

TENNESSEE VALLEY AUTHORITY

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JUN 29 1989

U.S. Nuclear Regulatory Commission
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Gentlemen:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

WATTS BAR NUCLEAR PLANT (WBN) - NRC BULLETIN (NRCB) 88-04 - POTENTIAL
SAFETY-RELATED PUMP LOSS

This letter provides TVA's revised response to NRC questions regarding the adequacy of miniflow systems for safety-related pumps. These questions were expressed in NRCB 88-04, which was issued by NRC on May 5, 1988. TVA's previous response was submitted in R. L. Gridley's letter to NRC dated February 27, 1989.

Enclosure 1 provides the results of TVA's evaluation of the issues identified in NRCB 88-04 for WBN. A summary list of commitments made in this submittal is provided in enclosure 2.

If you have any questions, please telephone T. W. Horning at (615) 365-3381.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

W. J. Ray Jr.
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Enclosures
cc: See page 2

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
NRC BULLETIN (NRCB) 88-04
POTENTIAL SAFETY-RELATED PUMP LOSS

The purpose of NRCB 88-04 was to request licensees to investigate and correct, as applicable, two miniflow design concerns for safety-related system pumps. The first concern involves the potential for dead-heading of one or more pumps that have a miniflow line common to two or more pumps or other piping configurations that do not preclude pump-to-pump interaction during miniflow operation. The second concern is whether or not the installed miniflow capacity is adequate for even a single pump in operation.

DISCUSSION:

TVA evaluated the following WBN safety-related system pumps for these concerns as required by items 1, 2, and 3 of Actions Requested of NRCB 88-04:

- ° Containment Spray
- ° Centrifugal Charging
- ° Motor-Driven Auxiliary Feedwater
- ° Turbine-Driven Auxiliary Feedwater
- ° Safety Injection
- ° Component Cooling Water
- ° Essential Raw Cooling Water (ERCW)
- ° ERCW Screenwash
- ° Residual Heat Removal (RHR)

The system-by-system evaluation included the review of design drawings, design data, surveillance test data, maintenance data, and pump supplier information.

Item 4 of Actions Requested of NRCB 88-04 requested a written response that (a) summarizes the problems and the systems affected, (b) identifies the short-term and long-term modifications to plant operating procedures or hardware that have been or are being implemented to ensure safe plant operations, (c) identifies an appropriate schedule for long-term resolution of this and/or other significant problems that are identified as a result of this bulletin, and (d) provides justification for continued operation particularly with regard to General Design Criterion 35 of Appendix A to Title 10 of the Code of Federal Regulations (10 CFR 50), "Emergency Core Cooling," and 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling System for Light Water Nuclear Power Reactors."

TVA's response to Item 4 follows.

RESPONSE:

4.(a) SUMMARY OF PROBLEMS AND SYSTEMS AFFECTED

With the exception of the RHR pumps, the WBN safety-related system pumps that were evaluated are not adversely affected by either of the miniflow operating concerns identified by the bulletin. Specifically:

- ° Pump-to-pump interaction during recirculation flow would not occur for the WBN containment spray pumps since they have independent miniflow lines.
- ° The following WBN pumps have an individual flow restrictor in the discharge piping for each pump. The flow restrictor for each pump is located upstream of a common miniflow line. The common line is large enough in flow area such that its resistance is a small part of the overall hydraulic resistance. As a result of this configuration, adverse pump-to-pump interaction during recirculation flow would be precluded for these pumps:

Centrifugal Charging Pumps

Motor-Driven and Turbine-Driven Auxiliary Feedwater Pumps

Safety Injection Pumps

- ° The following WBN pumps do not have miniflow lines. Since the pumps are operated above their respective minimum continuous flow rating, pump-to-pump interaction during recirculation flow would not occur for these pumps:

Component Cooling Water Pumps

ERCW Pumps

ERCW Screenwash Pumps

- ° No changes to the existing miniflow requirements for any of the pumps evaluated have been identified from the review of miniflow information from pump vendors. Surveillance testing for the auxiliary feedwater pumps, the centrifugal charging pumps, the RHR pumps, and the safety injection pumps utilizes flow through the miniflow lines; thus, the adequacy of the miniflow lines for these pumps has been demonstrated during preoperational testing.
- ° Subsequent to TVA's previous response to NRCB 88-04, we have completed the calculation for WBN unit 1 which shows a minimum flow rate through the containment spray miniflow path of approximately 1200 gallons per minute (GPM). This is significantly greater than the minimum flow rate of 500 GPM recommended by the pump vendor and documented in the containment spray system description. Additionally, since the containment spray miniflow is not anticipated to be required in any operating mode, TVA considers the WBN unit 1 containment spray miniflow design to be adequate. TVA will perform a similar calculation to document the adequacy of the containment spray pumps' miniflow systems for WBN unit 2.

The two parallel RHR pumps will be operated at miniflow conditions during a small-break loss of coolant accident (LOCA) or main steam line/main feedwater line break event, and may be operated in parallel at miniflow conditions prior to entry into RHR shutdown cooling. Because the discharge headers for the RHR pumps are connected by an open cross-tie, there is a potential for pump-to-pump interaction resulting in the weaker of the two pumps dead-heading because of pump head differences. Based upon analysis of the current preoperational data available for the unit 1 RHR pumps, as reflected in Surveillance Instruction (SI) 4.0.5.74.P, the weaker pump (1A-A) could be dead-headed if it operated in a miniflow recirculation mode concurrent with the stronger pump (1B-B) also running on miniflow recirculation. Similar pump-to-pump interaction could occur on unit 2.

4.(b) SHORT-TERM AND LONG-TERM CORRECTIVE ACTIONS

TVA will install a full-flow check valve downstream of each RHR heat exchanger and miniflow path for WBN unit 1. This will preclude the potential for the weaker pump to dead-head because of pump head differences. Similar modifications will be performed for WBN unit 2.

4.(c) SCHEDULE FOR LONG-TERM RESOLUTION

All corrective actions resulting from this bulletin will be implemented before fuel loading of each unit.

4.(d) JUSTIFICATION FOR CONTINUED OPERATION

Since WBN is a construction permit plant, a justification for continued operation is not applicable.

ENCLOSURE 2

LIST OF COMMITMENTS

1. TVA will perform a similar calculation to document the adequacy of the containment spray pumps' miniflow systems for WBN unit 2.
2. TVA will install a full-flow check valve downstream of each residual heat removal (RHR) heat exchanger and miniflow path for WBN unit 1.
3. Similar modifications will be performed for WBN unit 2.
4. All corrective actions resulting from this bulletin will be implemented before fuel loading of each respective unit.