

NSP

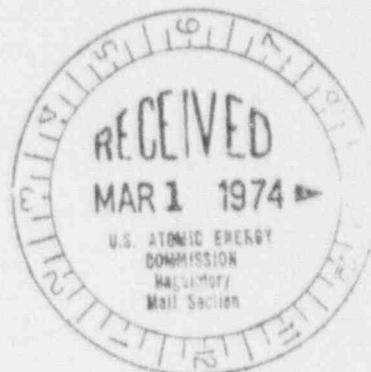
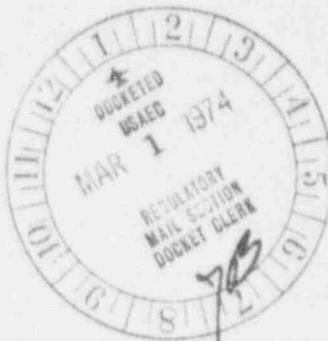
NORTHERN STATES POWER COMPANY

MINNEAPOLIS, MINNESOTA 55401

PDR

February 25, 1974

Mr. J F O'Leary
Director
Directorate of Licensing
Office of Regulation
U S Atomic Energy Commission
Washington, DC 20545



Dear Mr. O'Leary:

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

Failure of Outboard Main Steam Isolation Valves
AO-2-86B and AO-2-86C to Close

A condition occurred at the Monticello Nuclear Generating Plant which we are reporting to your office in accordance with Section 6.7.B.1, Abnormal Occurrence Reports, of Appendix A, Technical Specifications of Provisional Operating License DPR-22.

On February 16, 1974, while performing a routine surveillance test, two outboard MSIV's, AO-2-86B and AO-2-86C failed to close using the control room handswitch. The redundant MSIV's on the "B" and "C" steam lines were closed and the reactor was brought to a hot standby condition while an investigation was conducted. It was found that the AC solenoids on the MSIV air operators were not venting properly when deenergized. The solenoid manifolds for AO-2-86B and AO-2-86C were disassembled and inspected. Metal chips, which could have prevented the solenoid plunger from repositioning properly, were found in the AC solenoid from the AO-2-86B manifold; however, no significant metal chips were found in the AC solenoid from the AO-2-86C manifold. The chips were the result of inadequate deburring and cleaning of the manifold during manufacture.

Further investigation revealed a generic design problem with the solenoid valves. It had been noted that the AC solenoids on the outboard MSIV's exhibited leakage through their exhaust ports. It was found that the viton seats in the solenoid plungers had assumed a permanent deformation. It was postulated that leakage through the exhaust port could create a low pressure area across the top of the plunger, resulting in a differential pressure force sufficient to prevent plunger operation. The plausibility of this theory was confirmed by calculations and demonstrated by bench tests of a solenoid manifold. These tests demonstrated that solenoid valves with exhaust port leakage would fail to operate upon deenergization when operating at pressure near the normal supply pressure of 100 psig. Non-leaking valves operate properly at pressures beyond 150 psig.

Mr. J F O'Leary
February 25, 1974
Page 2

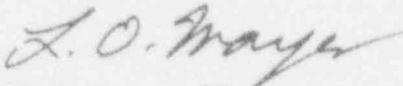
The solenoids and manifolds for all main steam isolation valves were disassembled and cleaned. New plungers with spring cushioned upper seats were installed in all MSIV AC solenoids. The spring cushioned seats will:

- 1) Limit seating force, thereby reducing deformation and promoting longer seat life.
- 2) Remain seated during the initial motion of the plunger, thereby minimizing flow induced forces.
- 3) Provide additional spring force to assist the initiation of plunger movement.

All MSIV's were demonstrated to function properly prior to returning to power operation.

The malfunction of two of the four outboard MSIV's would not have prevented an automatic isolation of the main steam lines, since the inboard MSIV's were all fully operable. However, the malfunction was of a generic nature. It is noted that the MSIV's in the steam chase are exposed to a higher ambient temperature than those in the drywell. This temperature difference (approx. 150°F vs. 110°F) may have contributed to the additional seat leakage observed on the outboard MSIV's. The present MSIV solenoid valves were manufactured by the Allied Control Company, Inc., of Plantsville, Connecticut for the Automatic Valve Corporation, of Farmington, Michigan and were installed during the spring, 1973 refueling outage. Except for a MSIV exercise test overtravel during the first routine MSIV exercise closure following installation, this is the first failure of this type of solenoid valve. This type of solenoid valve is not used on any other safety related system. The design of the solenoid valves on other systems is not susceptible to this type of failure. Although the modified plungers reduce the potential for a recurrence, we are continuing to investigate the possibility of further modifications. The solenoids and manifolds will be inspected during the spring, 1974, refueling outage.

Yours very truly,



L O Mayer, PE
Director of Nuclear Support Services

LOM/kn

cc: J G Keppler
G Charnoff
Minnesota Pollution Control Agency
Attn. E A Pryzina