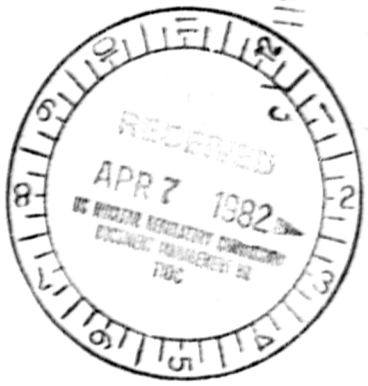
TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

March 24, 1982

WBRD-50-390/81-11
WBRD-50-391/81-10



U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - DEFICIENCIES IN PRESSURE TESTING - WBRD-50-390/81-11, WBRD-50-391/81-10 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector F. S. Cantrell on December 30, 1980, in accordance with 10 CFR 50.55(e) as NCR WB-M-80-16. Interim reports were submitted on January 29, May 14, August 18, October 18, and December 18, 1981. Enclosed is our final report.

If you have any questions, please get in touch with R. H. Shell at FTS 856-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure
cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
DEFICIENCIES IN PRESSURE TESTING
WBRD-50-390/81-11, WBRD-50-391/81-10
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

During a QA audit of the pressure testing program for safety-related piping, several deficiencies were identified. The audit consisted of a detailed review of all completed test documentation for pressure tests by both hydrostatic and pneumatic methods. The problems identified are as follows:

1. Identification of Test Boundaries

   It was almost impossible to determine the test boundaries or if the complete system had been tested, without a large amount of man-hours expended to cross-reference to accompanying drawings. The recently initiated procedure, WBNP-QCI 4.34 now requires marked flow diagram drawings for each system to identify the pressure test boundaries.

2. Calibrated Test Instruments

   The majority of the pressure test documentation did not record any temperature measuring device used, even though there is a requirement for minimum temperature and no more than 10°F difference between the temperature of the pressure membrane and the testing medium.

3. System Interface Test Pressure

   Some instances were found where piping subject to design pressure changes with system interface were not tested to the correct pressure as required by Construction Specification G-29M, 3.M.9.1(c), section 7, and addendum 2. Discussion with some engineering personnel revealed they were not aware of this requirement.

4. Components Limiting Test Pressure

   Instances were found where the computed test pressure used was less than the minimum required. This was most likely due to a limiting component in the system, but there was no comment in the "Remarks Section" of the documentation sheet to indicate why this pressure was used or to reference the deviation.

5. Components Excluded from Pressure Test

   Cases were found where components and portions of systems were purposely excluded from the pressure test. This is not discovered until the numerous tests are compared to the entire system flow diagrams. The documentation should state approval for not testing.

6. Conflict and Change of Requirements

A few instances were found where test pressures for the same area conflicted with approved drawings. Also, new requirements were added after tests were conducted.

7. Modifications After Testing

Interviews with engineering personnel revealed that several piping segments had been cut and moved to conform to pipe locations verification or support installations. In addition, review of documentation shows valves have been installed by ECN's. Both examples were done after completion of the pressure tests.

The pressure tests for the following systems had one or more of the above deficiencies: main steam and steam generator blowdown, main and auxiliary feedwater, fuel oil, fire protection, control air, service air, demineralized water, chemical and volume control, safety injection, essential raw cooling water, component cooling, containment spray, residual heat removal, waste disposal, fuel pool cooling and cleanup, and diesel starting air.

Safety Implications

The pressure tests for the safety-related systems mentioned above may be inadequate to verify pressure retaining ability of those systems. Thus, a deficiency which could adversely affect the functioning of a safety-related system could have gone undiscovered.

Corrective Action

No hydrostatic testing has been performed since this audit on safety-related systems without a specific test procedure being prepared and reviewed. All hydrostatic and pneumatic test records generated for safety-related systems before audit WB-M-80-16 have been reviewed by engineering personnel. Corrective action for each deficiency discovered has been or is being addressed. These include issuing NCRs to document use-as-is dispositions, reperforming the test, rechecking test boundaries, and requesting the Division of Engineering Design to clarify conflicting test requirements.

Corrective action will be implemented on a system-by-system basis with all corrective action complete before hot functional testing of the involved unit. Those systems on which modifications have been performed since hydrostatic or pneumatic testing was completed will be retested.

The root cause of this deficiency was inadequate controls on pressure testing, (i.e., the procedure in use did not require the attention to detail necessary to ensure proper testing).

In order to prevent recurrence, TVA has initiated a Construction Test Manual containing a general pressure testing procedure from which specific test procedures for each future test are prepared. No pressure testing is performed on safety-related systems without a specific test procedure being prepared and reviewed.