Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

MAY 22 1991

WBRD-50-390/91-18 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 - REACTOR VESSEL HEAD VENT SYSTEM (RVHVS) OPERATING MODES EVALUATION - INTERIM REPORT

The subject deficiency was initially reported to NRC Region II Inspector A. R. Long on April 16, 1991, in accordance with 10 CFR 50.55(e), as Significant Corrective Action Report (SCAR) WBSCA 910202. Enclosure 1 is TVA's interim report. Enclosure 2 contains the commitments made in this report.

A final report will be submitted on this issue by July 31, 1991.

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

Very truly yours,

TENNESSEE VALLEY AUTHORITY

Mark Burzynski for

E. G. Wallace, Manager
Nuclear Licensing and
Regulatory Affairs

Enclosures
cc: See page 2

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U.S. Nuclear Regulatory Commission

cc (Enclosures):
Ms. S. C. Black, Deputy Director
Project Directorate II-4
U.S. Nuclear Regulatory Commission
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852

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

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN)
INCOMPLETE REACTOR VESSEL HEAD VENT SYSTEM OPERATING MODES EVALUATION
SCAR WBSCA 910202

INTERIM REPORT

DESCRIPTION OF CONDITION

The operating modes calculation for the Reactor Vessel Head Vent System (RVHVS) does not address the required operation of the RVHVS for mitigation of the Design Basis Events (DBEs) delineated in Watts Bar Design Criteria WB-DC-40-64, Design Basis Events Criteria.

During emergency or abnormal situations, the system functions as a reactor vent to remove gases which may potentially impair natural circulation. The temperature of the gases and fluids the RVHVS would be required to accommodate could be in excess of the normal Th range of 618°F. Additionally, Design Criteria WB-DC-40-64 requires operation of the RVHVS to provide Reactor Coolant System (RCS) letdown to accommodate boration for mitigation of numerous DBEs. Many of these events are postulated to occur in plant operating mode 1, during which the reactor would be at full temperature and pressure for power operation. If the RVHVS were called upon for event mitigation soon after occurrence of an event, the RVHVS piping could experience temperatures in excess of the normal Th range of 618°F. Contrary to the operating conditions of the above described modes, the current system-based operating modes calculation and resulting pipe stress analysis downstream of valves FSV-68-394 and FSV-68-395 have been performed at a temperature of only 327°F.

The original operating modes calculation was generated between October 1988 and January 1989, in parallel with the development of the design basis events mitigation requirements of WB-DC-40-64.

ROOT CAUSE OF CONDITION

The root cause of this deficiency and the extent of condition are still under review and will be summarized in the final report.

SAFETY IMPLICATIONS

A sample review of the Safety Injection, Reactor Coolant, Containment Spray, and Residual Heat Removal Systems functions, specified in WB-DC-40-64 as being required to mitigate DBE, revealed no other modes of system operation with the potential to invalidate the pipe stress analysis.

A 3/8-inch flow restrictor exists at the connection of the RVHVS piping to the RCS. This flow restrictor limits the flow through the RVHVS to a rate less than the capability of the reactor coolant makeup system should a break occur downstream of the flow restrictor. Should the RVHVS piping fail during venting operations for the reactor or during letdown operations following a DBE, and assuming that a significant pipe crack or pipe break were to occur, a suitable flow path would exist for venting and letdown. Components in the area which perform a primary safety function are protected from the resulting water spray environment. Failure of this piping in such a way as to essentially isolate the RVHVS (a complete crimping of the pipe) is considered to be highly unlikely, but if this were to occur, its requirement to function as a vent or redundant letdown path following a DBE would be lost.

The current Unit 2 problem NE-68-10R operating mode calculation for the RVHVS contains an upset condition in which the operating temperature through valves FSV-68-396 and 397 is conservatively specified as 650°F. The N3-68-10R rigorous pipe stress analysis qualifies the Unit 2 RVHVS piping under the old analysis methodology for the 650°F upset condition; thus enveloping the emergency modes for venting of reactor gases or RCS letdown for inventory control. Although this Unit 2 analysis gives a certain level of assurance that the similar Unit 1 RVHVS piping will also qualify for the higher temperature, qualification of Unit 1 is not totally assured until the piping is reanalyzed under the more stringent criteria of the latest piping analysis design criteria.

CONCLUSION

There exists no documented pipe stress analysis to show that the Unit 1 RVHVS piping can perform its intended functions of (a) reactor vent to remove gases which may potentially impair natural circulation during emergency or abnormal situations, or (b) reactor coolant letdown for inventory control during emergency or abnormal situations. Although failure of the RVHVS piping during either of these modes is not desirable, release of the vented hydrogen to containment atmosphere or loss of the RCS letdown to lower containment is not expected to prevent safe shutdown of the reactor.

CORRECTIVE ACTION

The RCS operating modes calculation will be revised to properly specify operating temperatures and pressures for the RVHVS piping. The rigorous pipe stress analysis will then be qualified using the updated operating modes. Pipe reroutes, if necessary, will be performed to support piping qualification and pipe supports will be redesigned, if necessary. Other design documents will be revised, as required, to clearly identify RCS venting and letdown for inventory control as required operating conditions for the RVHVS. These corrective actions will be performed no later than Group 4 system completion for the RCS.

Corrective actions necessary to prevent recurrence of this issue will be discussed within the final report, upon finalization of the root cause and extent of condition. The schedule date for issuance of this final report is July 31, 1991.

ENCLOSURE 2

LIST OF COMMITMENTS

1. The Reactor Coolant System (RCS) operating modes calculation (EPM-MJD-100388) will be revised to properly specify operating temperatures and pressures for the Reactor Vessel Head Vent System (RVHVS) piping.

2. The RVHVS rigorous pipe stress analysis will be qualified using the updated operating modes calculation EPM-MJD-100388. Pipe reroutes, if necessary, will be performed to support piping qualification and pipe supports will be redesigned, if necessary.

3. Other design documents (e.g., system descriptions) will be revised, as required, to clearly identify RCS venting and letdown for inventory control as required operating conditions for the RVHVS.

These corrective actions will be performed no later than Group 4 system completion for the RCS.

4. A final report will be submitted by July 31, 1991.