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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 101 TO FACILITY OPERATING LICENSE NO. DPR-22

NORTHERN STATES POWER COMPANY

MONTICELLO NUCLEAR GENERATING PLANT

DOCKET NO. 50-263

1.0 INTRODUCTION

By revised application dated June 19, 1998, as supplemented July 1, 1998, the Northern States Power Company (NSP, 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 Section 3.6.C, Coolant Chemistry, and 3/4.17.B, Control Room Emergency Filtration System, of the TS. The June 19, 1998, submittal superseded in its entirety NSP's previous letters dated July 26, 1996, and April 11, 1997. NSP letter dated May 5, 1997, "Supplementary Information to Revision One to License Amendment Request Dated July 26, 1996 Reactor Coolant Equivalent Radioiodine Concentration and Control Room Habitability (TAC M96256)," was also considered in the staff's review of the amendment request. Among other changes, this TS amendment proposes to establish TS requirements that are consistent with modified analysis inputs used for the evaluation of the radiological consequences of a postulated main steam line break accident and of a postulated line break in the reactor water cleanup system.

2.0 EVALUATION

2.1 In-Place Filter Testing Requirements

Current TS Sections 3.17.B.2.a(1), 3.17.B.2.a(2), 3.17.B.3.a, 3.17.B.3.b, 4.17.B.2.a(1), 4.17.B.2.a(2), 4.17.B.3.a, and 4.17.B.3.b require verification that the in-place testing of the high-efficiency particulate air (HEPA) filters and charcoal adsorbers for the control room emergency filtration (EFT) system shows a penetration of less than 1 percent when tested in accordance with ANSI [American National Standards Institute]/ASME [American Society of Mechanical Engineers] Standard N510-1980, "Testing of Nuclear Air-Cleaning Systems," at a flow rate of 1000 cfm [cubic feet per minute] (±10 percent).

Proposed TS Sections 3.17.B.2.a(1) and 3.17.B.3.a require that an in-place dioctyl phthalate (DOP) test of the HEPA filters in the EFT shall show a DOP penetration of less than 1 percent on each individual HEPA filter and a DOP penetration of 0.05 percent on the combined HEPA filters at a flow rate of 1000 cfm (±10 percent). Proposed TS Section 4.17.B.2 specifies that this in-place performance testing of the HEPA filters shall be conducted in accordance with Section 10 of ASME N510-1989 with exceptions as described in Exhibit F of the June 19, 1998, submittal. The ASME standard is acceptable because it is an NRC-approved standard that is referenced in the improved Standard Technical Specifications (STS). The acceptance value of 1 percent per filter ensures that gross degradation of the individual filters is detected and it complies with the ASME N510-1989 guidance of testing HEPA filters in series, separately. The acceptance value of 0.05 percent for the combined results measured across both filters is consistent with Revision 2 of Regulatory Guide (RG) 1.52, "Design, Testing, and Maintenance Criteria for Postaccident Engineered Safety Feature Atmosphere Cleanup System Air Filtration Units of Light Water Cooled Nuclear Power Plants," and is therefore acceptable.

Proposed TS Sections 3.17.B.2.a(2) and 3.17.B.3.b require that an in-place halogenated hydrocarbon test of the charcoal adsorbers in the EFT shall show a penetration of less than 0.05 percent on the combined charcoal banks at a flow rate of 1000 cfm (±10 percent). Proposed TS Section 4.17.B.2 specifies that this in-place performance testing of the charcoal adsorbers shall be conducted in accordance with Section 11 of ASME N510-1989 with exceptions as described in Exhibit F of the June 19, 1998, submittal. The ASME standard is acceptable because it is an NRC-approved standard that is referenced in the improved STS. The acceptance value of 0.05 percent for the EFT is consistent with RG 1.52, Revision 2, and is therefore acceptable.

Exhibit F of the June 19, 1998, submittal provides the following exceptions to the ASME N510-1989 in-place testing:

1. Monticello performs a visual inspection of applicable items from Section 5.5.1 of ASME N510-1989. Examples of items that are not applicable to Monticello include dovetail type access gaskets with a seating surface suitable for a knife edge seal, and shaft seals.

2. The housing leak test in Section 6.2.2 and Table 1 of ASME N510-1989 is not performed at Monticello because the EFT was built to be tested to ANSI/ASME N510-1980 which does not require these tests to be performed periodically.

3. The mounting frame pressure leak test in Section 7.1 of ASME N510-1989 is not performed at Monticello. Leaks of this nature are detected by the visual inspection test or the in-place filter bypass test.

4. The housing component pressure drop airflow test in Section 8.5.1.4 of ASME N510-1989 is not performed at Monticello because the EFT was built to be tested to ANSI/ASME N510-1980 which does not require these tests to be performed periodically.

5. The periodic airflow distribution test in Section 8.5.2.2 of ASME N510-1989 is not performed at Monticello because the EFT was built to be tested to ANSI/ASME N510-1980 which does not require these tests to be performed periodically.

6. Section 10.3 of ASME N510-1989 states that sample points for the HEPA filter in-place testing shall be located downstream of the fan or downstream sample manifolds shall be qualified. Monticello samples upstream of the fan using a single injection point. No shaft seals are installed on the system's fans; therefore sampling downstream of the fan would obtain a diluted air sample. The EFT does not have any provisions for sampling manifolds.

7. Section 10.5.8 of ASME N510-1989 states that upstream and downstream DOP concentrations are repeated until readings within ±5 percent of respective previous readings are obtained. Monticello takes readings until the concentrations are within ±10 percent, and the highest penetration reading is conservatively used with a minimum of three readings taken. Because of the injection point location for the Monticello EFT system, it is difficult to consistently achieve ±5 percent between readings.

8. Section 11.3 of ASME N510-1989 states that sample points for the charcoal filter in-place testing shall be located downstream of the fan or downstream sample manifolds shall be qualified. Monticello samples upstream of the fan using a single injection point. No shaft seals are installed on the system's fans; therefore sampling downstream of the fan would obtain a diluted air sample. The EFT does not have any provisions for sampling manifolds.

9. Monticello reserves the ability to use alternate test gases that are found to be acceptable alternatives to R-11 by the industry because of future availability of the gases specified in ASME N510-1989.

10. The in-series charcoal adsorbers will be tested as a unit rather than testing each bank separately because testing individually was not a requirement under ASME N510-1980 and is not feasible at Monticello.

In its July 1, 1998 letter, the licensee proposed the following commitments with the understanding that these commitments will become license conditions:

> Within 9 months of the date of the approval of the Monticello license amendment request dated June 19, 1998, NSP will conduct an independent evaluation of the testing methodology and the testing configuration of the EFT system by HEPA and charcoal filter testing experts. The exceptions to the ASME N510-1989 testing standard listed in Exhibit F of the above license amendment request will be evaluated. The evaluation results will be reported to the staff. Within 24 months of the date of approval of this amendment request, NSP will initiate appropriate modifications to the EFT System to comply with the ASME N510-1989 testing standard or obtain staff approval for continued use of the exceptions.

Based on these commitments, the above exceptions to the ASME N510-1989 in-place testing will be allowed for the next 24 months. The 9 months provides the licensee ample time to arrange for an independent HEPA and charcoal filter testing expert to evaluate and make recommendations for improving in-place filter testing. The 24 months provides the licensee ample time to initiate appropriate modifications or obtain the staff approval for continued use of the exceptions.

2.2 Laboratory Charcoal Sample Testing Requirements

Current TS Sections 3.17.B.2.a(3) and 4.17.B.2.a(3) require verification that the results of a laboratory carbon sample analysis shows ≥ 98 percent methyl iodide removal efficiency when tested in accordance with ASTM [American Society for Testing and Materials] Standard D3803-1979, "Standard Test Method for Nuclear-Grade Activated Carbon," at a temperature of

80 °C and a relative humidity (RH) of 95 percent. The essential elements of the current TS for testing per ASTM D3803-1979 are as follows:

- 95 percent RH
- Thermal stabilization until charcoal is at 80 °C
- 2-hour challenge, with gas at 80 °C and 95 percent RH
- A 2-hour elution time, with air at 80 °C and 95 percent RH

Proposed TS Section 3.17.B.2.a(3) requires verification that the results of a laboratory carbon sample analysis shows ≤ 0.4 percent methyl iodide penetration when tested at a temperature of 30 °C and an RH of 95 percent. Proposed TS Section 4.17.B.2.a(3) specifies that this carbon sample test for methyl iodide shall be conducted in accordance with ASME D3803-1989. However, the correct title of ASME D3803-1989 is ASTM D3803-1989. This correction was discussed with the licensee and TS Section 4.17.B.2.a(3) has been revised to specify ASTM D3803-1989 rather than ASME D3803-1989. The essential elements of the proposed TS change for testing per ASTM D3803-1989 are as follows:

- 95 percent RH
- 2-hour minimum thermal stabilization, at 30 °C
- 16-hour pre-equilibration time, with air at 30 °C and 95 percent RH
- 2-hour equilibration time, with air at 30 °C and 95 percent RH
- 1-hour challenge, with gas at 30 °C and 95 percent RH
- 1-hour elution time, with air at 30 °C and 95 percent RH

The major differences between the current and proposed TS requirements for carbon testing are:

	Proposed TS	Current TS
Thermal Stabilization Temperature	30 °C	80 °C
Pre-Equilibration Temperature	30 °C	NA
Challenge Temperature	30 °C	80 °C
Elution Temperature	30 °C	80 °C
Total Pre-Test Equilibration	18 hours	NA
Tolerances of Test Parameters	Smaller	Larger

The discussion below demonstrates that these differences make the proposed TS more conservative than the present TS requirements.

As stated above, ASTM D3803-1989 challenges the representative charcoal samples at 30 °C rather than at 80 °C. The quantity of water retained by charcoal is dependent on temperature, with less water being retained as the temperature rises. The water retained by the charcoal decreases its efficiency in adsorbing other contaminants. Because most charcoal is anticipated to be challenged at a temperature closer to 30 °C rather than 80 °C, the lower temperature test condition of ASTM D3803-1989 will yield more realistic results than a test performed at 80 °C.

ASTM D3803-1989 provides results that are reproducible compared to ASTM D3803-1979 because it has smaller tolerances on various test parameters, and it requires that the charcoal sample be pre-equilibrated. During the pre-equilibration, the charcoal is exposed to a flow of air controlled at the test temperature and RH before the challenge gas is fed through the charcoal. The purpose of the pre-equilibration phase of the test is to ensure that the charcoal has stabilized at the specified test temperature and RH for a period of time that results in the charcoal adsorbing all the available moisture before the charcoal is challenged with methyl iodide. This ensures reproducibility of the results by having every charcoal sample begin the test at the same initial conditions. Hence, the proposed testing in accordance with ASTM D3803-1989 standard would result in a more realistic prediction of the capability of the charcoal.

As stated above, the proposed TS requires that the laboratory testing of charcoal samples shows a methyl iodide penetration ≤ 0.4 percent. In the licensee's dose analysis, the 4-inch charcoal filters are credited with a filter efficiency of 98 percent. Therefore, the proposed TS acceptance criteria of ≤ 0.4 percent includes a safety factor of 5 which is consistent with RG 1.52, Revision 2, and is therefore acceptable.

The licensee has also revised the Bases for TS Sections 3.6/4.6, 3.17, and 4.17 consistent with the changes proposed in this amendment.

2.3 Radiological Consequences

In Monticello Licensee Event Report (LER) 96-008, "Reactor Water Cleanup Line Break Reanalysis Due to an Error Discovered During Re-evaluation," the licensee identified a discrepancy in the mass and energy release calculated for a postulated high energy line break in the reactor water cleanup (RWCU) system. As part of the corrective actions to address the discrepancy, the licensee established an administrative limit of 0.25 µCi of dose equivalent iodine-131 per gram of water in the reactor primary coolant (lowered from 5 µCi/gm). The licensee proposed to incorporate this administrative limit of 0.25 µCi/gm of dose equivalent iodine-131 into the TS. The licensee committed in LER 96-008 to submit a TS amendment request to establish the administrative limit on reactor primary coolant dose equivalent iodine concentration as a TS limiting condition for operation.

The staff reviewed the radiological consequence analysis submitted by the licensee in the June 19, 1998, submittal and finds that the calculational methods used are acceptable and that radiological consequences calculated by the licensee meet the relevant dose acceptance criteria. To verify the licensee's assessment, the staff performed an independent radiological consequence calculation resulting from a postulated high energy line break in the RWCU system using the limiting break mass flow rate of 719 pound-mass (lbm) per second provided by the licensee.

This break flow rate is approximately 3 times greater than the break flow rate previously used by the licensee in its original licensing-basis evaluation. The staff assumed that the break mass flow release to the environment would occur at ground level without filtration by the standby gas treatment system. The licensee proposed and the staff accepted that the control room operator will be able to isolate the postulated high energy line break within 10 minutes after initiation of the postulated break by closing remotely controlled and motor-operated isolation valves from the control room.

Based on the staff's review of the radiological consequence analyses submitted by the licensee and the staff's independent confirmatory analysis, the staff concludes that the radiological consequences with the proposed primary coolant iodine concentration of 0.25 μCi/gm dose equivalent iodine-131 are within the relevant dose criteria specified in 10 CFR Part 100 and General Design Criterion 19 of Appendix A to 10 CFR Part 50. Therefore, we find the requested amendment to be acceptable. The major parameters and assumptions used by the staff for the high energy line break accident and the resulting radiological consequences are provided below:

Assumptions Used in Computing High Energy Line Break Accident and Resulting Radiological Consequences

Parameter	Value	
Power level, MWt	1918	
Reactor primary coolant iodine concentrations (μCi/gm DEI-131)	0.25	
Total mass release, lbm	4.43E+5	
Operator Action Time, minutes	10	
Iodine Partition factor	1.0	
Dose conversion factor	FGR 11 and 12	
Breathing rate, m^3/sec	3.74E-4	
Atmospheric dispersion values, sec/m^3		
0 to 2 hours, EAB [exclusion area boundary]	9.20E-4	
0 to 2 hours, LPZ [low-population zone]	7.93E-5	
Control Room		
Dispersion value, sec/m^3	1.67E-3	
Volume, ft^3	2.7E+4	
Filter intake, cfm	9E+2	
Filter Efficiency, %	98	
Unfiltered inleakage, cfm	250	
Iodine protection factor	4.29	
Radiological consequences, rem	Thyroid	Whole Body
Exclusion area boundary	16	<1
Low population zone	1.4	<1
Control room operator	6.8	<1

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 and changes surveillance requirements. 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 (63 FR 40321). 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.

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