



Northern States Power Company
Prairie Island Nuclear Generating Plant
1717 Wakonade Dr. East
Weich, Minnesota 55089

February 12, 1996

Generic Letter 95-07

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Response to Generic Letter 95-07: Pressure Locking and
Thermal Binding of Safety-Related Power-Operated Gate Valves

The purpose of this letter is to provide the 180 day response required by NRC Generic Letter 95-07 for the Prairie Island Nuclear Generating Plant.

Generic Letter 95-07 (dated August 17, 1995) was issued by the NRC requesting licensees to provide information concerning (1) the evaluation of operational configurations of safety-related, power-operated gate valves for susceptibility to pressure locking and thermal binding; and (2) analyses, and needed corrective actions, to ensure that safety-related power-operated gate valves that are susceptible to pressure locking or thermal binding are capable of performing the required safety function.

Generic Letter 95-07 contained the following required response:

Within 180 days from the date of this generic letter, each addressee of this generic letter is requested to implement and complete the guidance provided in Attachment 1 to perform the following actions:

1. Evaluate the operational configurations of safety-related power-operated (i.e., motor-operated, air-operated, and hydraulically operated) gate valves in its plant to identify valves that are susceptible to pressure locking or thermal binding;

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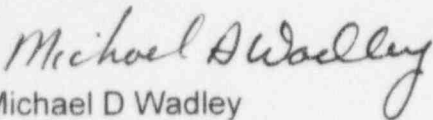
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2. Perform further analyses as appropriate, and take needed corrective actions (or justify longer schedules), to ensure that the susceptible valves identified in 1 are capable of performing their intended safety function(s) under all modes of plant operation, including test configuration.

Attachment 1 to this letter provides our 180-day response. In this letter we have made no new Nuclear Regulatory Commission commitments.

Please contact Jack Leveille (612-388-1121, Ext. 4662) if you have any questions related to this letter.



Michael D Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
J E Silberg

Attachments: (1) Summary of Actions Taken to Address Pressure Locking and Thermal Binding of Power Operated Gate Valves at Prairie Island Nuclear Generating Plant - Units 1 and 2

(2) Affidavit

SUMMARY OF ACTIONS TAKEN TO ADDRESS PRESSURE LOCKING AND THERMAL BINDING OF POWER OPERATED GATE VALVES AT PRAIRIE ISLAND NUCLEAR GENERATING PLANT - UNITS 1 AND 2

Introduction:

Prairie Island's response to the issue of pressure locking and thermal binding (PL/TB) of power operated gate valves has been in several stages. These stages of response have occurred as new information has been received and knowledge of the issue has increased. Most of the activity has been during actions to respond to motor valve operability relative to NRC Generic Letter 89-10.

The first activity performed was the change of normal position of the Low Head Safety Injection (Vessel Injection) motor valves from normally closed to normally open; these four valves are among the classic pressure locking susceptible valves for a pressurized water reactor. Prairie Island Safety Evaluation #351, "Basis for Repositioning Low Head Vessel Injection Motor Valves from Closed to Open Due to Susceptibility to Pressure Locking" was developed to support this change.

The major evaluation relative to the issue was performed by Safety Evaluation #373, "Operability Determination for Generic Letter 89-10 Valves Determined Susceptible to Thermal Binding/Pressure Locking." The primary guidance used for the evaluation was the 1992 "AEOD Special Study on Pressure Locking and Thermal Binding of Gate Valves," AEOD/S92-07 (later known as NUREG 1275, Volume 9). Additional evaluation was subsequently performed relative to the containment sump suction motor valves in our response to TI 2515/129, "Pressure Locking of PWR Containment Sump Recirculation Gate Valves."

A subsequent review was also performed when NRC Generic Letter 95-07 was issued. Earlier efforts were reviewed and the screening methodology of the Westinghouse Owner's Group Task Team on Pressure Locking and Thermal Binding was performed. Test procedures were reviewed to determine if any additional valves which are normally open would be susceptible to PL/TB during testing where Technical Specification limiting conditions for operation were not entered during the test. No additional valves were discovered.

Note that Prairie Island is licensed as a hot shutdown plant.

Non-Motor Valve, Power Operated Gate Valves:

A search was performed for applicable non-motor operated gate valves. No additional valves beyond the scope of NRC Generic Letter 89-10 were found.

Summary Description:

MV-32064, MV-32065 [MV-32167, MV-32168]: Residual Heat Removal (RHR) to Vessel Injection (Low Head Safety Injection)

These flex wedge gate valves were determined to be susceptible to pressure locking in 1993 and were changed from their historical normally closed position to normally open and therefore are no longer a concern for pressure locking. Justification for the position change is provided in Prairie Island Safety Evaluation #351.

**MV-32164, MV-32165 [MV-32192, MV-32193]: Reactor Coolant System (RCS) Loop A Hot Leg RHR Suction
MV-32230, MV-32231 [MV-32232, MV-32233]: RCS Loop B Hot Leg RHR Suction**

These normally closed flex wedge gate valves perform no accident mitigation function, and are not required to open to bring the plant to hot shutdown. Cooldown to cold shutdown is considered a non-safety related function. Therefore, PL/TB is not a nuclear safety concern. NRC Information Notice 95-18, Supplement 1, "Potential Pressure-Locking of Safety-Related Power-Operated Gate Valves," raised the concern that plant heat up after RHR isolation could raise the pressure in the valve bonnet area beyond code allowable limits due to heat transfer from the reactor coolant system. GL 95-07 also references French experience with similar valves in NUREG/CP-0137 (July 1994), "Proceedings of the Third NRC/ASME Symposium on Valve and Pump Testing." In the French experience, similar valves are affected by heat transfer from the reactor coolant system. The temperatures of the bonnets on each of these valves at Prairie Island were measured during power operation. The temperature remained at local ambient conditions. Therefore this concern is not applicable to Prairie Island since the bonnets do not heat up and thus do not pressurize, from heat transfer from the connected high temperature system.

MV-32066 [MV-32169]: RHR to RCS Loop B

These normally closed parallel double disk gate valves perform no accident mitigation function, and are not required to open to bring the plant to hot shutdown. Cooldown to cold shutdown is considered a non-safety related function. Therefore, PL/TB is not a nuclear safety concern. The bonnet temperatures of these valves were also measured at power to determine if they were susceptible to the concern raised by NRC IN 95-18, Supplement 1. They also remain at local ambient temperature and therefore this concern is not applicable since the bonnets do not heat up and thus do not pressurize, from heat transfer from the connected high temperature system.

MV-32023, MV-32024, [MV-32028, MV-32029]: Feedwater (FW) to Steam Generator Isolation

These flex wedge gate valves, which are susceptible to PL/TB, are normally open and automatically close on a containment isolation signal. They are not required to open in order to prevent or mitigate an accident previously evaluated in the USAR. Failure of auxiliary feedwater, which may require reopening of these valves, is beyond the design basis. Therefore PL/TB is not a design basis nuclear safety concern. These valves have been modified with SB actuators to improve their reliability by reducing inertia and reducing the possibility of thermal binding problems. The compensating spring pack of the SB actuator helps in two ways, 1) it limits wedging/unwedging force due to inertia, and 2) it prevents differential expansion/contraction of dissimilar metals due to relative stem growth from causing additional wedging as cooling occurs.

MV-32096, MV-32097 [MV-32108, MV-32109]: RHR to Containment Spray Pump Suction

These split wedge gate valves which would be susceptible to pressure locking are not required to function to mitigate the consequences of an accident. They were designed to provide for containment spray during the recirculation phase following a loss of coolant accident. Containment Spray is not needed after the injection phase of a design basis accident. This is documented in Prairie Island Safety Evaluations #234 and #364.

These valves are connected to the RHR system which may be in operation at 350°F. The bonnet temperatures of the Unit 1 valves were measured during our recent plant cooldown in preparation for refueling and maintenance outage to determine if they were susceptible to the concern raised by NRC IN 95-18, Supplement 1. They also remain at local ambient temperature and therefore this concern is not applicable since the bonnets do not heat up and thus do not pressurize, from heat transfer from the connected high temperature system. The Unit 2 piping configuration is similar and therefore should also remain at ambient conditions during RHR operation.

MV-32206 MV-32207, [MV-32208, MV-32209]: RHR to Safety Injection Pump Suction

These split wedge gate valves were determined to be potentially susceptible to pressure locking. The Unit 1 valves were modified in 1994 and the Unit 2 valves in 1995 by installation of bonnet vents with manual valves which are controlled administratively to prevent pressure locking.

MV-32075, MV-32076, MV-32077, MV-32078, [MV-32178, MV-32179, MV-32180, MV-32181]: Containment Sump B to RHR Pump Suction

These flex wedge gate valves are required to open to provide water for core cooling during the recirculation phase. Each train contains two valves in series, both of which must open to provide containment sump water to the RHR Pump. These valves were determined to be susceptible to pressure locking.

The Unit 1 pumpside valves were modified in 1994 and the Unit 2 pumpside valves in 1995 by installation of bonnet vents with manual valves which are controlled administratively to prevent pressure locking.

The sumpside valves are cycled administratively prior to leaving cold shutdown to ensure the bonnet and the pipe between the pumpside and sumpside valve is drained backwards to the containment sump and thus are filled with air preventing the possibility of pressure locking.

MV-32195, MV-32196, [MV-32197, MV-32198]: Pressurizer Power Operated Relief Block Valves

These normally open flex wedge gate valves are potentially susceptible to PL/TB should a valve be closed to isolate a leaking power operated relief valve. Technical Specifications require the block valve to remain operable to provide back up de-pressurization capability for response to a steam generator tube rupture. Thermal binding would not be expected to prevent reopening of the block valve during this event, since the temperature decrease in the nearby pressurizer would only be about 50°F. Since Prairie Island's licensing basis is hot shutdown, cooldown to cold shutdown is considered a non-safety related function. Therefore, thermal binding is not a nuclear safety concern. On Unit 2, the valves have been modified with SB actuators, primarily as a GL 89-10 margin improvement project (control of inertia allows a higher torque switch setting while still protecting the structural limitations of the valve and actuator). A secondary benefit of the SB actuator is to reduce susceptibility to thermal binding. The Unit 1 valves are being similarly modified with SB actuators during the ongoing Unit 1 refueling and maintenance outage.

Pressure locking would not be expected to prevent reopening of the block valve during the steam generator tube rupture event. A bounding calculation of the steam generator tube rupture scenario using the Commonwealth Edition methodology (presented at the Region III workshop on GL 95-07) was performed. The calculation shows a small increase in required opening force due to pressure locking, with the total opening force well within the valve/actuator capability (at design reduced voltage using the standard Limitorque capability equation and a conservative stem coefficient of friction) such that substantial margin is maintained. Since Prairie Island's licensing basis is hot shutdown, cooldown to cold shutdown is considered a non-safety related function. Therefore, pressure locking during plant cooldown is not a nuclear safety concern.

It should also be noted that at Prairie Island, leaking power operated relief valves are rare, such that normally all block valves are open and PL/TB is not a concern.

Conclusion:

Actions associated with NRC Generic Letter 95-07 "Pressure Locking and Thermal Binding of Safety Related Power-Operated Gate Valves" are considered complete.

UNITED STATES NUCLEAR REGULATORY COMMISSION

NORTHERN STATES POWER COMPANY

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

DOCKET NO. 50-282

DOCKET NO. 50-306

GENERIC LETTER 95-07, PRESSURE LOCKING AND
THERMAL BINDING OF SAFETY-RELATED, POWER-OPERATED GATE VALVES

Northern States Power Company, a Minnesota corporation, by this letter dated February 12, 1996 hereby submits information required by Generic Letter 95-07 for the Prairie Island Nuclear Generating Plant.

This letter contains no restricted or other defense information.

NORTHERN STATES POWER COMPANY

By Michael D Wadley
Michael D Wadley
Plant Manager
Prairie Island Nuclear Generating Plant

On this 12th day of February, 1996
before me a notary public in and for said County, personally appeared, Michael D Wadley, Plant Manager, Prairie Island Nuclear Generating Plant, and being first duly sworn acknowledged that he is authorized to execute this document on behalf of Northern States Power Company, that he knows the contents thereof, and that to the best of his knowledge, information, and belief the statements made in it are true and that it is not interposed for delay.

Marcia K. LaCore

