October 29, 1997

Mr. Roger O. Anderson, Director
Nuclear Energy Engineering
Northern States Power Company
414 Nicollet Mall
Minneapolis, MN 55401

SUBJECT: MONTICELLO NUCLEAR GENERATING PLANT - ISSUANCE OF AMENDMENT RE: MINIMUM CRITICAL POWER RATIO SAFETY LIMITS (TAC NO. M97487)

Dear Mr. Anderson:

The Commission has issued the enclosed Amendment No. 99 to Facility Operating License No. DPR-22 for the Monticello Nuclear Generating Plant. The amendment consists of changes to the Technical Specifications in response to your application dated November 25, 1996, as supplemented December 12, 1996, April 23, May 8, July 1, August 21, and September 29, 1997.

The amendment revises the Minimum Critical Power Ratio (MCPR) safety limits for Cycle 18 based on the cycle-specific analysis of the current mixed core of GE11/GE10 fuel parameters. A copy of our related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED BY

Tae Kim, Senior Project Manager
Project Directorate III-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-263

Enclosures: 1. Amendment No. 99 to DPR-22
2. Safety Evaluation

cc w/encl: See next page

DISTRIBUTION: See attached page

DOCUMENT NAME: G:\WPDOCS\MONTICEL\MON97487.AMD *See previous concurrence.
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DATED: October 29, 1997

AMENDMENT NO. 99 TO FACILITY OPERATING LICENSE NO. DPR-22 - MONTICELLO

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

NORTHERN STATES POWER COMPANY

DOCKET NO. 50-263

MONTICELLO NUCLEAR GENERATING PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 99
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 November 25, 1996, as supplemented December 12, 1996, April 23, May 8, July 1, August 21, and September 29, 1997, 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. 99 , 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 issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Tae Kim, Senior Project Manager
Project Directorate III-1
Division of Reactor Projects - III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: October 29, 1997

ATTACHMENT TO LICENSE AMENDMENT NO.99

FACILITY OPERATING LICENSE NO. DPR-22

DOCKET NO. 50-263

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the attached pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

REMOVE	INSERT
6	6
10	10
213	213
249b	249b

2.0 SAFETY LIMITS

2.1 FUEL CLADDING INTEGRITY

Applicability

Applies to the interrelated variables associated with fuel thermal behavior.

Objective:

To establish limits below which the integrity of the fuel cladding is preserved.

Specification:

A. Core Thermal Power Limit (Reactor Pressure >800 psia and Core Flow is >10% of Rated)

When the reactor pressure is >800 psia and core flow is >10% of rated, the existence of a minimum critical power ratio (MCPR) less than 1.08*, for two recirculation loop operation, or less than 1.09* for single loop operation, shall constitute violation of the fuel cladding integrity safety limit.

* MCPR values for cycle 18 only.

LIMITING SAFETY SYSTEM SETTINGS

2.3 FUEL CLADDING INTERGRITY

Applicability

Applies to trip settings of the instruments and devices which are provided to prevent the reactor system safety limits from being exceeded.

Objective:

To define the level of the process variables at which automatic protective action is initiated to prevent the safety limits from being exceeded.

Specification:

The Limiting safety system settings shall be as specified below:

A. Neutron Flux Scram
   1. APRM - The APRM flux scram trip setting shall be:
      a. For two recirculation loop operation (TLO):

$$S \leq 0.66W + 70\%$$

where

S = Setting in percent of rated thermal power, rated power being 1670 MWT

W = Percent of the drive flow required to produce a rated core flow of 57.6×10^6 lb/hr

      b. For single recirculation loop operation (SLO):

$$S \leq 0.58(W - 5.4) + 62\%$$

      c. No greater than 120%.

Bases:

2.1 The fuel cladding integrity limit is set such that no calculated fuel damage would occur as a result of an abnormal operational transient. Because fuel damage is not directly observable, a step-back approach is used to establish a Safety Limit such that the MCPR is no less than the values specified in Technical Specification 2.1.A. This limit represents a conservative margin relative to the conditions required to maintain fuel cladding integrity. The fuel cladding is one of the physical barriers which separate radioactive materials from the environs. The integrity of this cladding barrier is related to its relative freedom from perforations or cracking. Although some corrosion or use related cracking may occur during the life of the cladding, fission product migration from this source is incrementally cumulative and continuously measurable. Fuel cladding perforations, however, can result from thermal stresses which occur from reactor operation significantly above design conditions and the protection systems safety settings. While fission product migration from cladding perforation is just as measurable as that from use related cracking, the thermally caused cladding perforations signal a threshold, beyond which still greater thermal stresses may cause gross rather than incremental cladding deterioration. Therefore, the fuel cladding Safety Limit is defined with margin to the conditions which would produce onset of transition boiling. (MCPR of 1.0). These conditions represent a significant departure from the condition intended by design for planned operation. The concept of MCPR, as used in the GETAB/GEXL critical power analyses, is discussed in Reference 1.

A. Core Thermal Power Limit (Reactor Pressure) > 800 psia and Core Flow > 10% of Rated.) Onset of transition boiling results in a decrease in heat transfer from the clad and, therefore, elevated clad temperature and the possibility of clad failure. However, the existence of critical power, or boiling transition, is not a directly observable parameter in an operating reactor. Therefore, the margin to boiling transition is calculated from plant operating parameters such as core power, core flow, feedwater temperature, and core power distribution. The margin for each fuel assembly is characterized by the critical power ratio (CPR) which is the ratio of the bundle power which would produce onset of transition boiling divided by the actual bundle power. The minimum value of this ratio for any bundle in the core is the minimum critical power ratio (MCPR). It is assumed that the plant operation is controlled to the nominal protective setpoints via the instrumented variables. The Safety Limit (T.S.2.1.A) has sufficient conservatism to assure that in the event of an abnormal operational transient initiated from the Operating MCPR Limit (T.S.3.11.C) more than 99.9% of the fuel rods in the core are expected to avoid boiling transition. The margin between MCPR of 1.0 (onset of transition boiling) and the Safety Limit

3.0 LIMITING CONDITIONS FOR OPERATION	4.0 SURVEILLANCE REQUIREMENTS
C. Minimum Critical Power Ratio (MCPR) All MCPRs shall be greater than or equal to the MCPR Operating limits provided in the Core Operating Limits Report. 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 operation is within the prescribed limits. If the steady state MCPR is not returned to within the prescribed limits within two hours, reduce thermal power to less than 25% within the next four hours.	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.

The next page is 216

7. Core Operating Limits Report

a. Core operating limits shall be established and documented in the Core Operating Limits Report before each reload cycle or any remaining part of a reload cycle for the following:

Rod Block Monitor Operability Requirements (Specification 3.2.C.2a)
Rod Block Monitor Upscale Trip Settings (Table 3.2.3, Item 4.a)
Recirculation System Power to Flow Map Stability Regions (Specification 3.5.F)
Maximum Average Planar Linear Heat Generation Rate Limits (Specification 3.11.A)
Linear Heat Generation Ratio Limits (Specification 3.11.B)
Minimum Critical Power Ratio Limits (Specification 3.11.C)
Power to Flow Map (Bases 2.3.A)

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel" (the approved version at the time the reload analyses are performed)*

NSPNAD-8608-A, "Reload Safety Evaluation Methods for Application to the Monticello Nuclear Generating Plant" (the approved version at the time the reload analyses are performed)

NSPNAD-8609-A, "Qualification of Reactor Physics Methods for Application to Monticello" (the approved version at the time the reload analyses are performed)

ANF-91-048(P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors-EXEM BWR Evaluation Model," Siemens Power Corporation (the approved version at the time the reload analyses are performed)

NEDO-31960, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," June 1991 (the approved version at the time the reload analyses are performed)

NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," March 1992 (the approved version at the time the reload analyses are performed)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal-mechanical limits, core thermal-hydraulic limits, ECCS limits, nuclear limits such as shutdown margin, transient analysis limits and accident analysis limits) of the safety analysis are met.

d. The Core Operating Limits Report, including any mid-cycle revisions or supplements, shall be supplied upon issuance, for each reload cycle, to the NRC Document Control Desk with copies to the Regional Administrator and Resident Inspector.

* For cycle 18 only as approved in SE dated October , 1997.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 99 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 November 25, 1996, as supplemented December 12, 1996, April 23, May 8, July 1, August 21, and September 29, 1997, the Northern States Power Company (the licensee) requested an amendment to the Technical Specifications (TS) appended to Facility Operating License No. DPR-22 for the Monticello Nuclear Generating Plant (MNGP). The proposed amendment would revise the Minimum Critical Power Ratio (MCPR) safety limits based on the cycle-specific analysis of the current mixed core of GE11/GE10 fuel parameters.

The December 12, 1996, letter provided an affidavit for the original application dated November 25, 1996. The April 23, May 8, August 21, and September 29, 1997, letters provided clarifying information in response to the staff's request for additional information. The July 1, 1997, letter provided a nonproprietary version of the April 23, 1997, submittal. This information was within the scope of the original application and did not change the staff's initial proposed no significant hazards considerations determination. Therefore, renoticing was not warranted.

2.0 EVALUATION

The licensee requested a change to the Monticello TS in accordance with 10 CFR 50.90. The proposed revision of TS 2.1.A and its associated Bases 2.1, TS 3.11.C, and TS 6.7 is described below. This revision is based on the cycle-specific analysis of the current mixed core of GE11/GE10 fuel parameters, and therefore the revision is effective until the end of operating cycle 18.

2.1 Revision to TS 2.1.A and Bases 2.1

The licensee has proposed to change the Safety Limit MCPR (SLMCPR) in TS 2.1.A from 1.07 to 1.08 for two recirculation loop operation, and from 1.08 to 1.09 for single recirculation loop operation, when the reactor steam dome pressure is greater than 800 psia [pounds per square inches absolute], and core flow is greater than 10% rated core flow. The licensee also proposed to change the associated TS Bases 2.1 to replace a numerical value of the SLMCPR by a phrase, "The values specified in TS 2.1.A."

The staff has reviewed the proposed changes to TS 2.1.A and Bases 2.1, which are based on the analyses performed using Monticello Cycle 18 cycle-specific inputs and approved methodologies including GESTAR II (NEDE-24011-P-A-11, Sections 1.1.5 and 1.2.5 [proprietary information-not publicly available]), and NEDO-10985-A [proprietary information-not publicly available], January 1977 and found them to be acceptable. Because the R-factor methodology referenced in NEDE-24011-P-A-11 is not applicable to the part-length GE11 fuel, a revised R-factor methodology described in NEDC-32505P, "R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," [proprietary information-not publicly available] November 1995 was used. The revised R-factor calculation method uses the same NRC-approved equation stated in GESTAR II (NEDE-24011-P-A) with the correction factors to account for the peaking factor effects due to the part-length-rod design. The staff has reviewed the R-factor calculation method for GE11 fuel, the relevant information provided in the proposed Amendment 25 to GESTAR II, NEDE-24011 (which is under staff review) and the supplemental information dated April 23 and May 8, 1997, in response to the staff request for additional information during a teleconference on March 18, 1997, on the Monticello Cycle 18 SLMCPR calculation. Based on this review, the staff has found the revised R-factor methodology in NEDC-32505P acceptable for use at MNGP.

The staff has also determined that the justification for analyzing and determining the SLMCPR of 1.08 for two recirculation loop operation and 1.09 for single loop operation for Monticello Cycle 18 with respect to the generic GE11 SLMCPR evaluation is acceptable because (1) MNGP Cycle 18 is not an equilibrium core; (2) MNGP Cycle 18 has a slightly flatter core MCPR distribution and bundle R-factor distributions than the generic GE11 equilibrium core; (3) MNGP Cycle 18 is loaded with a higher latest reload average batch weight percent enrichment; (4) only eight SPC [Siemens Power Corporation] ATRIUM-9B assemblies (starting Cycle 17) are loaded in the core locations such that they have significant CPR margin relative to the limiting MCPR assemblies in the core; and (5) the result of the analysis using higher interim additive constant uncertainty for ATRIUM-9B fuel shows no impact on the proposed SLMCPR for MNGP Cycle 18. Therefore, the staff has concluded that the proposed SLMCPR (1.08 for two recirculation loop operation and 1.09 for single loop operation) will ensure that a sufficient margin to the fuel cladding integrity limit (i.e., that 99.9 percent of the fuel rods in the core avoid transition boiling) exists for MNGP Cycle 18.

2.2 Revision to TS 3.11.C MCPR

The proposed change to TS 3.11.C includes revising the first sentence to read:

> "All MCPRs shall be greater than or equal to the MCPR operating limits provided in the Core Operating Limits Report"

to replace the existing statement which reads:

> "The MCPR shall be greater than or equal to the limits provided in the Core Operating Limits Report."

In addition, the proposed change also includes deletion of the second sentence which currently reads:

> "The OLMCPR [operating limit minimum critical power ratio] limit for one recirculation loop operation is 0.01 higher than the comparable two loop value."

These changes clarify the TS requirement for MCPR consistent with the changes to TS 2.1.A as described in Section 2.1 of this safety evaluation and provides for the relocation of OLMCPR for single recirculation loop operation to the COLR consistent with the COLR guidance in Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits From Technical Specifications," dated October 4, 1988. Therefore, the staff finds these changes acceptable.

2.3 TS 6.7 Core Operating Limits Report (COLR)

The proposed change to TS 6.7 includes adding an asterisk to the first item on the list of documents in TS 6.7.b. to read:

> "NEDE-24011-P-A, 'General Electric Standard Application for Reactor Fuel' (the approved version at the time the reload analyses are performed)*"

and adding a footnote on TS page 249b that reads:

> "* For cycle 18 only as approved in SE dated ."

The revision to TS 6.7.b. is to reflect the approved use of the revised R-factor calculation method and will ensure that values for cycle-specific parameters are determined such that applicable limits (i.e., nuclear limits, transient analysis limits, and accident analysis limits) are met. Therefore, the staff finds these changes acceptable.

In addition, the staff finds acceptable the correction of the spelling of the word "SER" in the licensee's proposed footnote to "SE."

Based on its review as documented above, the staff concludes that the proposed changes to the TS and Bases are acceptable for Monticello Nuclear Generating Plant Cycle 18 application since the changes are analyzed based on the NRC-approved methodologies and the conservative cycle-specific parameters for SLMCPR analysis are used.

Also, on page 10 of the bases for Section 2.1, the licensee revised the wording "protection system safety settings" to "protection systems safety settings." The staff finds this clarifying change to the bases acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Minnesota State official was notified of the proposed issuance of the amendments. 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 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 (62 FR 17238). The amendment also changes reporting or record keeping requirements. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and (c)(10). 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: T. Huang

Date: October 29, 1997