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ACCESSION NBR:9812010182 DOC.DATE: 98/11/24 NOTARIZED: YES DOCKET #
FACIL:50-305 Kewaunee Nuclear Power Plant, Wisconsin Public Servic 05000305
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SUBJECT: Forwards response to GL 98-02, "Loss of Reactor Coolant Inventory & Associated Potential for Loss of Emergency Mitigation Functions While in Shutdown Condition."

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NRC-98-119

Wisconsin Public Service Corporation
(a subsidiary of WPS Resources Corporation)
600 North Adams Street
P.O. Box 19002
Green Bay, WI 54307-9002
1-920-433-5544 fax

November 24, 1998

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Ladies/Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Wisconsin Public Service Corporations's (WPSC's) Response to Generic Letter 98-02

Reference: 1) Generic Letter 98-02; "Loss of Reactor Coolant Inventory and Associated Potential for Loss of Emergency Mitigation Functions While in a Shutdown Condition," dated May 28, 1998.

In Reference 1, the Nuclear Regulatory Commission (NRC) identified an example where a drain path was inadvertently created from the reactor coolant system (RCS) to the refueling water storage tank (RWST) at hot shutdown conditions. The event described led to a drain-down of the RCS and the introduction of hot RCS fluid to the emergency core cooling system (ECCS) pump suction header which flashed to steam resulting in a water/steam mixture. The Generic Letter requests licensees review their ECCS configuration for susceptibility to common cause failures similar to the one described. If a susceptibility is found describe the features and controls that ensure the RHR and ECCS will not be adversely affected by activities conducted at hot shutdown. The Generic Letter requests licensees perform this review within 180 days.

This letter provides the WPSC response to the information requested by the NRC. The attachment to this letter provides a summary of WPSC's assessment of the issues outlined in the Generic Letter.

As required by the Generic Letter, this response is being submitted under oath and affirmation. If any additional information is required, please contact David Lohman at (920) 388-8368.

A001

Sincerely,

Mark L. Marchi
Site Vice President-Kewaunee Plant

Subscribed and Sworn to
Before Me This 24th Day
of November 1998

Jeanne M. Ferris
Notary Public, State of Wisconsin

My Commission Expires:
June 13, 1999

010082

DCL
Attach.
cc - US NRC Region III
US NRC Senior Resident Inspector

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ATTACHMENT

Letter from Mark L. Marchi (WPSC)

To

Document Control Desk (NRC)

Dated

November 24, 1998

WPSC Response to NRC Generic Letter 98-02

WPSC Response to NRC Generic Letter 98-02

Required Information:

1) **Perform an assessment of whether your emergency core cooling systems iuclude certaiu design features, such as common pump suction header, which can render the systems susceptible to common cause failure as a rcsult of events similar to the Wolf Creek RCS drain down event of September 17, 1994.**

WPSC Response

The low head and high head safety injection pumps at the Kewaunee plant share a common suction header from the Refueling Water Storage Tank (RWST). Flow paths from the reactor coolant system (RCS) to the RWST do exist that could make the Kewaunee Nuclear Power Plant (KNPP) susceptible to a common cause failure as defined in this Generic Letter. The internal containment spray (ICS) system has a separate suction header.

Required Information:

2) **If this susceptibility is fouud, prepare, with consideration of plant specific design attributes, a description of the features of your Appendix B quality assurance program (for example, the methods used to verify valve position, the controls in place to assure compliance with plant surveillance, maintenance, modification, and operating procedures, and the adequacy of operator training for such activities) that provide assurance that the safety related functions of the RHR system and ECCS will not be adversely affected by activities conducted at hot shutdown (such as occurred at Wolf Creek). Addressees may limit their attention to surveillance, maintenance, modification, and operational activities at hot shutdown during which it is feasible to divert RCS fluid to the RWST, resulting in simnltaneous drain-down of the RCS and voiding in the suction header of the RHR and ECCS system pumps. Addressees may further limit their response to the consideration of potential coufigurations and conditions that involve flow paths with pipe diameters cqual to or greater than 2 inches.**

WPSC Response

Three flow paths were identified that could result in RCS fluid being diverted to the RWST resulting in a simultaneous drain-down of the RCS and voiding in the suction header for the Safety Injection (high head safety injection (SI)) pump and the Residual Heat Removal (low-head SI) pump. They are:

1. Flow from the residual heat removal (RHR) system to the RWST through the refueling water transfer line.

2. Flow through the RHR-SI cross connect through the SI pump and then to the RWST through the pump mini-flow line.
3. Flow through the RHR-ICS cross connect through the ICS pump and then to the RWST through the pump mini-flow line or through the full flow test line. Even though the ICS mini flow line is less than 2 inches in diameter, it will still be evaluated.

Kewaunee has both physical and administrative barriers in place that preclude flow diversion through these paths. Each path is evaluated below.

Flow from the RHR system back to the RWST through the refueling water transfer line

This flow path is used for draining the refueling cavity and as such is only open when the RCS temperature is less than 200°F. As the temperature in the RCS during this evolution is less than 200°F, there is no concern with voiding in the ECCS suction header during the cavity drain evolution. However, if the valve is not returned to the closed position following draining of the refueling cavity, a RCS drain-down could occur when the RHR train is returned to the normal cooldown configuration. Voiding is not a concern due to the initial temperature of the fluid. Voiding could occur if the drain path was not isolated and a heat up was initiated prior to returning the train of RHR to the normal cooldown configuration. This is not credible as the reactor vessel head would still be removed, requiring RCS temperature be maintained less than 140°F.

The flow path from RHR to the RWST is isolated by manual valve RHR-110. RHR-110 does not have any position indication in the control room. Valve RHR-110 is procedurally closed and its position independently verified after the draining evolution. It is also procedurally checked and independently verified closed prior to placing RHR in service.

The fact that this flow path is only open when RCS temperature is less than 200°F and that the isolation valve for the flow path is checked and independently verified closed after the draining evolution and before putting RHR in service minimizes the potential that this flow path will cause a RCS drain-down. Voiding in the ECCS pumps suction header with the temperature conditions seen during the drain down is not possible.

Flow from the RHR system to the RWST through the RHR-SI cross connect

This flow path is not used during normal plant power or shutdown operations. It is provided to allow the RHR pumps to provide the necessary suction head for the SI pumps during post-LOCA sump recirculation. This flow path is isolated by two parallel path motor operated valves, RHR-299A(B) operated from the control room. These valves are interlocked such that they cannot be opened at RHR pressures greater than 210 psig or if the SI pump suction valve from the RWST is open. When open, RHR-299A(B) will light up panels on the SI Active status panels, providing additional visual indication of their position further minimizing the possibility of an undetected valve mis-positioning.

These valves are verified closed by two independent operators prior to putting RHR in service. The only reason that RHR-299A or B would be opened during normal power or shutdown operations is for MOV testing or inservice testing (IST). MOV testing is controlled by a General Maintenance Procedure (GMP) and a Special Operating Procedure (SOP). IST testing is controlled by a surveillance procedure. These tests would typically be done during plant power operation with RHR isolated from the RCS. The RHR suction valves are interlocked such that they cannot be opened at RCS pressures greater than 450 psig. Since these tests are performed with the plant at power, the RCS pressure will be 2235 psig. Timing of the test is controlled by the Planning and Scheduling group.

GMP 236-01, "Diagnostic Testing of Limitorque Motor Operated Valves Using the Torque Thrust Cells," requires maintenance to leave the valve in the position directed by operations. The procedure also requires the dynamic tests be controlled by a SOP. The SOP used for dynamic testing of RHR-299A(B) verifies that RHR is isolated from the RCS prior to the test and closes the valve and independently verifies its position after the test. The IST test that times these valves also verifies the RHR system is isolated from the RCS and that the valves are closed following the test and their position independently verified. Activities such as the testing of MOVs and valve timing require a pre-job briefing with all personnel involved in the task. This briefing provides added assurance that both the operations crew and the people in the field performing the test are aware of plant operating requirements.

The physical interlocks, procedural guidance and scheduling reviews for MOV and IST testing along with the communications between the operations crew and test personnel minimize the potential that this flow path will cause a simultaneous RCS drain-down and voiding in the ECCS pump suction header. The verification of RHR-299A(B) position prior to placing RHR in service plus the visual indication provided by the SI Active status panel provides additional assurance that a valve mis-positioning will not cause a flow diversion.

Flow from the RHR system to the RWST through the RHR-ICS cross connect

This flow path is not typically used during normal plant power or shutdown operations. It is provided to allow the RHR pumps to provide the necessary suction head for the ICS pumps during post-LOCA sump recirculation. This flow path is isolated by two parallel path motor operated valves, RHR-400A(B) operated from the control room. These valves are verified closed by two independent operators prior to putting RHR in service. There are three plant activities that require RHR-400A or B to be opened. One is for MOV testing, the second for draining the refueling cavity, and the third for periodic inservice testing of the RHR pumps.

MOV testing is controlled by a General Maintenance Procedure (GMP) and a Special Operating Procedure (SOP) as described for RHR-299A(B). The controls discussed for testing valves RHR-299A(B) also apply for these valves.

There are times when it is desirable to cool the water from the refueling cavity before returning it to the RWST. The normal lineup through RHR-110 bypasses the RHR heat exchangers so no cooldown is possible. An alternate path is through the RHR heat exchanger B, RHR-400B, ICS pump B, and the ICS full flow test line back to the RWST. The drain down of the refueling cavity is done at a RCS temperature of less than 140°F, so voiding in the ECCS suction header is not a concern. However, if the valves are not returned to the closed position following draining of the refueling cavity, a drain-down could occur when the RHR train is returned to the normal cooldown configuration. Voiding is not a concern due to the initial temperature of the fluid. Voiding could occur if the drain path was not isolated and a heat up was initiated prior to returning the train of RHR to the normal cooldown configuration. This is not credible as the reactor vessel head would still be removed, requiring RCS temperature be maintained less than 140°F. This evolution is controlled by a SOP. The SOP closes RHR-400B and isolates the full flow test line following the drain-down and independently verifies the position of the valves.

The quarterly inservice test of the RHR pumps uses a flow path from the RHR pumps, through either RHR-400A or B, through the full flow test line back to the RWST. This test is performed at power with RHR isolated from the RCS. The test is controlled by a surveillance procedure (SP). The SP verifies that the RHR system is isolated from the RCS prior to beginning the test and closes and independently verifies the position of RHR-400A(B) following the test. In addition the RHR suction valves are interlocked such that they cannot be opened at RCS pressures greater than 450 psig. This test is performed quarterly with the plant at power and the RCS pressure at 2235 psig.

The physical interlocks, procedural guidance for MOV and IST testing and drain-down along with communications between the operations crew and the MOV test personnel minimize the potential that this flow path will cause a simultaneous RCS drain-down and voiding in the ECCS pump suction header. The verification and independent verification of RHR-400A(B) position prior to placing RHR in service provides additional assurance that a valve mis-position will not occur and cause a flow diversion.