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SUBJECT: Responds to GL 96-06, "Assurance of Equipment Operability & Containment Integrity During Design-Basis Accident Conditions."

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WASHINGTON PUBLIC POWER SUPPLY SYSTEM
P.O. Box 968 • Richland, Washington 99352-0968

January 28, 1997
GO2-97-015

Docket No. 50-397

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **WNP-2, OPERATING LICENSE NPF-21, GENERIC LETTER 96-06, "ASSURANCE OF EQUIPMENT OPERABILITY AND CONTAINMENT INTEGRITY DURING DESIGN BASIS ACCIDENT CONDITIONS," REQUEST FOR INFORMATION**

References:
1) NRC Generic Letter 96-06, dated September 30, 1996, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions"

2) Letter, GO2-96-213, dated October 30, 1996, JV Parrish (SS) to NRC, "Response to Generic Letter 96-06, Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions"

The Supply System hereby responds to the referenced generic letter and provides the requested information relative to the following concerns:

(1) Cooling water systems serving containment air coolers may be exposed to the hydrodynamic effects of water hammer during either a loss-of-coolant accident (LOCA) or a main steamline break (MSLB) for which they were not designed.

(2) Cooling water systems serving the containment air coolers may experience two-phase flow conditions during postulated LOCA and MSLB scenarios while the heat removal assumptions were based on single-phase flow conditions.

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(3) Thermally induced overpressurization of isolated water-filled piping sections in containment could jeopardize the ability of accident mitigating systems to perform their safety functions and could also lead to a breach of containment integrity via bypass leakage.

In a previous letter (see Reference 2) the Supply System informed the staff that action would be taken and a response submitted within the requested 120 day time period to determine:

(1) if containment air cooler cooling water systems are susceptible to either water hammer or two-phase flow conditions during postulated accident conditions; and

(2) if piping systems that penetrate containment are susceptible to thermal expansion of fluid so that overpressurization of piping could occur.

Included in the Attachment to this letter is a summary report addressing WNP-2's susceptibility to water hammer and two-phase flow in the containment air cooler cooling water system, and to overpressurization of piping that penetrates containment. Those systems that were found to be susceptible to the conditions discussed in the generic letter have also been identified. The basis for continued operations of affected systems and components is addressed, as well as a schedule for identifying planned corrective actions.

The Supply System will continue to support other industry groups such as the Boiling Water Reactor Owners Group, the Nuclear Energy Institute, and the Electric Power Research Institute to develop longterm corrective actions necessary to ensure the important issues noted by Generic Letter 96-06 are addressed appropriately.

Should you have any questions or desire additional information regarding this matter, please call me or Ms. L. C. Fernandez at (509) 377-4147.

Respectfully,

J. V. Parrish
Chief Executive Officer
Mail Drop 1023

Attachment

cc: LJ Callan - NRC RIV
KE Perkins, Jr. - NRC RIV, WCFO
NRC Sr. Resident Inspector - 927N
NS Reynolds - Winston & Strawn
JE Dyer - NRC RIV
TG Colburn - NRR
DL Williams - BPA/399

STATE OF WASHINGTON)
)
COUNTY OF BENTON)

Subject: Generic Letter 96-06
Request for Information

I, J. V. PARRISH, being duly sworn, subscribe to and say that I am the Chief Executive Officer for the WASHINGTON PUBLIC POWER SUPPLY SYSTEM, the applicant herein; that I have the full authority to execute this oath; that I have reviewed the foregoing; and that to the best of my knowledge, information, and belief the statements made in it are true.

DATE 28 January, 1997

J. V. Parrish
Chief Executive Officer

On this date personally appeared before me J. V. PARRISH, to me known to be the individual who executed the foregoing instrument, and acknowledged that he signed the same as his free act and deed for the uses and purposes herein mentioned.

GIVEN under my hand and seal this 28 day of January 1997.

Notary Public in and for the
STATE OF WASHINGTON

Residing at Kennewick, WA

My Commission Expires 4/28/98

GENERIC LETTER 96-06, REQUEST FOR INFORMATION

Summary

WNP-2 has performed an evaluation to address the three primary concerns identified in Generic Letter 96-06. The evaluation addressed the potential, during design basis accident (DBA) conditions, for the containment air cooler cooling water system to experience water hammer or two-phase flow conditions. It was determined that the potential for water hammer or two-phase flow is not a concern because the non-safety related containment air coolers are isolated during design basis accidents. The containment air coolers are not safety-related systems and are not relied upon to mitigate the consequences of any design basis accidents.

The evaluation also addressed the potential for piping systems that penetrate containment to overpressurize during DBA conditions due to thermal expansion of fluid between closed isolation valves. It was determined that for the piping systems that penetrate containment, three of the systems, and their associated isolation valves, were susceptible to overpressurization due to thermal expansion of trapped fluid. However, with the exception of the containment penetration itself, these piping systems are not part of any safety-related systems. In addition, containment integrity for the containment penetrations associated with these piping systems is not compromised because the pressures experienced by the piping and the associated isolation valves do not cause these components to exceed the appropriate ASME Code faulted allowable limit.

WNP-2 was not licensed by the NRC for the faulted load combination represented by the accident conditions identified in Generic Letter 96-06. The WNP-2 licensed faulted load combinations did not include the postulated pressure loading caused by heating trapped fluid in isolated sections of piping following an accident.

Estimated expenditures by WNP-2 in order to support the evaluation required by Generic Letter 96-06 are approximately $140,000 to date.

The Supply System will provide the staff by May 30, 1997 a list of corrective actions, and an implementation schedule, to ensure the two susceptible piping systems are not exposed to thermal overpressurization during design basis accident conditions.

Additional Information

In regard to the potential for water hammer and two-phase flow in the containment air cooler cooling water system, WNP-2 utilizes five containment air coolers during normal operation, but does not credit the use of containment air coolers to mitigate the consequences of any design basis accident. These non-safety-related coolers are isolated during and after a design basis loss of coolant accident, or main steam line break. Isolation of the air cooler systems eliminates the potential for water hammer and two-phase flow.

Restart of the containment air coolers during design basis accident recovery scenarios is beyond the design basis assumptions and is controlled by the Emergency Operating Procedures (EOPs). The concern in Generic Letter 96-06 regarding "delayed sequencing of equipment" is not considered applicable to the restart of containment cooling at WNP-2. Cooling water to the containment air coolers is supplied by the Reactor Closed Cooling Water System (RCC). The RCC is an open system outside containment, with a surge tank maintaining piping head pressure and a coolant inventory reserve. During DBA conditions the RCC will isolate. Rising containment temperatures will thermally expand the fluid trapped between containment inboard and outboard isolation valves (as discussed later), while other fluid in RCC piping inside containment can be relieved through a relief valve should thermal expansion occur. Subsequent long term fluid cooling, if any, inside containment following the accident could create vacuum pockets in the piping system when the containment temperature drops below boiling. Conversely, if the containment temperature was above boiling, the opening of isolation valves may result in two phase flow and/or boiling. After opening the isolation valves, the surge tank would ultimately restore a positive static pressure throughout the system, minimizing any voids. Upon successful reopening of the valves and a pump restart, the parallel loops inside containment would slowly sweep any minor non-condensables, voids, or steam pockets into the return headers, out of containment and into the vented surge tank. The EOP currently addresses slowly reintroducing cooling flow into some components such as motor coolers. Neither water hammer nor two-phase flow would be an anticipated nuclear safety concern during this evolution. If there is containment air cooler cooling water system pressure boundary damage during the accident, two potential indications that this non-safety system had been affected would be observable when the isolation valves were reopened. Those indications would be a decreasing surge tank level and possibly increasing drywell unidentified leakage.

The evaluation determined that there are piping systems at WNP-2 that penetrate containment and are susceptible to thermal overpressurization during DBA conditions. An increase in trapped fluid pressure will occur in these systems between containment penetration isolation valves.

All containment penetrations were individually reviewed as part of the evaluation. A screening criterion was established which first identified if the line was potentially liquid filled. Lines that were air, gas, or steam filled were not susceptible. For those lines that were liquid filled, the next screening eliminated those lines where the fluid temperature is higher than the accident temperature or where the piping penetrated containment below the water level of the suppression pool and had no inboard isolation valve. The third level of screening determined if the line utilized an isolation check valve inside containment and connected to containment atmosphere, or to the reactor pressure boundary itself. The fourth level of screening eliminated those lines that have both isolation valves outside containment, but connect to either the containment atmosphere or the reactor pressure boundary. In none of these cases could the accident induce pressures above the design pressure of the line. At the fifth level, instrument lines (designed in accordance with Regulatory Guide 1.11) which contained excess flow check valves outside containment and connected to either containment atmosphere or the reactor pressure boundary were evaluated. No instrument penetrations were identified that were susceptible to the Generic

susceptible to the Generic Letter concerns. The sixth and final level of screening then individually evaluated the specific design configuration of each remaining line. These evaluations were documented separately and resulted in identification of the following piping systems that penetrate containment and are susceptible to thermal overpressurization:

1) a normally isolated two inch diameter demineralized water (DW) supply line to containment;

2) a currently isolated one inch liquid sample line in the Process Sample Radioactive (PSR) System; and,

3) a ten inch diameter return line from containment in the Reactor Closed Cooling Water (RCC) System.

The two inch line passing through the containment DW penetration was confirmed to be drained of fluid. To support DW system and component operability, a revised valve line-up was implemented to preclude refilling the line with demineralized water during plant operation. This small bore line is only used during plant outages, if needed, to supply air or water to a distribution header inside containment. No further corrective action is required for this piping system.

The one inch PSR sample line would not normally be susceptible to thermal overpressurization because the two containment isolation valves associated with the line are designed such that thermal overpressurization would not occur. However, the two containment isolation valves recently exhibited leakage during in-service testing, thus requiring the sample line and it's respective containment penetration to be isolated by closing manual valves associated with the penetration. In the present isolated configuration, the sample line piping is susceptible to thermal overpressurization. It has been determined, based on a worst case design basis accident temperature profile, that the sample line isolation valves and piping will not exceed ASME Code faulted allowable limits. Containment integrity for the containment penetration associated with the sample line is maintained because the pressures experienced by the piping and the associated isolation valves do not cause these components to exceed Code faulted allowable limits. Sample system operability is also not compromised because the system remains isolated during the accident scenario, and ASME Code faulted allowable limits are not exceeded.

A containment penetration consisting of a ten inch diameter RCC System return line from containment, and the associated containment isolation valves, is also susceptible to thermal overpressurization during DBA conditions. This line automatically isolates during a Design Basis Loss of Coolant Accident (LOCA), and is not credited for mitigating any DBAs. Based on the incorporation of measured boundary leakage for this containment penetration, it has been determined that the piping and the containment isolation valves will not exceed ASME Code faulted allowable limits. In addition, containment integrity for the containment penetration associated with the RCC piping line is not compromised because the pressures experienced by

the piping and the associated isolation valves do not cause these components to exceed the ASME Code faulted allowable limits. The RCC system is not safety-related and not required to remain operable after a DBA LOCA. However, the system is expected to remain available for use after the accident because ASME Code stress limits are not exceeded.

The Supply System will provide the Staff by May 30, 1997 a list of corrective actions, and an implementation schedule, to ensure the two susceptible piping systems are not exposed to thermal overpressurization during DBA conditions.