TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

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August 14, 1985

WBRD-50-391/84-30

U.S. Nuclear Regulatory Commission
Region II
Attn: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Dr. Grace:

WATTS BAR NUCLEAR PLANT UNIT 2 - RESIDUAL HEAT REMOVAL PUMP MINIFLOW LOW FLOW RATE - WBRD-50-391/84-30 - FINAL REPORT FOR UNIT 2

The subject deficiency was initially reported to NRC-OIE Inspector P. E. Fredrickson on June 18, 1984 in accordance with 10 CFR 50.55(e) as NCR WBN NEB 8409. Our final report for unit 1 and first interim report for unit 2 was submitted on July 18, 1984. Enclosed is our final report for unit 2.

If you have any questions concerning this matter, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Domer

O. W. Hufham, Manager
Licensing and Risk Protection

Enclosure
cc: Mr. James Taylor, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Records Center (Enclosure)
Institute of Nuclear Power Operations
1100 Circle 75 Parkway, Suite 1500
Atlanta, Georgia 30339

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNIT 2
RESIDUAL HEAT REMOVAL PUMP MINIFLOW LOW FLOW RATE
WBRD-50-391/84-30
NCR WBN NEB 8409
FINAL REPORT

Description of Deficiency

Westinghouse letter No. WAT-D-4919 to TVA and the Watts Bar Nuclear Plant (WBN) Residual Heat Removal (RHR) Pump Manual require the RHR pump miniflow to operate at a flow rate greater than 500 gal/min. During a retest of TVA preoperational test W-4.1 for unit 1, the RHR pump miniflow flow rate was less than 500 gal/min for both train A and train B pumps. Additionally, cavitation was detected at flow control valve (FCV) 74-12 and 74-24 for trains A and B, respectively. The trains A and B retests for unit 1 were conducted on June 4, 1984, and May 25, 1984, respectively. Since the unit 2 RHR miniflow design is identical to unit 1, TVA considered this item applicable to unit 2 also.

The cause of this deficiency is that early design parameters used by Westinghouse and TVA led to a miniflow loop designed to support the RHR pump minimum operational requirements (i.e., pressure drop across the pump, back pressure to prevent pump runout, etc.). The existing RHR pump miniflow design at WBN utilized two 3" by 2" reducers in conjunction with a 2" control valve. This design, in addition to piping resistance and pump efficiency, caused the hydraulic resistance to be higher than design estimates. Thus, the miniflow flow rate was less than the pump design low flow limit.

TVA submitted a final report for WBN unit 1 on this item on July 18, 1984.

Safety Implications

An inadequate RHR pump miniflow flow rate and subsequent induced cavitation could degrade the RHR pump performance or damage the pump. The RHR system at WBN functions after a loss of coolant accident (LOCA) to provide injection of borated water into the reactor coolant system cold leg piping. The RHR also provides long-term recirculation for core cooling following a LOCA. Therefore, the degradation or loss of the RHR pump could adversely affect the safe operation of the plant.

Corrective Action

TVA has replaced the two 2" by 3" reducers and 2" control valve with a 3" globe valve on both trains for unit 2. This modification has been implemented successfully for WBN unit 1 and assures that the RHR pump miniflow flow rate will meet design specifications. All corrective action has been completed for unit 2 per engineering change notice (ECN) 4174.

Since this condition is unique to the Westinghouse RHR pump miniflow system design, the aforementioned corrective actions will prevent recurrence of this deficiency for WBN. Additionally, the replacement globe valves may be adjusted to obtain the proper flow value across the valve and locked at the proper value. Periodic testing will indicate any need to readjust the valve position to compensate for any additional system flow losses. Since actual test and operating experience on Westinghouse-designed RHR systems using this design at various nuclear plants has resulted in a new Westinghouse design for the RHR pump miniflow system, no further corrective action is required.