TENNESSEE VALLEY AUTHORITY
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MAR 16 1988

WBRD-50-390/87-06
WBRD-50-391/87-06

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	)	50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - ICE CONDENSER FLOOR DRAIN PIPING INADEQUATELY QUALIFIED - WBRD-50-390/87-06 AND WBRD-50-391/87-06 - FINAL REPORT

The subject deficiency was initially reported to NRC Region II Inspector Steve Elrod on January 16, 1987, in accordance with 10 CFR 50.55(e) as SCRs WBN NEB 8663 and 8664. Our interim report was submitted on February 13, 1987. Enclosed is our final report.

Glenn Walton and Gordon Hunegs were notified of delays in submittal of this report on February 29 and March 11, 1988, respectively.

If there are any questions, please telephone C. J. Riedl at (615) 365-8527.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

R. Gridley, Director
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Regulatory Affairs

Enclosure
cc: See page 2

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U.S. Nuclear Regulatory Commission

MAR 16 1988

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
ICE CONDENSER FLOOR DRAIN PIPING INADEQUATELY QUALIFIED
WBRD-50-390/87-06 AND WBRD-50-391/87-06
SCRS WBN NEB 8663 AND 8664
10 CFR 50.55(e)

FINAL REPORT

DESCRIPTION OF DEFICIENCY

Ice condenser floor drain piping and check valves do not conform to Watts Bar Nuclear Plant (WBN) Design Criteria WB-DC-40-36, "Classification of Piping, Pumps, Valves and Vessels." According to this design criteria, components required to perform a containment cooling safety function should be ANS Safety Class 2b (TVA Class C). The ice condenser floor drain pipes are necessary to route ice-melt drainflow to the inner side of the crane wall to provide cooling after a loss of coolant accident (LOCA) or a main steam line break (MSLB) inside containment. The floor drain piping is currently designated TVA Class G, nonsafety grade. The floor drain check valves were supplied by Westinghouse. The remaining components of the floor drain piping were purchased by TVA.

The ice condenser floor drains were considered not essential to safety when originally designed, and were built to nonsafety grade standards as specified by Westinghouse, the system's designer. Tests described in the WBN Final Safety Analysis Report (FSAR), section 6.7.1.3, demonstrated that containment final pressure following a LOCA was not affected by ice condenser floor drain performance. However, in 1978 an assumption in the Emergency Core Cooling System (ECCS) net positive suction head analysis, FSAR section 9.2.7.1, was revised to state that the ice-melt solution would be available to the residual heat removal (RHR) sump for ECCS operation following a LOCA. This means that the ice condenser floor drains would now be required to perform a containment cooling safety function. In addition, a design change was implemented which sealed the crane wall to elevation 716 feet in order to ensure adequate water depth in the RHR containment sump area. Because the crane wall is now sealed, any ice-melt solution spilled outside the crane wall is prevented from draining back inside the crane wall to the sump. Therefore, ice solution spilled resulting from a postulated failure of ice condenser floor drains may not be available for ECCS supply as assumed in the analysis. This deficiency (inadequately qualified piping) occurred with the addition of new functional requirements for the existing ice condenser floor drains and check valves without proper review of their qualification. This was an oversight on the part of the engineer performing the calculations for the FSAR revision, in that, it was not realized that taking credit for the ice-melt flow would place safety-related implications on the nonsafety grade piping and check valves. The qualification of the piping and valves should have been determined before credit was taken for their functioning.

In November 1985, Westinghouse submitted to NRC, on behalf of TVA, ice condenser drain test analyses which documented the use of the ice-melt drainflow to maintain lower compartment temperatures below design maximum should superheated steam be released following a MSLB inside containment. The drain has been neither analyzed nor qualified to ensure that the piping integrity would be maintained in case of a seismic event.

This piping deficiency was noted during a review of all WBN Class G piping performed as part of the corrective action for NRC violation nos. 390, 391/86-02-03 and SCR WBN EEB 8626, which identified a discrepancy in classification of auxiliary control air piping.

The root cause of this deficiency was a procedural weakness which allowed an assumption (the availability of the ice-melt solution) to remain unverified. Because the calculations were not associated with actual design changes or hardware modifications, with regard to the ice condenser drains and valves, the calculations were not subjected to a rigorous design change verification.

SAFETY IMPLICATION

There are two safety considerations resulting from this deficiency.

1. If the integrity of the ice condenser floor drain pipes were to fail during a LOCA or MSLB, the ice-melt solution could be spilled outside the crane wall. The immediate containment cooling effect would be lost since the ice-melt water would not fall through the lower containment atmosphere inside the crane wall. In the event of a superheated steam release because of steam generator tube uncovery following a MSLB, environmental qualification temperatures for safety-related equipment in lower containment could be exceeded, and the safe shutdown capability of the plant might be reduced. This condition could adversely affect the safety of operations of the plant.

2. ECCS supply water for residual core and containment heat removal would also be reduced if the ice-melt solution spilled outside the crane wall and became isolated from the RHR sump. However, this aspect of the deficiency would not necessarily affect adversely the safety of operations of the plant. This is because RHR Sump Model studies indicate that a water depth of 7.8 feet above the containment floor is adequate to prevent vortexing and to allow sufficient RHR pump suction during recirculation. If all the ice-melt solution fell outside the crane wall, the depth of water in the sump area would be at least 8.27 feet from refueling water storage tank and cold leg accumulator injection water alone.

Corrective Action

TVA will upgrade or replace the piping and valves to ASME Section III, Class 3 (TVA Class C).

Since occurrence of the deficiency (1977-1978 timeframe), TVA has greatly strengthened the design control process and instituted more thorough and detailed calculation verification and review. This process also applies to design verification. (The current procedural controls are provided by Nuclear Engineering Procedures (NEPs) 3.1, "Calculations," and NEP 5.2, "Review.") Deficiencies of this type should not occur with the program currently in place, and no further action is required to prevent recurrence.

All corrective action will be completed before fuel load of the respective unit.