Northern States Power Company

Monticello Nuclear Generating Plant
2807 West Hwy 75
Monticello, Minnesota 55362-9637

August 22, 1996

10 CFR Part 2
Section 2.201

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
Docket No. 50-263 License No. DPR-22

Reply to Notice of Violation Contained in
NRC Inspection Report No. 50-263/96005

Pursuant to the provisions of 10 CFR Part 2, Section 2.201, our reply to the notice of violation contained in your letter of July 23, 1996, is provided in Attachment A.

Your letter of July 23, 1996 also requested a discussion of actions to be taken to address issues related to the RHR room temperature analysis. The requested discussion is provided in Attachment B. In addition, the NRC staff requested that Monticello provide additional information to the staff prior to isolating service water cooling to the Core Spray pump motors. The test results supporting this isolation of service water cooling to the Core Spray pump motors are to be re-evaluated and safety evaluation SRI 95-002 is to be revised as appropriate prior to isolating service water cooling to the pump motors. The results of this re-evaluation will be communicated to the staff.

Attachment A, Reply to Notice of Violation, contains the following new NRC commitments:

> The administrative procedure governing special tests will be revised to ensure the requirements pertaining to the offsite performance of special tests are clear.
>
> Training will be provided to the Engineering/Technical staff on the nature of this violation and the requirements for written procedures and acceptance criteria.

Attachment B, Information Concerning Residual Heat Removal Room Heatup Calculation, contains the following new NRC commitments:

> Appropriate procedure changes and plant documentation revisions will be performed to reflect the calculation input of 88°F for the maximum ESW temperature.
>
> Further evaluation will be performed of the input assumptions for the RHR pump heat load. Testing is to be performed to provide further confirmation that the RHR pump motor horsepower requirements used in the RHR room heat up calculation are appropriate.

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Please contact Marv Engen at (612) 295-1291 if you require further information.

William J Hill

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Plant Manager
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Attachments A - Reply tc Notice of Violation
B - Information Concerning Residual Heat Removal Room Heatup Calculation

Attachment A

REPLY TO NOTICE OF VIOLATION

Violation

10 CFR Part 50, Appendix B, Criterion XI "Test Control" stated, in part, that all testing required to demonstrate that a component will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents.

Contrary to the above:

A. *On May 3, 1994, and July 8, 1994, testing was performed to demonstrate that the core spray pump motors 12 and 11, respectively, would perform satisfactorily in service under normal room temperatures without cooling water. The procedures used, 8892 and 8893, failed to incorporate acceptance limits as to when test objectives were achieved. Specifically, the tests did not contain any criteria for determining when equilibrium oil temperatures were achieved, although the test objective was to show that oil temperatures would reach an equilibrium value without cooling water to the oil bath.*

B. *On August 12, 1994, testing was performed without a written test procedure to demonstrate that the core spray pump motors would perform satisfactorily in service under the most adverse temperature requirements expected during the operation of the pumps.*

This is a Severity Level IV violation (Supplement 1).

NSP Response

NSP acknowledges the above violation. The purpose of tests 8892, 8893, and the Maple Grove test was to gather data for a safety evaluation. The tests themselves were not intended to verify system or component compliance against an existing license limit. The purpose of Safety Evaluation, SRI 95-002, "Justification for Operating ECCS Pump Motors with Less than the Recommended Flowrate to the Thrust Bearing Oil Cooler," was to evaluate the data and determine the acceptability of operating the motors with reduced or no water cooling.

The Maple Grove test was identical in purpose to test 8892 and 8893, however, it was not performed at the Monticello Plant site. Plant Engineering determined that data taking efforts on the spare motor did not require a special procedure or safety evaluation because it had no effect on current plant operation. Once again, the purpose of the SRI was to evaluate the data and verify license requirements were met prior to operating the motors with any modified cooling water flows.

Reason For Violation:

The reason for both violation examples is a failure to correctly interpret and implement test control requirements. A contributing factor was the presumed acceptability to rely on the skill and judgment of the System Engineers (the test performers) to obtain adequate data for the Safety Evaluation.

Corrective Action Taken and Results Achieved:

Monticello's Administrative Work Instructions were reviewed to verify they contained adequate detail to comply with 10 CFR Part 50, Appendix B, Criterion XI.

Corrective Action to be Taken to Avoid Further Violations:

The administrative procedure governing special tests will be revised to ensure the requirements pertaining to the offsite performance of special tests are clear.

Training will be provided to the Engineering/Technical staff on the nature of this violation and the requirements for written procedures and acceptance criteria.

Date When Full Compliance Will Be Achieved

Full compliance has been achieved.

Attachment B

Information Concerning Residual Heat Removal Room Heatup Calculation

By letter dated July 23, 1996, with subject "NRC INTEGRATED INSPECTION REPORT NO. 50-263/96005, NOTICE OF VIOLATION," the NRC staff requested that Monticello discuss the steps to be taken to evaluate concerns identified in section E1.3 of NRC inspection report 96005 regarding assumptions for the residual heat removal room heatup calculation. Monticello has evaluated the concerns identified in section E1.3 and provides the following information.

Background

To resolve an open issue identified as part of the Monticello design basis reconstitution program, Monticello requested the General Electric Company (GE) to re-analyze the containment pressure and temperature response to the design basis loss of coolant accident (DBA-LOCA). This containment analysis assumes a loss of offsite power with the limiting single active failure of a loss of one Emergency Diesel Generator (EDG) and the loss of the associated divisional equipment powered from the EDG. A safety evaluation was approved in March of 1995 to revise the Monticello USAR to reflect the results of the re-analyzed DBA-LOCA containment response. As a result of this re-analysis of the containment temperature and pressure response, it was determined that the maximum suppression pool temperature increased.

The suppression pool temperature is an input for calculation CA-92-036. Calculation CA-92-036 was performed to conservatively evaluate the heat generation rate in the Residual Heat Removal (RHR) pump rooms and to evaluate the temperature behavior of the RHR pump rooms using the calculated heat generation rate. An increased suppression pool temperature results in a change to the heat generation within the RHR pump room from the piping containing the higher temperature fluid and heat transfer from the adjacent suppression chamber room. Upon identification that an input to CA-92-036 was affected, revision 6 to CA-92-036 was performed and approved in October 1995.

This revision to CA-92-036 is conservative. The suppression pool temperature response is based on the long term limiting complement of one division of RHR pumps (two RHR pumps available powered from the available EDG) with one RHR pump in the suppression pool cooling mode and the second RHR pump secured to support RHR Service Water (RHRSW) pump loading on the available EDG. Conservatism is provided in calculation CA-92-036 in that the RHR room heatup calculation assumes both RHR pumps are in operation providing heat input to the RHR pump room for the duration of the event as well as the available Core Spray pump. Calculation CA-92-036 shows that the heat generation rate of one RHR pump motor is approximately 25% of the total heat generation rate. For the complement of RHR pumps assumed to be in operation for the RHR room heat up calculation the suppression pool temperature has been evaluated and found to be much less than the conservative value used in revision 6 of calculation CA-92-036.

Additional conservatism is provided in the calculation in that the calculation does not credit cooling water flow to the RHR or Core Spray pump motor coolers and the calculation assumes a conservative value for the cooling water flow rate to the RHR pump room cooler.

NRC Concern

The calculation assumed that both RHR pump motors were rated at 600 horsepower (hp) and 94.4 percent efficiency. However, two of the four motors (one per room) were replaced with 700 hp motors. Assuming that the efficiency remained the same, this equated to a 16.7 percent increase in heat load into the room.

Engineering personnel stated that the work performed by the 700 hp motor was less than rated; therefore, the additional heat input would be less than 16.7 percent. However, no further information was provided to the inspectors.

NSP Response

The heat contribution to the RHR pump room from the pump motors is the difference of the electrical horsepower input to the motor and the brake horsepower of the motor delivered to drive the pump. The heat input of the motor is provided by the following equations.

$$H = EHP_M - BHP_M = \frac{BHP_M}{eff_M} - BHP_M = BHP_M\left(\frac{1 - eff_M}{eff_M}\right) \text{ where,}$$

H is the heat input to the room,
EHP_M is the electrical horsepower input to the motor,
BHP_M is the brake horsepower output of the motor to drive the pump, and
eff_M is the motor efficiency.

The work performed in pumping a liquid, the hydraulic horsepower, depends on the weight of the liquid being handled in a given time against the total head or differential pressure being developed. The actual or brake horsepower of a pump will be greater than the hydraulic horsepower by the amount of losses incurred within the pump which are characterized as the pump efficiency. Thus;

$$BHP_P = \frac{(H)(Q)}{(C)(eff_P)} \text{ where}$$

BHP_P is the brake horsepower required by the pump,
H is the total head in feet of liquid differential pressure,
Q is the pump flow rate,
C is a conversion factor, and
eff_P is the pump efficiency.

The electrical horsepower required by the pump driver is dependent on the pump brake horsepower and the motor efficiency (BHP_M equals BHP_P). With the replacement of a 600

horsepower RHR pump motor with a 700 horsepower motor in each RHR pump room, the work required by the pump from the pump driver did not change as there were no changes made to the pumping system.

Evaluation of the pump brake horsepower (BHP_P) based on data obtained during pump surveillance tests confirms that the values used for the RHR room heat up calculation properly represent the actual plant conditions.

In addition, the electrical horsepower may be calculated using the equation

$$EHP_M = \frac{(I)(V)(PF)(\sqrt{3})}{746}$$ where

EHP_M is the electric horsepower input to the motor,
I is the motor current,
V is the motor voltage, and
PF is the motor power factor.

Using data previously obtained of the motor current and voltage during RHR pump surveillance tests with non-calibrated instrumentation, and using a power factor from the motor drawings corrected for operating voltage, the electric horsepower (EHP_M) for the RHR pump motors has been evaluated. The evaluation further supports that the brake horsepower used for the RHR room heat up calculation properly represent the actual plant conditions.

NRC Concern

There appeared to be a discrepancy in minimum flow requirements for the system. Section 1.0, "Purpose," of the calculation noted one reason for revising the calculation was to increase service water flow to the room cooler from 24 to 26 gpm. This increase was not in accordance with other design basis documents. For example, the inspectors determined that system flow balancing tests, as documented in calculation CA 93-040, used an acceptance criteria of greater than 24 gpm, which would have allowed a flow below 26 gpm being supplied to the cooler. The DBD also referenced a service water flow of 24 gpm. Use of 24 gpm would reduce the efficiency of the room cooler (and thus the heat removal capability) by 7.7 percent.

NSP Response

Revisions 0 through 5 of calculation CA-92-036 performed in 1992 and 1993 used an input assumption of 24 gpm for the ESW flow to the RHR pump room coolers. This value was conservative with respect to the minimum ESW flow of 26 gpm to the RHR pump room cooler provided in the ESW system design basis document. Revision 0, the current effective revision of the ESW design basis document, was issued in December of 1991.

Calculation CA-93-050 (referred to in the inspection report as calculation CA-93-040) was performed in 1993 to evaluate the Emergency Service Water (ESW) system flow rates

supplied to the various components cooled by the ESW system. This calculation used measured plant data of ESW system flow rates and differential pressures to determine the ESW flow rate to the room coolers for the RHR pump rooms. The calculation established an acceptance criterion consistent with the input assumption for the ESW flow rate established in calculation CA-93-050. Calculation CA-93-050 determined that the flow rate to the RHR room coolers is approximately 40 gpm and 30 gpm to the Division I and Division II RHR pump rooms respectively.

Revision 6 of calculation CA-92-036 included changes in input assumptions to conservatively evaluate a worst case increase in RHR room heat generation rate. In determining the inputs for calculation CA-92-036, Revision 6, it was recognized that the actual ESW flow rate to the RHR pump room coolers, as determined by calculation CA-93-050, performed in 1993, was significantly greater than the conservative ESW flow rate of 24 gpm to the RHR room cooler used in previous revisions of calculation CA-92-036. In order to conservatively credit the actual ESW flow rate to the RHR pump room cooler, and thus compensate for the evaluated increase in heat generation in the room, a value of 26 gpm was used as the calculation input for the ESW flow rate to the RHR pump room cooler. This value is consistent with the ESW system design basis provided in the system design basis document for the minimum flow rate.

To ensure the input assumption of calculation CA-92-036, revision 6, for the ESW flow rate to the RHR pump room coolers is maintained, the quarterly ESW pump and valve operability surveillance procedure includes acceptance criteria to ensure the minimum required flow is supplied to components served by the ESW system. This acceptance criteria is based on ensuring 26 gpm is provided to the RHR pump room coolers, consistent with the input value for calculation CA-92-036 for ESW flow rate to the RHR pump room coolers. This value is consistent with the input assumptions of CA-92-036 and the ESW system design basis, and is conservative with respect to the actual ESW system flow rate.

Monticello has reviewed the documents referenced in the NRC inspection report, SRI 88-013, the RHR system design basis document, design specification M-118, and the USAR; and has not been able to confirm a discrepancy in the design basis for the minimum ESW flow rate to the RHR pump room cooler.

NRC Concern

> *There appeared to be a discrepancy in maximum water temperature for the system. The calculation assumed that maximum service water inlet temperature was 88°F. This was lower than the 90°F cited in the USAR, the DBD, or safety evaluation SRI 88-013. Use of a 90°F service water inlet temperature would reduce the room cooler efficiency by an additional 4.3 percent, for a total of 12 percent.*

NSP Response

As stated previously, revision 6 of calculation CA-92-036 included changes in input assumptions to conservatively evaluate a worst case increase in RHR room heat generation rate. To compensate for the evaluated increase in heat generation in the room due to the changes to input assumptions, in addition to conservatively crediting the actual ESW flow rate to the RHR pump room cooler, the maximum water temperature for the ESW system was

reduced from 90°F to 88°F. This maximum system temperature provides a conservative upper bound on the actual worst case conditions which could occur.

The source of water for the ESW system is the Mississippi river. Plant data indicates that maximum upstream river temperature for the ESW cooling water supply is bounded by the 88°F maximum temperature used in revision 6 of calculation CA-92-036. Contrary to the statement provided in inspection report 96005, plant data does not indicate that service water inlet temperatures have increased over the life of the plant nor did the temperatures exceed 85°F during the summer of 1995. Temperature data retrieved by the plant staff indicates a peak service water inlet temperature of approximately 83°F during the summer of 1995. A review of service water inlet temperatures for the years 1988 through 1996 shows only one instance of service water temperatures exceeding 85°F. This occurred for a three hour period on a single day during extreme drought conditions in 1988 with a peak temperature of 85.1°F observed.

River water temperature is expected to decrease during the remainder of the year; however, revised operating procedures have been issued to limit plant operation to conditions consistent with the calculation CA-92-036 input of 88°F for maximum river water temperature.

NSP Actions

Monticello plant staff will process an addendum to safety evaluation SRI-88-013, "Justification for Plant Operation at Service Water Temperatures up to 90°F". The purpose of this addendum is to incorporate the information contained in revision 6 to calculation CA-92-036 and to reflect that the maximum allowed operating ESW temperature is 88°F consistent with the calculation input for maximum ESW temperature. As part of this SRI, appropriate procedure changes and plant documentation revisions will be identified to ensure proper configuration control to reflect the calculation input of 88°F for the maximum ESW temperature.

Further evaluation will be performed of the input assumptions for the RHR pump heat load. Testing is to be performed to provide further confirmation that the RHR pump motor horsepower requirements used in the RHR room heat up calculation are appropriate.