September 24, 1984

Docket No. 50-263

Mr. D. M. Musolf
Nuclear Support Services Department
Northern States Power Company
414 Nicollet Mall - 8th Floor
Minneapolis, Minnesota 55401

Dear Mr. Musolf:

The Commission has issued the enclosed Amendment No. 26 to Facility Operating License No. DPR-22 for the Monticello Nuclear Generating Plant. The amendment authorizes changes to the Technical Specifications in response to your application dated April 2, 1984, supplemented by the General Electric Company's document 23A1673, dated January 1984.

The amendment changes the Technical Specifications to incorporate revised safety and operating limits associated with the operation of Monticello during the upcoming fuel Cycle 11 by (1) changing the Minimum Critical Power Ratio (MCPR) operating limits, (2) changing the design basis for the Standby Liquid Control System by lowering the achievable boron concentration from 900 ppm to 660 ppm, and (3) correcting errors in the Average Planar Linear Heat Generation Rate (APLHGR) Multipliers.

A copy of the Safety Evaluation is also enclosed.

Sincerely,

Original signed by:
Vernon L. Rooney, Project Manager
Operating Reactors Branch #2
Division of Licensing

Enclosures:
1. Amendment No. 26 to License No. DPR-22
2. Safety Evaluation

cc w/enclosures:
See next page

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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. 26
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 April 2, 1984, supplemented by the General Electric Company's document #23A1673 dated January 1984, 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:

   2 Technical Specifications

   The Technical Specifications contained in Appendix A as revised through Amendment No. 26 , 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 the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 24, 1984

ATTACHMENT TO LICENSE AMENDMENT NO. 26

FACILITY OPERATING LICENSE NO. DPR-22

DOCKET NO. 50-263

Remove the following pages and insert identically numbered pages:

INSERT
99
211
213

Amendment No. 26

Bases 3.4 and 4.4:

A. The design objective of the standby liquid control system is to provide the capability of bringing the reactor from full power to a cold, xenon-free shutdown assuming that none of the withdrawn control rods can be inserted. To meet this objective, the liquid control system is designed to inject a quantity of boron which produces a concentration of 660 ppm of boron in the reactor core in less than 125 minutes. The 660 ppm boron concentration in the reactor core is required to bring the reactor from full power to a 3% Δk subcritical condition considering the hot to cold reactivity swing, xenon poisoning and an additional 25% boron concentration margin for possible imperfect mixing of the chemical solution in the reactor water and dilution from the water in the cooldown circuit. A minimum net quantity of 1400 gallons of solution having a 21.4% sodium pentaborate concentration is required to meet this shutdown requirement.

The time requirement (125 minutes) for insertion of the boron solution was selected to override the rate of reactivity insertion due to cooldown of the reactor following the xenon poison peak. The maximum net storage volume of the boron solution is 2895 gallons. (256 gallons are contained below the pump suction and, therefore, have not been used in the net quantities above.)

Boron concentration, solution temperature, and volume (including check of tank heater and pipe heat tracing system) are checked on a frequency to assure a high reliability of operation of the system should it ever be required. Experience with pump operability demonstrates that testing at a three-month interval is adequate to detect if failures have occurred.

The only practical time to test the standby liquid control system is during a refueling outage and by initiation from local stations. Components of the system are checked periodically as described above and make a functional test of the entire system on a frequency of less than once each refueling outage unnecessary. A test of explosive charges from one manufacturing batch is made to assure that the replacement charges for the tested system are satisfactory. A continual check of the firing circuit continuity is provided by pilot lights in the control room.

The relief valves in the standby liquid control system protect the system piping and positive displacement pumps which are nominally designed for 1500 psi from overpressure. The pressure relief valves discharge back to the standby liquid control solution tank.

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS

3.11 REACTOR FUEL ASSEMBLIES

Applicability

The Limiting Conditions for Operation associated with the fuel rods apply to those parameters which monitor the fuel rod operating conditions.

Objective

The objective of the Limiting Conditions for Operation is to assure the performance of the fuel rods.

Specifications

A. Average Planar Linear Heat Generation Rate (APLHGR)

During power operation, the APLHGR for each type of fuel as a function of average planar exposure shall not exceed the limiting value given in Table 3.11.1 based on a straight line interpolation between data points. When core flow is less than 90% of rated core flow, the APLHGR shall not exceed 94% of the limiting value given in Table 3.11.1. When core flow is less than 70% of rated core flow, the APLHGR shall not exceed 91% of the limiting value given in Table 3.11.1. If any time during operation it is determined that the limit for APLHGR is being exceeded, action shall be initiated within 15

4.11 REACTOR FUEL ASSEMBLIES

Applicability

The Surveillance Requirements apply to the parameters which monitor the fuel rod operating conditions.

Objective

The objective of the Surveillance Requirements is to specify the type and frequency of surveillance to be applied to the fuel rods.

Specifications

A. Average Planar Linear Heat Generation Rate (APLHGR)

The APLHGR for each type of fuel as a function of average planar exposure shall be determined daily during reactor operation at $\geq$ 25% rated thermal power.

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS

Amendment No. 26

C. Minimum Critical Power Ratio (MCPR)

During power operation the Operating MCPR Limit shall be $\geq$ 1.35 for 8x8, $\geq$ 1.38 for P8x8R fuel at rated power and flow, provided $T_B \geq T_{ave}$* (see section 3.3.C.3). If at any time during operation it is determined that the limiting value for MCPR is being exceeded, action shall be initiated within 15 minutes to restore operation to within the prescribed limits. Surveillance and corresponding action shall continue until reactor operations is within the prescribed limits. If the steady state MCPR is not returned to within the prescribed limits within two (2) hours, the reactor shall be brought to the Cold Shutdown condition within 36 hours. For core flows other than rated the Operating MCPR Limit shall be the above applicable MCPR value time K_f where K_f is as shown in Figure 3.11.3.

C. Minimum Critical Power Ratio (MCPR)

MCPR shall be determined daily during reactor power operation at $\geq$ 25% rated thermal power and following any change in power level or distribution which has the potential of bringing the core to its operating MCPR Limit.

*If $T_{ave} > T_B$, the operating MCPR Limit shall be a linear interpolation between the limits in 3.11.C and 1.43 for 8x8, and 1.45 for P8x8R.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 26 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 April 2, 1984 (Reference 1) Northern States Power Company (the licensee) proposed to change the Technical Specifications for the Monticello Nuclear Generating Plant to permit its operation for Cycle 11. In the core-related areas of fuel design, thermal-hydraulic design nuclear design, and safety analyses of postulated accidents and transients, the licensee has relied on the results presented in the approved GE topical report NEDE-24011, "General Electric Standard Application for Reactor Fuel", or GESTAR II (Reference 3).

In addition, the licensee submitted a supplemental reload licensing document (Reference 2) which provides results of other analyses necessary to justify Cycle 11 operation but which are not included in GESTAR II.

2.0 Evaluation

2.1 Fuel Design

Fresh fuel assemblies (P8DBR284LB), which are pressurized 8x8 retrofit barrier fuel assemblies, will be loaded for Cycle 11 operation. Since the pressurized 8x8 retrofit barrier fuel has been previously approved (Ref. 3) we conclude that the fuel assemblies are acceptable for Cycle 11 operati

Reference 2 states that not all the fuel channels to be used in Cycle 11 were supplied by GE but that GE, at the direction of the licensee, assumed that the performance characteristics of these channels are

identical to the characteristics of the channels supplied by GE. We have discussed this with the licensee and conclude that such an assumption is acceptable based on: (1) the fact that the channels are similar in specifications to those of the GE channels, and (2) the licensee has used these channels for previous cycles of operation with no adverse effects.

2.2 Nuclear Design

The nuclear design and analysis of the proposed reload has been performed by the methods described in Reference 3. Reference 3 has been approved for use in the design and analysis of reloads in BWR reactors and its use is acceptable for this reload. We have reviewed the results of the nuclear design analysis for Monticello Cycle 11 and have determined that, since the nuclear parameters are within the range of those normally obtained for similar reloads and are done with acceptable methods, they are acceptable.

2.3 Thermal-Hydraulic Design

The objective of the review of the thermal hydraulic design of the core for Cycle 11 operation is to confirm that the thermal-hydraulic design has been accomplished using acceptable methods, and to assure an acceptable margin of safety from conditions which could lead to fuel damage during normal operation and anticipated transients, and to assure that the core is not susceptible to thermal-hydraulic instability.

The review includes the following areas: (1) operating limit minimum critical power ratio (MCPR), and the related changes to the Technical Specification, and (2) thermal-hydraulic stability. Discussion of the review concerning the thermal-hydraulic design for Cycle 11 operation follows:

(1) Operating Limit MCPR and the Related Technical Specification Changes

A safety limit MCPR has been imposed to assure that 99.9 percent of the fuel rods in the core will not experience boiling transition during normal operation and anticipated operational transients. As stated in Reference 3 the approved safety limit MCPR for the Monticello reload core is 1.07. The safety limit of 1.07 was used for the Cycle 11 analyses.

To assure that the fuel cladding integrity safety limit MCPR will not be violated during any anticipated transient, the most limiting events have been reanalyzed for this reload (Reference 2) by the licensee, in order to determine which event results in the largest reduction in minimum critical power ratio. The operating limit MCPR for each fuel type was then established by adding the largest reduction factor in the minimum critical power ratio to the safety limit MCPR.

We find that, since approved methods (Reference 3) were used and the results show an acceptable margin of safety from conditions which could lead to fuel damage during any anticipated operational transient, the thermal hydraulic design of the Cycle 11 core is acceptable. The corresponding changes to Technical Specification 3.11.C.1. are also acceptable since they are consistent with the Cycle 11 safety analysis.

(2) Thermal Hydraulic Stability

The results of thermal hydraulic analyses show that the maximum core stability decay ratio for Cycle 11 is 0.63 which is the same as that for Cycle 10. Based on the findings that (1) the maximum calculated decay ratio for Cycle 11 is the same as that for Cycle 10, and (2) the calculated decay ratio compares favorably to the calculated values for several operating reactors which have been previously approved, we therefore conclude that the stability results are acceptable for Cycle 11 operation.

2.4 Transient and Accident Analysis

The licensee reported the results of those events which required a reanalysis to support Cycle 11 operation. All events reanalyzed showed results consistent with the applicable criteria.

The feedwater controller failure (FWCF) event was analyzed at the 98% power/100% flow point since this point was found to be more conservative than the 100% power/100% flow point. This is unique to Monticello because the increased steam flow during the FWCF coupled with Monticello's small turbine bypass capacity (15%) results in a higher steam line initial pressurization than that typically calculated for other plants for a turbine trip initiated from rated conditions. Thus the safety/relief valve (S/RV) setpoint is exceeded by the initial pressurization wave after the turbine trip on high water level. This actuation of the S/RVs occurs early enough to reduce the severity of the FWCF event. However, when the transient is initiated at 98% power, the S/RVs are not actuated until much later in the transient, thus yielding more severe results. The staff finds it acceptable and more conservative to analyze the FWCF event at the 98% power/100% flow point. This transient is one of the limiting transients for Cycle 11.

It should be noted that the licensee, in Reference 2, stated that single loop operation was considered. However, we have confirmed in a discussion with the licensee that all transient and accident analyses and all Technical Specifications are consistent with two loop operation since the staff has not yet approved single loop operation for Monticello.

On the basis that approved methods have been used to perform the analyses and to obtain input parameters for them and that the results of the accident analysis are acceptable for Cycle 11, we conclude that the transients and accident analyses are acceptable.

2.5 Technical Specification Changes

There are three Technical Specification changes for Cycle 11 as discussed below:

(1) Changes in APLHGR Multipliers

This will be discussed in a separate SE as part of our review of the Northern States Power Company submittal dated May 30, 1984 (ARTS proposal).

(2) Correction to the Bases for the Standby Liquid Control System (SLCS)

This change corrects an error in the Technical Specifications. The SLCS is capable of injecting boron in the reactor core and recirculation system such that the boron concentration equals 900 ppm. However, the licensee states that after accounting for the 25% imperfect mixing allowance, the 900 ppm decreases to 660 ppm. Thus, in the bases Section 3.4.A the licensee proposed replacing the 900 ppm with 660 ppm.

We find this change acceptable since the licensee has verified that 645 ppm will bring the reactor from full power to 3.5% subcritical at 20°C, xenon free condition, and the 660 ppm available will produce a shutdown margin greater than the 3% value discussed in the bases of the Technical Specifications.

(3) Minimum Critical Power Ratio (MCPR)

We conclude that the Technical Specification 3.11.C.1 changes related to the operating limit MCPRs as discussed in Section 2.3(1) of this SE are acceptable.

3.0 Environmental Considerations

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this 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 this amendment.

4.0 Conclusions

We have 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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: A. M. Gill

Dated: September 24, 1984

5.0 References

1. Letter from D. Musolf (NSPC) to H. Denton (NRC), Request for Revision to Technical Specifications for Cycle 11 Reload, April 2, 1984.

2. 23A1673, Supplemental Reload Licensing Submittal for Monticello Nuclear Generating Plant Reload 10 (Cycle 11), January 1984.

3. NEDE-24011-P-A-6, General Electric: Boiling Water Reactor Generic Reload Fuel Applications, April 1983.