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.

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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.