



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

NOV 04 1991

WBRD-50-390/91-08  
WBRD-50-391/91-08

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 )  
Tennessee Valley Authority )

Docket Nos. 50-390  
50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - DEFICIENCY IN THE INTAKE  
PUMPING STATION AND DIESEL GENERATOR BUILDING ENVIRONMENTAL CONTROL  
SYSTEMS - WBRD-50-390/91-08, WBRD-50-391/91-08 - FINAL REPORT

The subject deficiency was initially reported to NRC Inspector  
H. Livermore on March 7, 1991, in accordance with 10 CFR 50.55(e) as  
Significant Corrective Action Report (SCAR) WBP 900084SCA. An interim  
report was submitted on April 11, 1991. Enclosed is TVA's final report.

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

Sincerely,

John H. Garrity

Enclosures

cc: See page 2

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U.S. Nuclear Regulatory Commission

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cc (Enclosures):

INPO Record Center  
1100 Circle 75 Parkway, Suite 1500  
Atlanta, Georgia 30339

NRC Resident Inspector  
Watts Bar Nuclear Plant  
P.O. 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

Mr. B. A. Wilson, Chief, Project Chief  
U.S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2  
DEFICIENCY IN THE INTAKE PUMPING STATION AND  
DIESEL GENERATOR BUILDING ENVIRONMENTAL CONTROL SYSTEMS  
SIGNIFICANT CORRECTIVE ACTION REPORT WBP 900084SCA  
10 CFR 50.55(e)

FINAL REPORT

DESCRIPTION OF DEFICIENCY:

During a generic applicability review of a Sequoyah Nuclear Plant deficiency, the following deficiencies have been identified.

1. The ventilation and heating systems serving the mechanical and the electrical equipment rooms of the intake pumping station are not designed to ensure that the room temperatures are maintained between the 110°F high and the 40°F low. The electric space heaters and the ventilation fans are not safety-related and are classified as non-Quality Assurance, nonseismic Category I, and non-class 1E. The continued operation of the heaters and the fans cannot be assured. As a result, the safety-related instrument sense lines and non-safety-related piping could freeze and the environmental qualification temperature of the safety-related electrical equipment could be exceeded during, before, or after a design basis accident.
2. The heating, ventilation, and air conditioning (HVAC) equipment for the intake pumping station, which included electric heaters purchased under Contract No. 81131 and roof ventilators under Contract No. 83105 are not qualified to Seismic Category I(L) requirements. Watts Bar Design Criteria WB-DC-40-36.1 states that this equipment must be qualified to Seismic Category I(L) requirements.
3. The minimum temperatures in the Diesel Generator Building 480V electrical board rooms cannot be maintained for normal or abnormal conditions or the minimum temperature for the Diesel Generator Building rooms for abnormal conditions (i.e., loss of offsite power) upon failure of the non-safety-related electric heaters.
4. Heat generated by the potential failure of non-safety-related electric heaters in a nonconservative mode was not considered in cooling loads to prevent their adverse impact on the safety-related equipment.

SAFETY IMPLICATIONS

As a consequence of the above conditions, the mechanical piping and sense lines in the intake pumping station mechanical equipment rooms, associated with the backwashing essential raw cooling water strainer operation, could freeze during the worst-case conditions and could cause flooding of safety-related components essential to safe shutdown.

The frozen instrument sense lines on the essential raw cooling water (ERCW) system would lose their ability to detect/signal the condition of clogged strainers, and therefore, fail to initiate automatic operation of the ERCW backwash/backflush valves on the strainers. This could result in gradual clogging of the strainers over a period of time. However, low flow alarms in the control room would indicate reduced flow rates. The ERCW system pressure boundary integrity could be violated by potential freezing of the sense lines, but this should not impact ERCW system performance requirements.

Cooling for each of the intake pumping station (IPS) mechanical and electrical equipment rooms is provided by non-safety-related roof ventilators. If these fans failed, temperatures in the intake pumping station electrical equipment room, which contains safety-related electrical cables, could exceed the maximum temperature for which the electrical equipment is qualified.

The minimum temperatures could not be maintained in the Diesel Generator Building 480V electrical board rooms if the electric heaters failed; however, there are no water piping or instrument sense lines in the room which could be damaged from freezing temperatures, and the electric equipment should not be adversely affected by the decrease in room temperatures. Therefore, the failure of electric heaters should not have a detrimental effect on the safety-related Diesel Generator Building 480V electrical board rooms.

In a seismic event, parts of the heaters and the fans located in the intake pumping station, which are not qualified to seismic requirements, could become disengaged and fall, thus impacting the required functions of the safety-related equipment underneath.

The current upper temperature limits for the safety-related equipment areas, as specified on the Environmental Data (ED) drawings, could be exceeded through the potential failure of these non-safety-related heaters in the energized state through the action of nonqualified thermostats or internal damage.

#### CORRECTIVE ACTIONS:

TVA plans to ensure environmental control for the IPS by using only the offsite power system. TVA will perform an analysis to determine the minimum and maximum temperatures for the stated conditions and to determine the effect of loss of offsite power. To address the low temperature condition in the intake pumping station, TVA will replace the IPS mechanical equipment rooms fan controls with 1E qualified controls to ensure shutdown of the ventilation fans during winter to prevent an overcooling condition. A time-dependent temperature analysis will be performed to confirm that safety-related piping located in the IPS mechanical equipment rooms will not freeze during the time from loss to restoration of offsite power. To address the high temperature conditions, TVA will revise procedures to monitor the temperatures inside the equipment rooms or manually shut down nonessential heat loads upon loss of offsite power during summer conditions. TVA will perform an analysis to qualify the existing heaters and roof ventilators to Seismic Category I(L) requirements.

For the Diesel Generator Building, TVA will perform an analysis to determine the minimum and maximum temperatures in the safety-related spaces and to qualify the existing safety-related equipment to the calculated minimum and maximum temperatures.

For determining the extent of condition, TVA will review and revise HVAC calculations as necessary for the other safety-related plant areas to determine the worst-case minimum and maximum space temperatures. The cooling load analyses will address the heat generated by failure of the non-safety-related electric heaters in the energized state. Additional corrective actions will be taken if other areas are identified for which the environmental temperature limits cannot be maintained.

In addition, TVA will perform safety analyses, either by revising the existing Failure Modes and Effects Analyses (FMEA) or generating single failure calculations, to include the effects of credible failure modes of non-safety-related components on the safety-related systems.

To prevent recurrence of this condition, the design criteria WB-DC-40-36, "Classification of Piping, Pumps, Valves, and Vessels," and WB-DC-40-36.1, "Classification of HVAC Systems," will be revised to add guidelines which will assist the system engineer in the determination of limited seismic qualification requirements for equipment and components.

These actions will be complete prior to system group testing.

ENCLOSURE 2

LIST OF COMMITMENTS

1. TVA will provide technical justification for using only the off-site power to ensure environmental control in the Intake Pumping Station (IPS).
2. TVA will perform an analysis of the IPS heating, ventilation, and air conditioning (HVAC) to determine the minimum and maximum temperatures for the stated conditions and to determine the effect of loss of offsite power.
3. TVA will replace the IPS mechanical equipment fan controls with 1E qualified controls to ensure shutdown of the ventilations fans during winter to prevent an overcooling condition.
4. A time-dependent temperature analysis will be performed to confirm that safety-related piping located in the IPS will not freeze during the time from loss to restoration of offsite power.
5. TVA will revise procedures to monitor the temperatures inside the equipment rooms or manually shut down nonessential heat loads upon loss of offsite power during summer conditions.
6. TVA will perform an analysis to determine the minimum and maximum temperatures in the Diesel Generator Building safety-related spaces and to qualify the existing equipment to new minimum and maximum temperatures.
7. TVA will perform an analysis to qualify the existing IPS heaters and roof ventilators to seismic Category I(L) requirements.
8. For determining the extent of condition, TVA will review and revise HVAC calculations as necessary for the other safety-related plant areas to determine the worst-case minimum and maximum space temperatures.
9. TVA will perform safety analyses, either by revising the existing Failure Modes and Effects Analyses (FMEA) or generating single failure calculations, to include the effects of credible failure modes of non-safety-related components on the safety-related systems.
10. To prevent recurrence of this condition, the Design Criteria WB-DC-40-36, "Classification of Piping, Pumps, Valves, and Vessels," and WB-DC-40-36.1, "Classification of HVAC Systems," will be revised to add guidelines which will assist the system engineer in the determination of limited seismic qualification requirements for equipment and components.

These commitments will be completed prior to system group testing.