November 19, 1987

Docket No. 50-263

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Mr. D. M. Musolf, Manager
Nuclear Support Services
Northern States Power Company
414 Nicollet Mall
Minneapolis, Minnesota 55401

Dear Mr. Musolf:

The Commission has issued the enclosed Amendment No. 53 to Facility Operating License No. DPR-22 for the Monticello Nuclear Generating Plant. This amendment is in response to your application dated February 14, 1986, as supplemented August 26, 1987.

The amendment revises the license to extend the duration to 40 years from the date of issuance of the operating license. Therefore, the Monticello Nuclear Generating Plant license is extended to September 8, 2010. Prior to the issuance of this amendment, the Monticello license would have expired June 19, 2007.

A copy of our related Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's next regular bi-weekly Federal Register notice.

Sincerely,

/S/

Dominic C. DiIanni, Project Manager
Project Directorate III-3
Division of Reactor Projects

Enclosures:
1. Amendment No. 53 to License No. DPR-22
2. Safety Evaluation

cc w/enclosures:
See next page

*SEE PREVIOUS CONCURRENCE

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Date:	10/20/87	10/26/87	11/19/87	11/02/87

Mr. D. M. Musolf
Northern States Power Company

Monticello Nuclear Generating Plant

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

NORTHERN STATES POWER COMPANY

DOCKET NO. 50-263

MONTICELLO NUCLEAR GENERATING PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 53
License No. DPR-22

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Northern States Power Company (the licensee) dated February 14, 1987 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, paragraph 2.G of Facility Operating License No. DPR-22 is hereby amended to read as follows:

G. This license is effective as of the date of issuance and shall expire at midnight, September 8, 2010.

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Kenneth E. Perkins, Director
Project Directorate III-3
Division of Reactor Projects

Date of Issuance: November 19, 1987

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 53 TO FACILITY OPERATING LICENSE NO. DPR-22

NORTHERN STATES POWER COMPANY
MONTICELLO NUCLEAR GENERATING PLANT
DOCKET NO. 50-263

1.0 INTRODUCTION

By letter dated February 14, 1987, Northern States Power Company (the licensee) submitted a request for an amendment to the Monticello Nuclear Generating Plant Facility Operating License No. DPR-22.

The amendment would extend the expiration date of the license from June 19, 2007, to September 8, 2010.

2.0 DISCUSSION

Section 103.C of the Atomic Energy Act of 1954 provides for a license to be issued for a period not exceeding 40 years. Paragraph 50.51 of 10 CFR Part 50 states that the Commission may issue an operating license for the term requested by the applicant, or for the estimated useful life of the facility, should that be less than the term requested, but in no case greater than 40 years from the issuance date. The operating license for the Monticello Nuclear Generating Plant was issued to expire June 19, 2007, 40 years from the issuance date of the construction permit. Because approximately 39 months were required to construct the facility to the point of fuel loading and startup testing, the effective period of the license is 36 years and 9 months.

Pursuant to 10 CFR 50.90, Northern States Power Company by letter dated February 14, 1986, proposed to amend the operating license to extend its duration for a full term of 40 years, starting on the effective date of the issuance of the operating license. This request would extend the operating life of the Monticello Nuclear Generating Plant by 38½ months. The requested date for the expiration of the operating license is September 8, 2010.

3.0 EVALUATION

3.1 Mechanical Equipment

The components of the reactor coolant pressure boundary of the Monticello Nuclear Generating Plant were designed, built and tested to the appropriate ASME Boiler and Pressure Vessel Codes, Regulatory standards, and supplemental

criteria in compliance with the requirements of 10 CFR Part 50, Section 50.55a, "Codes and Standards." The inservice inspection program was described in the Technical Specifications and complies with the requirements of Section 50.55a(g), except where specific relief was granted by the Commission pursuant to paragraph 50.55a(g)(6)(i).

The inspections conducted at several boiling water reactors (BWR's) indicated intergranular stress corrosion cracking (IGSCC) in large-diameter stainless steel pipe. The staff considered this a generic problem and as a result, the Commission issued Generic Letter 84-11 requiring a reinspection program at all BWR's, involving stainless steel welds in pipes greater than 4-in. diameter, in systems that are part of or connected to the reactor coolant pressure boundary, out to the second isolation valve. If IGSCC is discovered, repair, analysis and additional surveillance may be required to ensure the continued integrity of the affected pipe.

Further, the Commission has issued for public comment a draft of the proposed revision to NUREG-0313, "Technical Report on Material and Processing Guidelines for BWR Piping," including the Generic Letter to implement the staff's position. NUREG-0313, Rev. 2, contains the relevant recommendations of the Piping Review Committee Task Group on Pipe Cracking issued as NUREG-1061 Volume I.

NUREG-0313, Rev. 2, describes methods acceptable to the staff to control the susceptibility of BWR ASME Boiler and Pressure Vessel Code Class 1, 2, and 3 pressure boundary piping and safe ends to intergranular stress corrosion cracking. The revision describes the technical bases for the staff's positions on the following items: materials of construction; processes to minimize or control IGSCC; water chemistry; reinforcement by weld overlay; replacement of piping; stress improvements; clamping devices crack characterization and repair criteria; inspection methods, schedules, and personnel; and limits on number of cracked weldments in piping. For piping that does not conform to the staff positions, varying degrees of inservice inspection is required to ensure structural integrity of the pressure boundary piping system, pursuant to paragraph 50.55a(g)(6)(ii) of 10 CFR Part 50.

In response to Generic Letter 84-11 and during the 1984 refueling outage, the Monticello Nuclear Generating Plant replaced Type 304 stainless steel pipe in the recirculation system and several connected branch systems susceptible to IGSCC with more corrosion resistant Type 316 NG stainless steel pipe. After the replacement was completed, the staff reviewed the Northern States Power Company submittal, including the augmented inspection plan, and concluded that the Monticello Nuclear Generating Plant met the requirements and guidelines of Generic Letter 84-11.

We conclude from our evaluation that compliance with the codes, standards and regulatory requirements to which the mechanical equipment for the Monticello Nuclear Generating Plant was analyzed, constructed, repaired, and inspected, including the inservice inspection programs in compliance to Section XI of the

ASME Boiler and pressure Vessel Code and the augmented inspections of austentic stainless steel piping required by the Commission, provide adequate assurance that the structural integrity of components important to safety will be maintained for the authorized operating period including the extension until September 2010.

3.2 Structures

In evaluating the design of Category I structures for the Monticello Nuclear Generating Plant, the staff considered the (a) geology and nature of the foundation, (b) criteria for design loads, load combinations and design stresses, and (c) seismic design criteria and method of analysis. Consideration was also given to the fact that the Dresden Units 2 and 3, Quad Cities Units 1 and 2, and Millstone boiling water reactors under licensing review were designed by the General Electric Company and were essentially similar to the Monticello Nuclear Generating Plant.

The general requirements for the design of Category I structures and equipment include provisions of resisting dead, live and operating combination loads within the allowable stress requirements of local and state building codes, the Uniform Building Code, the ASME Boiler and Pressure Vessel Code, USAS B31.1-1967 Code for Pressure Piping, the American Institute of Steel Construction Code and the American Concrete Institute Code. A number of consultants were engaged by the staff in the review of the Category I structures and equipment. These were identified in the SER. In addition, the staff compared the proposed design requirements to the Generic Design Criteria, published for comment by the Commission on November 22, 1965. Industrial experience with Category I structures to these standards confirm that a service life in excess of 40 years may be anticipated.

The use of the indicated codes, standards, and specifications in the design, analysis, and construction, and the identified testing and inservice surveillance requirements, provide reasonable assurance that the Category I structures would withstand service without loss of function for an extended period of 38½ months at the Monticello Nuclear Generating Plant.

3.3 Reactor Vessel

The FSAR states that the reactor vessel for the Monticello Nuclear Generating Plant was designed and fabricated for a service life of 40 years at 80% plant capacity. The vessel was designed, fabricated, inspected and tested in accordance to Section III of the ASME Boiler and Pressure Vessel Code, 1965 Edition,

including Summer 1966 Addenda. The vessel was field-erected by the Chicago Bridge and Iron Company (CB&I) under strict supervision of the General Electric Company to requirements more stringent than those required by the ASME Code. The details of the vessel fabrication and inspection are recorded in Volume VII of the FSAR, "Pressure Vessel Design Report."

Operation limitations on temperature and pressure were established using Appendix G of Section III of the ASME Boiler and Pressure Vessel Code and Appendix G of 10 CFR Part 50. The inservice inspection program is periodically upgraded to comply with the recommendations of Section 50.55a(g), 10 CFR Part 50, that incorporates Section XI of the ASME Boiler and Pressure Vessel Code.

The integrity and performance capability of the ferritic materials in the reactor vessel for the Monticello Nuclear Generating Plant is assured because the fracture toughness is monitored with a surveillance program in conformance to the extent practical to the recommendations of Appendix H, 10 CFR Part 50, "Reactor Vessel Materials Surveillance Program Requirements," and ASTM E185, "Standard Practice for Conducting Surveillance Tests for Light-Water Cooled Nuclear Power Reactor Vessels." The ferritic materials must meet the fracture toughness properties of Section III of the ASME Boiler and Pressure Vessel Code and Appendix G, 10 CFR Part 50, "Fracture Toughness Properties."

The final report on "Examination, Testing, and Evaluation of Irradiated Pressure Vessel Surveillance Specimens from the Monticello Nuclear Generating Plant," BCL-585-84-2, Rev. 1, November 5, 1984, was submitted by Northern States Power Company for staff review. Surveillance data were presented to show end-of-life (EOL) fluence (E-1MeV) of 3.02×10^{18} nvt at ¼T position in the beltline region of the reactor vessel, assuming a use of 40-years at 80% full power operation of 1670 MWt.

The limiting reactor vessel beltline material was identified as plate, containing 0.17% Cu, 0.65% Ni, and 0.010%P. The unirradiated reference nil-ductility temperature of the material was 14°F and the upper-shelf was 109 ft-lbs. The adjusted reference nil-ductility temperature at EOL using the guidelines of Regulatory Guide 1.99, Revisions 1 and 2, was estimated at 91°F and 99°F, respectively. The EOL upper-shelf was estimated at 87 ft-lbs. Paragraph IV B of Appendix G, 10 CFR Part 50, sets minimum limits on the EOL estimated fracture toughness properties at 200°F and 50 ft-lbs. for the adjusted reference nil-ductility temperature and upper-shelf energy, respectively. The fracture toughness properties for the Monticello reactor vessel are estimated at EOL to be above the minimum limits set by Appendix G.

We conclude that there are no special considerations to indicate reactor vessel degradation for the Monticello Nuclear Generating Plant by increasing the useful life for an additional 38½ months. The structural integrity of the reactor vessel is assured because it was originally designed and constructed for 32 EFPY usage as a minimum; it is monitored, inspected and

tested to detect degradation processes at an early stage of their development; and it is operated with procedures to assure that design conditions are not exceeded.

3.4 Conclusion on Mechanical Equipment, Structures and Reactor Vessel

The staff concludes from its evaluation of the design, operation, testing and monitoring of the mechanical equipment, structures, and the reactor vessel that an extension of the operating license for the Monticello Nuclear Generating Plant to a 40-year service life is consistent with the FSAR, SER and submittals made by the licensee. The plant is operated in compliance with the Commission's regulations, and issues associated with plant degradation have been adequately addressed. The staff recommends extending Operating License DPR-22 for the Monticello Nuclear Generating Plant to a 40 year period, commencing on the effective date of the issuance of the operating license.

3.5 ALARA

The following evaluation was conducted to assure that the licensee's "as low as reasonably achievable" (ALARA) measures and dose projections are applicable for the additional years of plant operation and are in accordance with 10 CFR Part 20, "Standards For Protection Against Radiation" and Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Reasonably Achieveable" (Revision 3).

The licensee stated that operating and maintenance personnel will follow specific plans and procedures to ensure that ALARA goals are achieved in the extended years of operation. High radiation exposure operations will be planned and carried out by personnel trained in radiation protection and who will be using proper equipment. During such activities, personnel will be monitored for exposure to radiation and contamination. When major maintenance, repair, surveillance, and refueling tasks are completed, the experience gained from these activities will be factored into the radiation protection procedures and enhance future job procedures and techniques to reduce personnel exposures. The licensee anticipates improvements in robotics, remote surveillance, remote tooling, decontamination, improved computer resources, etc., to be factors in the future toward achieving ALARA doses.

The staff concludes that the licensee has an adequate health physics organization and radiation protection program, and that personnel are trained for the additional years of operation. The staff further concludes that the updated Final Safety Analysis Report (FSAR) for Monticello (Operational Radiation Protection) is in accordance with 10 CFR Part 20 and is consistent with the criteria of Regulatory Guide 8.8. Thus, the staff finds the ALARA program and practices to be acceptable.

3.6 Dose Assessment

The licensee has provided the total occupational dose by year for the past 10 years (1977-1986). Special modification work was done in 1981, 1984 and 1986, such as feedwater nozzle safe end improvements, replacement of recirculation piping, and replacement of core spray piping resulting in higher than normal exposures for those years. Adjusting for the years when special modifications were made, the average exposure since 1977 was less than 490 person-rem. Including those years, the average exposure would be 741 person-rem. The staff has audited the licensee's dose assessment for the extended years of operation. The licensee based the estimate on 10 years of operating experience engineering judgment. The licensee expects the additional years of operation of Monticello to result in an average of 741 person-rem per year. Currently, operating boiling water reactors (BWR's) average 981 person-rem per unit annually (1980-1986).

3.7 Conclusion on Radiation Protection

Based on the above, the staff concludes that the licensee's dose assessment is acceptable and the Monticello radiation protection program is adequate for ensuring that occupational radiation exposures will be maintained in accordance with ALARA guidelines and in compliance with 10 CFR Part 20 requirements.

4.0 ENVIRONMENTAL CONSIDERATION

An Environmental Assessment and Finding of No Significant Impact relating to the proposed extension of the Facility Operating License termination dates was published in the Federal Register on October 22, 1987 (52 FR 39575).

5.0 CONCLUSION

The staff 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; and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: F. Litton, D. Scaletti

Dated: November 19, 1987