



Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

JUL 14 1994

CDR-50-390/94-08

10 CFR 50.55(e)

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

Gentlemen:

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

WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - RESIDUAL HEAT REMOVAL PUMP 1B-B  
FAILURES - CDR-50-390/94-08

The purpose of this letter is to provide a report in accordance with 10 CFR 50.55(e). The subject deficiency, documented in Incident Investigation II-W-94-014, was initially reported to the NRC Operations Center on June 9, 1994. TVA is presently investigating this event and will submit a supplemental report by August 12, 1994, to address the root cause and any required corrective actions. Enclosure 1 to this letter contains TVA's report on this subject. Enclosure 2 provides a list of commitments made in this submittal.

If you have any questions, please telephone P. L. Pace at (615) 365-1824.

Sincerely,

Dwight E. Nunn  
Vice President  
New Plant Completion  
Watts Bar Nuclear Plant

Enclosures  
cc: See page 2

210004

9407210285 940714  
PDR ADOCK 05000390  
S PDR

IF 27  
11

U.S. Nuclear Regulatory Commission  
Page 2

JUL 14 1994

cc (Enclosures):

INPO Record Center  
700 Galleria Parkway  
Atlanta, Georgia 30339

NRC Resident Inspector  
Watts Bar Nuclear Plant  
Rt. 2, Box 700  
Spring City, Tennessee 37381

Mr. P. S. Tam, Senior Project Manager  
U.S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike  
Rockville, Maryland 20852

U.S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1  
RESIDUAL HEAT REMOVAL PUMPS  
CDR 50-390/94-08  
FINAL REPORT

DESCRIPTION OF DEFICIENCY

On April 9, 1994, Residual Heat Removal (RHR) pump 1B-B was started in parallel with RHR pump 1A-A. Seven minutes later, RHR pump 1B-B was manually shutdown as a result of increasing motor current. Pump disassembly showed that the upper casing ring was fused to the impeller and had shrunk away from the stuffing box extension. The impeller and ring were sectioned, microphotographed and metallurgically analyzed. This analysis showed that the Monel casing ring was friction welded to the stainless steel impeller.

Following this failure, TVA performed corrective actions to address component alignment and operating processes. However, on June 6, 1994, RHR pump 1B-B was once again manually shutdown as a result of high motor current. In the second event, pump 1B-B was being brought on line without RHR pump 1A-A operating. Pump disassembly showed that the upper casing ring was once again fused to the pump impeller.

SAFETY IMPLICATIONS

The residual heat removal (RHR) system at WBN is a safety-related system designed to ensure adequate heat removal during shutdown conditions (Modes 4, 5 and 6) and following a loss of coolant accident (LOCA) such that the acceptable fuel design limits are not exceeded. Following a LOCA, the RHR system provides low head flow, from the refueling water storage tank (RWST), to the reactor coolant system (RCS) during the injection phase. During the recirculation mode of cooling following a LOCA, the RHR system provides the capability to pump water from the containment sump to the RCS.

In each of the events discussed above (DESCRIPTION OF DEFICIENCY), the failure of the RHR pump occurred following the introduction of heated water to the pump. The temperature difference from the ambient RHR piping temperature to the RCS temperature was approximately 240 to 250 Degrees Fahrenheit (DEGF). TVA believes this event would not occur, during a design basis accident, when the plant was in Mode 1, 2 or 3, since the water initially supplied to the RHR pump during the injection mode of cooling would come from the refueling water storage tank which is maintained between 60 and 105 DEGF and would not introduce a 240 to 250 DEGF step transient to the suction of the RHR pumps. Additionally, TVA believes that during the recirculation mode of cooling, the water supply from the containment sump would be at a low enough temperature that this event would not have occurred since the temperature transient would not be as severe.

However, the WBN Technical Specifications require only one train of RHR to be operable in Mode 4. Had this event occurred while operating under

these conditions, it would have resulted in the loss of the required operable train of RHR.

#### CAUSE OF THE DEFICIENCY

TVA is presently evaluating the cause of the RHR pump failures. Items under evaluation as potential contributors to these events include: rapid temperature changes of the fluid through the pump, misalignment during installation, voids existing in the system, suction strainers causing voiding in the system and warping of the stuffing box extension affecting the upper casing ring clearance. TVA believes that some or all of these potential causes resulted in a loss of the water film between the pump impeller and the upper Monel casing ring and the subsequent failures of the pump.

#### CORRECTIVE ACTIONS

TVA is presently investigating the RHR pump failures and will supplement this report to address the root cause and any required corrective actions. TVA expects the investigation to be complete and the supplement report to be issued by August 12, 1994.

ENCLOSURE 2

LIST OF COMMITMENTS

The following commitment is made in Enclosure 1 to this letter:

TVA is presently investigating the RHR pump failures and will supplement this report to address the root cause and any required corrective actions. TVA expects the investigation to be complete and the supplement report to be issued by August 12, 1994.