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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 107 TO FACILITY OPERATING LICENSE NO. DPR-22

NORTHERN STATES POWER COMPANY

MONTICELLO NUCLEAR GENERATING PLANT

DOCKET NO. 50-263

1.0 INTRODUCTION

By application dated February 12, 1999, the Northern States Power Company (NSP or the licensee) requested an amendment to the Technical Specifications (TSs) for the Monticello Nuclear Generating Plant. The proposed amendment would change the TSs to (1) allow reactor vessel hydrostatic and leakage tests when reactor coolant temperature is above 212°F without maintaining primary containment integrity and (2) establish a limit and a surveillance requirement on reactor coolant activity when reactor coolant temperature is above 212°F, the reactor is not critical, and primary containment has not been established.

2.0 EVALUATION

2.1 Background

Hydrostatic and leakage tests of the reactor coolant system are required by Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. Hydrostatic tests are required to be performed once every ten years and leakage tests are required to be performed following opening and reclosing of a component in the reactor coolant system. The only significant difference between the hydrostatic and leakage tests is the hold time prior to performing inspections. ASME Code Cases 416-1 and 498 allow hydrostatic tests to be performed at the same pressure as leakage tests, which is the nominal operating pressure.

Appendix G to 10 CFR Part 50 states that "pressure tests and leak tests of the reactor vessel that are required by Section XI of the ASME Code must be completed before the core is critical." These reactor vessel hydrostatic and leakage tests are performed with the reactor pressure vessel in an essentially water-solid condition using reactor recirculation and control rod drive pump operation to achieve the required test temperatures and pressures. The minimum allowed temperatures for these tests are conservatively based on the fracture toughness of the reactor vessel, taking into account anticipated neutron fluence. For the current reactor vessel fluence, hydrostatic and leakage tests are required to be performed with minimum reactor coolant temperatures greater than 212°F.

With the required reactor coolant temperature above 212°F, the current TSs require that primary containment integrity be maintained. Establishing primary containment integrity requires that all openings be secured including installation of the drywell head. Installation of the drywell head restricts access to the reactor vessel head for required reactor vessel hydrostatic and leakage test inspections. The restricted access to the reactor vessel head combined with the elevated test temperature makes performance of the required inspections a personnel safety concern.

The proposed changes will allow performance of reactor vessel hydrostatic and leakage tests without maintaining primary containment integrity. In addition, the proposed change will establish a limit on reactor coolant activity when reactor coolant temperature is above 212°F, the reactor is not critical, and primary containment integrity has not been established, to ensure that the consequences of a large primary system break would be bounded by a previously evaluated accident. The proposed change does not affect any other TS operability requirements associated with reactor coolant temperature above 212°F, such as for low pressure emergency core cooling systems or secondary containment. The proposed change will also add a surveillance requirement to sample and analyze reactor coolant for radioiodine prior to entering plant conditions of reactor coolant temperature above 212°F, reactor not critical, and no primary containment integrity.

The proposed changes apply only to reactor vessel hydrostatic and leakage tests. They do not apply to leakage tests that do not coincide with reactor vessel hydrostatic or leakage tests and are performed specifically for repair or replacement activities on other components in the reactor coolant system, such as replacement of a safety relief valve topworks or replacement of a control rod drive assembly and/or flange gasket. Component-specific leakage tests are only used after reactor vessel integrity has previously been demonstrated by a reactor vessel hydrostatic or leakage test. Since component-specific leakage tests are not tests required for the reactor vessel, they may be performed during or after reactor startup at nominal operating pressures and temperatures.

2.2 Evaluation

The proposed change will no longer require primary containment integrity be maintained when performing reactor vessel hydrostatic and leakage tests with the reactor coolant temperature above 212°F. When performing reactor vessel hydrostatic and leakage tests at greater than 212°F, there is additional energy stored in the reactor coolant providing the potential for steam leaks, rather than water leaks. Small system leaks would be detected by leakage inspections and reactor coolant leakage monitoring equipment before significant inventory losses occurred. In addition, secondary containment and the standby gas treatment system would be capable of handling any airborne radioactivity from small steam leaks.

In the unlikely event of a large primary system break without primary containment integrity, the secondary containment would be pressurized, which could possibly result in a ground level radiological release to the environment. Potential radioactive material releases to the environment were conservatively assumed by the licensee to be equivalent to the total activity in the reactor coolant in the vessel and recirculation lines at the start of the hydrostatic or leakage test. To limit radioactive material releases to the environment under these conditions, the licensee proposes a limit on the dose equivalent Iodine-131 (DE I-131) of 0.02 microcuries/gram in the reactor coolant. This coolant activity requirement would limit the

potential offsite and control room thyroid doses, due to a primary system break during reactor vessel hydrostatic or leakage test conditions, to a small fraction of the potential thyroid doses for a postulated main steam line break outside of primary containment. Potential thyroid offsite and control room doses were calculated by the licensee to be less than 2.4 rem at the exclusion area boundary, 0.21 rem at the low population zone, and 1.0 rem in the main control room. Potential whole body offsite and control room doses were calculated by the licensee to be less than 1 rem, which are bounded by the whole body doses for a postulated main steam line break outside of containment, as analyzed in Updated Safety Analysis Report (USAR) Section 14.7.3. The coolant activity limit of 0.02 microcuries/gram DE I-131 provides adequate assurance that the consequences of a large primary system break during a reactor vessel hydrostatic or leakage test will be conservatively bounded by the consequences of the postulated main steam line break outside of containment analyzed in the USAR. With the reactor vessel nearly water solid, at nominal operating pressure, not critical, and at low decay heat values, the energy stored in the reactor vessel would be minimized such that a large primary system break would quickly depressurize the reactor vessel allowing the low pressure core cooling systems to operate, and the potential for failed fuel and a subsequent increase in coolant activity would be minimized.

A large primary system break during a reactor vessel hydrostatic or leakage test with reactor coolant temperatures above 212°F and without primary containment integrity could also create harsh environmental conditions in secondary containment. The licensee has evaluated the environmental conditions in secondary containment for this postulated accident and determined that required equipment would still be qualified to perform its safety-related functions.

The proposed changes are consistent with TS Section 3.10.1 and Bases Section B 3.10.1, "Inservice Leak and Hydrostatic Testing Operation," of NUREG-1433, Rev.1, "Standard Technical Specifications, General Electric Plants, BWR/4."

The licensee proposed to correct a punctuation error in TS Section 4.7.A.2.a. Following discussion via telephone call between C. Lyon (NRC) and S. Shirey (NSP) on October 15, 1999, the licensee concluded that no punctuation change was necessary; however, the "If" should not be capitalized. Changing "If" to "if" is an editorial change and is acceptable to the staff.

2.3 Conclusion

The proposed changes apply only to the performance of reactor vessel hydrostatic and leakage tests above 212°F without maintaining primary containment integrity. The proposed changes do not affect any other TS operability requirements associated with reactor coolant temperature above 212°F, such as for low pressure emergency core cooling systems or secondary containment. Since the hydrostatic and leak tests are performed nearly water solid, at low decay heat values, and not critical, the stored energy in the reactor core will be very low. Under these conditions, the potential for failed fuel and a subsequent increase in coolant activity are minimized. To limit radioactive material releases to the environment under these conditions, the licensee proposes a limit on the DE I-131 of 0.02 microcuries/gram in the reactor coolant. The required pressure testing conditions provide adequate assurance that the consequences of a steam leak will be conservatively bounded by the consequences of the postulated main steam line break outside containment analyzed in the USAR. Therefore, these requirements will conservatively limit radiation releases to the environment. In the event of a large primary

system leak, the reactor vessel would rapidly depressurize, allowing the low pressure core cooling systems to operate. The capability of these systems is more than adequate to keep the core flooded under the low decay heat load condition. Small system leaks would be detected by leakage inspections before significant inventory loss occurred. Therefore, the changes are acceptable to the staff.

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 a surveillance requirement. 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 (64 FR 14283). 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.

Principal Contributor: F. Lyon

Date: November 24, 1999