

OCT 31 1972

Docket No. 50-263

Northern States Power Company  
ATTN: Mr. Arthur V. Dienhart  
Vice President of Engineering  
414 Nicollet Mall  
Minneapolis, Minnesota 55401

Change No. 3  
License No. DPR-22

Gentlemen,

Your letter dated July 24, 1972, proposed a change to the Technical Specifications of Provisional Operating License No. DPR-22 for the Monticello Nuclear Generating Plant. The proposed change would reduce Residual Heat Removal Service Water (RHRSW) minimum pump discharge head pressure from 550 feet to 500 feet at 3500 gpm rated flow.

We have reviewed your proposal and the information presented in your letter dated July 3, 1972, to the Directorate of Licensing regarding the performance of the RHRSW pump and have concluded that the maximum demand on the RHRSW pump with allowance for primary coolant shell pressure during core cooling, service water flow resistance, containment pressure during accident conditions and tube to shell differential pressure of 20 psi specified in the Final Safety Analysis Report is 480 feet, 20 feet lower than the proposed minimum pump discharge pressure.

On this basis, we have concluded that the proposed change does not present significant hazards considerations not described or implicit in the Monticello Safety Analysis Report and that there is reasonable assurance that the health and safety of the public will not be endangered by operation of the RHRSW system in the manner proposed.

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Accordingly, pursuant to Section 50.59 of 10 CFR Part 50, the last line of item 3.5.C.4 (page 102) of the Technical Specifications of Provisional Operating License No. DPR-22 is hereby changed from "3500 gpm against a head of 550 feet." to "3500 gpm against a head of 500 feet."

Sincerely,

Original Signed by  
D. J. Skovholt

Donald J. Skovholt  
Assistant Director  
for Operating Reactors  
Directorate of Licensing

cc: Donald E. Nelson, Esquire  
Vice President and General Counsel  
Northern States Power Company  
414 Nicollet Avenue  
Minneapolis, Minnesota 55401

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UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

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Files (Docket No. 50-263)

THRU: P. L. Ziemann, Chief, ORB #2, L  
*D. R. Ziemann*

TECHNICAL SPECIFICATION CHANGE NO. 3 - REDUCTION OF RHRSW PUMP DISCHARGE HEAD FROM 550 TO 500 FEET (NORTHERN STATES POWER COMPANY -- MONTICELLO)

Introduction

By letter dated July 24, 1972, Northern States Power Company (NSP) submitted Proposed Change No. 4(1) to reduce the RHRSW pump discharge pressure from 550 feet to 500 feet because operation within the existing limit has been marginal since startup. We have reviewed NSP's letters dated July 24, 1972(1) and July 3, 1972, "Reporting of Low Discharge Head on 'A' Loop RHR Service Water Pumps"(2) and NSP presentation to the ACRS Subcommittee on September 30, 1972. The minimum RHR Service Water pump head requirement was established to assure that an adequate differential pressure would be maintained in the RHR heat exchanger to prevent leakage of the primary system water to the open cycle RHR service water system, according to NSP. The tube-shell side differential pressure required at the RHR system heat exchanger to accomplish this is 20 psid(3). NSP has reported that the current minimum RHRSW pump discharge pressure of 550 feet, as required by the Technical Specifications, was based in part upon the manufacturer's rating (3500 gpm at 626 feet) and is unnecessarily restrictive because the operating margin is inadequate.

Evaluation

Comparison between the vendor certified head/capacity curve for the RHRSW pumps and the curves obtained from tests performed by NSP at Monticello (Figure 2 of reference 2) shows that a flow measurement error of 5% could account for the discrepancy at rated conditions. We were advised by NSP personnel in a telecon on 10/5/72 that recent rerun test measurements by NSP near pump shutoff conditions have lowered the NSP data points plotted on the referenced figure to the proximity of the pump certification curve. NSP also reported (telecon 10/5/72) that the orifices in the 17-inch ID RHRSW lines at Monticello are 11 inches in diameter compared with a smaller orifice, thought to be about 7 inches in diameter, used at the vendor's facility. The calibration accuracy expected for the 11-inch orifice, it was stated by NSP, is in the range of 0.5 to 2.0%. NSP plans to resolve the discrepancy between pump behavior at the vendor's facility and the Monticello plant and if necessary to install new calibrated flow metering assemblies. We concur with this action.

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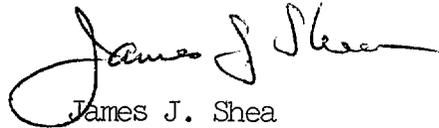
As a separate effort, the necessity for the minimum RHRSW pump discharge pressure of 550 feet at 3500 gpm has been reexamined. The highest measured pressure at the heat exchanger of the RHR primary coolant water is 315 feet. The measured maximum resistance to service water flow between pump and heat exchanger at 3500 gpm/pump is 62 feet. The required differential pressure between the tube and shell side is 46 feet (20 psi) and the containment pressure during accidents requiring RHR operation could reach 57 feet (25 psi). The minimum pump discharge pressure at the rated flow of 3500 gpm to assure sufficient pressure at the heat exchanger to prevent primary coolant water leakage to the river is therefore 480 feet. We concur that the proposed technical specification minimum pump discharge pressure limit of 500 feet assures sufficient head pressure to satisfy design requirements and provides an added operating margin of 20 feet. Support for this conclusion is provided by the NSP observation that the minimum differential pressure (tube-shell) at the heat exchanger is 86 psid. With a 25 psi allowance for containment pressurization, that differential pressure is nearly 4 times the minimum requirement of 20 psi. However, on the assumption that the RHRSW pump discharge pressure measurements that have been made at Monticello are not low, we have concluded that the specified pump discharge pressure may be reduced from the minimum value of 550 feet to 500 feet. If the NSP measurements are later determined to be low, the margin between the pump discharge pressure and the Technical Specifications will be greater than described above and pump performance will be significantly above the level of acceptability, 500 feet. Lending credence to the possibility that the NSP flow or pressure measurements are too low are the results of disassembly, inspection, and testing of a pump that was returned to the vendor. No pump degradation or mechanical failure could account for the pump characteristics observed by NSP. Pump testing by the vendor verified the original pump performance certification.

### Conclusion

There is no evidence of RHRSW pump performance degradation. Pump disassembly and inspection together with tests performed at the vendor's plant confirm that pump performance is **unchanged** from the original certification. Since the pump discharge head requirement to prevent primary coolant leakage to the river through the heat exchanger is 480 feet, the operating and safety margin will be adequate with a technical specification minimum pump discharge pressure of 500 feet instead of 550 feet. It is likely that biased measurements have contributed to the apparent reduction of pump discharge head and NSP will continue to investigate this possibility. A flow measurement error of 5% or less, if the pressure is erroneously low, could account for the apparent inconsistency of the pump performance between the vendor's facility and the Monticello plant. We have concluded that the flow-pressure measurements at Monticello may be in error. If it is assumed that the less conservative NSP pump performance measurements are correct, however,

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there is still sufficient margin with the pump discharge pressure reduced to a minimum of 500 feet, to assure that primary coolant water cannot leak to the river through the heat exchangers when the RHR system is activated, and we have concluded, therefore, that the Technical Specifications should be changed as requested by NSP.



James J. Shea  
Operating Reactors Branch #2  
Directorate of Licensing

Enclosure:  
References

cc w/enclosure:  
RTedesco, L:CS  
DJSkovholt, L:OR  
TJCarter, L:OR  
DLZiemann, L:ORB #2  
JJShea, L:ORB #2  
RMDiggs, L:ORB #2  
RO (3)  
MJinks, DRA (2)

## REFERENCES

1. Change Request No. 4 dated July 24, 1972 - Change the Residual Heat Removal (RHR) Service Water System pump discharge head requirements from 550 feet to 500 feet.
2. Reporting of Low Discharge Head on "A" Loop RHR Service Water Pumps dated July 3, 1972. Service water pipe ID is 17 inches (Figure 1). Manufacturer's head curve and NSP measured pump head curve differ by 5% Flow (Figure 2).

"Based on measurements taken during the seven-day repair period, the minimum differential pressure of the heat exchanger, with one RHR pump and two RHRSW pump operating at rated flow, is 86 psid . . . . The minimum discharge head required to maintain the 20 psid differential pressure at the heat exchanger is approximately 460 feet."

3. Final Safety Analysis Report (received October 21, 1968) Page 6-2.14 - "Cooling water for the heat exchangers of the RHR system is provided by four pumps located in the intake structure. Two service water pumps will deliver cooling water to each of two heat exchangers. Heat is transferred from the primary water to the cooling water and subsequently discharged to the river . . . . . The pressure on the tube side of the heat exchanger when RHR service water is flowing is maintained at a 20 psi differential above the pressure on the shell side with a  $\Delta P$  controlled valve in order to prevent reactor water leakage into the RHR service water system and thereby into the river."