1.0 INTRODUCTION

By application dated April 22, 2002, as supplemented on September 16, 2002, the Nuclear Management Company, LLC (the licensee), requested changes to the Technical Specifications (TSs) for the Monticello Nuclear Generating Plant. The supplement dated September 16, 2002, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the Nuclear Regulatory Commission (NRC) staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on September 3, 2002 (67 FR 56323).

The proposed amendment would change the Monticello TSs to revise the reactor vessel (RPV) pressure-temperature (P/T) limit curves. In conjunction with the proposed amendment, the licensee requested an exemption from the requirements of 10 CFR Part 50, Section 50.60(a) and Appendix G, to allow the use of American Society of Mechanical Engineers (ASME) *Boiler and Pressure Vessel Code* (ASME Code), Code Case N-640, "Alternative Reference Fracture Toughness for Development of P-T Limit Curves," as the basis for the revised P-T curves. On February 21, 2003, the NRC granted the licensee an exemption from the requirements of 10 CFR Part 50, Section 50.60(a), "Acceptance Criteria for Fracture Prevention Measures for Lightwater Nuclear Power Reactors for Normal Operation," and Appendix G, "Fracture Toughness Requirements." The proposed P/T curves were developed in accordance with (1) the 1989 edition of the ASME Code, Section XI, Appendix G, "Fracture Toughness Criteria for Protection Against Fracture," (2) 10 CFR Part 50, Appendix G, and (3) ASME Code Case N-640. The proposed changes include revising TS Figures 3.6.2, 3.6.3, and 3.6.4 to show the revised P/T limit curves for (1) inservice leakage and hydrostatic testing, (2) nonnuclear heatup and cooldown, and (3) criticality.

2.0 REGULATORY EVALUATION

The NRC staff finds that in Exhibits A and B of its April 22, 2002, application, the licensee identified the applicable regulatory requirements. The regulatory requirements upon which the NRC staff based its review are:

- 10 CFR Part 50, Section 50.60(a)
- 10 CFR Part 50, Appendix G
- 10 CFR 51.22(c)(9)

- 10 CFR 51.22(b)
- ASME Code, Section XI, Appendix G
- ASME Code Case N-640
- Regulatory Guide (RG) 1.99, Revision 2, "Radiation Embrittlement of Reactor Vessel Materials"

The NRC established the requirements in 10 CFR Part 50, Appendix G, to protect the integrity of the reactor coolant pressure boundary in nuclear power plants. This regulation requires that the P/T limits for an operating light-water nuclear reactor be at least as conservative as those that would be generated if the methods of ASME Code, Section XI, Appendix G, were used to generate the P/T limits. The methods of ASME Code, Section XI, Appendix G, postulate the existence of a sharp surface flaw in the RPV that is normal to the direction of the maximum applied stress. For materials in the beltline and upper and lower head regions of the RPV, the maximum flaw size is postulated to have a depth that is equal to one-fourth of the thickness and a length equal to 1.5 times the thickness. When evaluating an RPV nozzle, the surface flaw is postulated to propagate parallel to the axis of the nozzle's corner radius.

The basic parameter used in ASME Code, Section XI, Appendix G, for calculating P/T limit curves is the stress intensity factor, K_I factor, which is a function of the stress state at the crack-tip and flaw configuration. The methods of ASME Code, Section XI, Appendix G, require, in part, that licensees calculate the maximum allowable stress intensities (K_I factors) and pressures for the RPV as a function of temperature and based on use of the lower-bound crack-arrest fracture toughness equation (K_{IA} equation) for the limiting adjusted reference nil-ductility temperature value (RT_{NDT} value) material in the RPV. Thus, the critical locations in the RPV beltline and head regions are the 1/4-thickness (1/4T) and 3/4-thickness (3/4T) locations, which correspond to the points of the crack tips if the flaws are initiated and grown from the inside and outside surfaces of the vessel, respectively. RG 1.99, Revision 2, provides an acceptable method of calculating RT_{NDT} values for ferritic RPV materials. RG 1.99, Revision 2, includes methods for adjusting the RT_{NDT} values of materials in the beltline region of the RPV where the effects of neutron irradiation may induce an increased level of embrittlement in the materials.

ASME Code, Section XI, Appendix G, also requires that P/T curves satisfy a safety factor of 2.0 on stress intensities arising from primary membrane stresses and primary bending stresses during normal plant operations (including heatups, cooldowns, and transient operating conditions), and a safety factor of 1.5 on stress intensities arising from primary membrane stresses and primary bending stresses when leak rate or hydrostatic pressure tests are performed on the RCS.

Table 1 to 10 CFR Part 50, Appendix G, provides the NRC staff's criteria for meeting the P/T limit requirements of Appendix G to Section XI, as well as the minimum temperature requirements of the rule for bolting up the vessel during normal and pressure testing operations.

3.0 TECHNICAL EVALUATION

The NRC staff has reviewed the licensee's regulatory and technical analyses provided in Exhibits A and B of the April 22, 2002, application. The detailed evaluation below supports the NRC staff's conclusion that: (1) there is reasonable assurance that the health and safety of the

public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

The current P/T limit curves given in the Monticello TSs include four figures:

- TS Figure 3.6.1, which contains a figure for determining the adjusted reference temperature shift (ΔRT_{NDT} value) for the beltline region of the RPV as a function of the neutron fluence at the location of the RPV that is one-quarter of the distance across the RPV wall thickness ($1/4T$ location of the RPV, as measured relative to the inside surface of the RPV wall).
- TS Figure 3.6.2, which provides the P/T limit curves for the pressure test condition, including a curve for the beltline region of the RPV at zero effective full power years (EFPYs) and a curve for the limiting region of the RPV that is remote from the reactor core beltline.
- TS Figure 3.6.3, which provides the P-T limit curves for normal operations of the reactor with the core not critical, including a curve for the beltline region of the RPV at zero EFPYs and a curve for the limiting region of the RPV that is remote from the reactor core beltline.
- TS Figure 3.6.4, which provides the P/T limit curves for normal operations of the reactor with the core critical, including a curve for the beltline region of the RPV at zero EFPYs and a curve for the limiting region of the RPV that is remote from the reactor core beltline.

The licensing basis for Monticello allows the licensee to generate the current P/T limit curves for the irradiated vessel at the site without the need for NRC staff review and approval. The licensee accomplishes this by using the applicable neutron fluence data to obtain the limiting amount of RT_{NDT} shift (i.e., establish the ΔRT_{NDT} value for the beltline region) for the RPV, as determined from TS Figure 3.6.1. The licensee then calculates the irradiated P/T limit curves for the beltline region of the RPV by adding the ΔRT_{NDT} value to the temperature values in the applicable unirradiated P/T limit curves for the beltline region of the RPV, as applicable to the pressure test condition, normal operations with the core-not-critical condition, or normal operations with the core-critical condition and given in TS Figures 3.6.2, 3.6.3, or 3.6.4, respectively. For each of these operating conditions, the most limiting P/T limits points for the Monticello RPV are then generated by using the most conservative of the P/T limits points from the irradiated RPV beltline P/T limit curve and the P/T limit curve for the region of the RPV that is remote from the beltline.

In its April 22, 2002, application, the licensee proposed the following changes to the figures to reflect updated P/T curves:

- Modify TS Figure 3.6.2 to provide a new curve for the RPV beltline region at zero EFPYs and a new curve for the limiting RPV region that is remote from the reactor core beltline for the pressure testing condition.

- Modify TS Figure 3.6.3 to provide a new curve for the RPV beltline region at zero EFPYs and a new curve for the limiting region of the RPV that is remote from the reactor core beltline for normal operating conditions (mechanical heatup or cooldown) with the core not critical.
- Modify TS Figure 3.6.4 to provide a new curve for the RPV beltline region at zero EFPYs and a new curve for the limiting region of the RPV that is remote from the reactor core beltline for normal operating conditions with the core critical.

Section IV.A.2 of 10 CFR Part 50, Appendix G, requires the P/T limit curves to be at least as conservative as if the methods and criteria in Appendix G to Section XI were used to generate the P/T limit curves. The new P/T limit curves (i.e., the new unirradiated beltline P/T limit curves and new P/T limit curves for the region of the RV remote from the beltline) in TS Figures 3.6.2, 3.6.3, and 3.6.4 are based on use of ASME Code Case N-640 and the lower bound static initiation fracture toughness value equation (K_{IC} equation) given in ASME Code, Section XI, Appendix A, "Analysis of Flaws," Paragraph A-4200(b). ASME Code Case N-640 permits application of the K_{IC} equation as the basis for establishing the P/T limit curves in lieu of using the K_{IA} equation, which is the method currently invoked by Appendix G to Section XI and which is based on crack arrest and dynamic loading test data. However, since use of ASME Code Case N-640 will generate P/T limit curves that are less conservative than would be generated if methods of Appendix G to Section XI were used, licensees must be granted exemptions to use the code case methods if they seek to apply the code case methods to the generation of their P/T limits. As stated above, the NRC staff granted the licensee an exemption permitting use of the ASME Code Case N-640 methods for the generation of P/T limit curves.

To ensure that the methods for generating the irradiated P/T limit curves remain valid and that the irradiated P/T limit curves that are kept on record at Monticello would still comply with the intent of requirements of Section IV.A.2 of 10 CFR Part 50, Appendix G, by letter dated August 13, 2002, the NRC staff requested the licensee to provide additional irradiated P/T limit data for the Monticello RPV effective to 32 EFPYs. The licensee provided the additional information in its supplemental letter dated September 16, 2002. The NRC staff performed an independent assessment of the irradiated P/T limit data to verify compliance with the intent of Section IV.A.2 of 10 CFR Part 50, Appendix G. The NRC staff confirmed that (1) use of 157 °F as the $1/4T RT_{NDT}$ value for the irradiated P/T limit curves is valid and acceptable when evaluated against the recommended guidelines of RG 1.99, Revision 2, and (2) the irradiated P/T limit curves that are generated at the plant would be at least as conservative as those that would be generated if the criteria and methods in ASME Code, Section XI, Appendix G, as modified by the criteria and evaluation method in ASME Code Case N-640, were used to generate the curves. The NRC staff also confirmed that the licensee's P/T limit curves included appropriate minimum temperature requirements that were at least as conservative as those required in Table 1 to 10 CFR Part 50, Appendix G.

On the basis of the NRC staff's review and evaluation of the licensee's proposed P/T limit curves for Monticello, the NRC staff has determined that the proposed P/T limit curves are consistent with the alternate assessment criteria and methods of ASME Code Case N-640, and satisfy the requirements of 10 CFR Part 50, Appendix G, 10 CFR 50.60(a), and ASME Code,

Section XI, Appendix G, as exempted by the methods of analyses in the code case. Therefore, the NRC staff concludes that it is acceptable to incorporate the proposed P/T limits curves into the Monticello TSs.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Minnesota State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (67 FR 56323). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: J. Medoff

Date: February 24, 2003