TENNESSEE VALLEY AUTHORITY

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September 28, 1983

WBRD-50-390/81-33
WBRD-50-391/81-32

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - IMPROPER CLASSIFICATION OF ERCW SYSTEM PIPING AND COMPONENTS - WBRD-50-390/81-33, WBRD-50-391/81-32 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on March 24, 1981 in accordance with 10 CFR 50.55(e) as NCR WBN NEB 8106, concerning the seismic qualification for chillers/coolers and deficient piping of the HVAC system. A similar deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on May 7, 1981 in accordance with 10 CFR 50.55(e) as NCR 3116R R1, concerning improper classification of ERCW system piping. Interim reports were submitted on April 24, June 8, July 14, September 2, and December 9, 1981; February 17, August 11, and October 19, 1982 and April 27, 1983. Our August 11, 1982 submittal constituted a final report on NCR 3116R R1 (WBRD-50-390/81-50, WBRD-50-391/81-48).

Related NCR WBN NEB 8317, which concerns the lack of seismic qualification of the reactor coolant pump (RCP) motor coolers, was combined with the subject report. Our first interim report, for the combined NCRs, was submitted on August 29, 1983. Enclosed is our final report on NCRs WBN NEB 8106 and WBN NEB 8317.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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ENCLOSURE

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
IMPROPER CLASSIFICATION OF ERCW SYSTEM PIPING AND COMPONENTS
NCRs WBN NEB 8106 AND WBN NEB 8317
WBRD-50-390/81-33, WBRD-50-391/81-32
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency WBN NEB 8106

During the design review of the Watts Bar essential raw cooling water (ERCW) system, it was discovered that portions of the ERCW system (equipment coolers, air cooling units, etc.) may not have proper seismic specification. Watts Bar Design Criteria WB-DCR-40-36.1, Revision 0, requires that the components discussed here be classified ANS safety class 2b and be seismic category I or I(L). However, these coolers were incorrectly shown on TVA design drawings 47W845 series as TVA Class G, seismic category I(L). Seismic category I(L) has two levels; one level ensures pressure boundary integrity, the other ensures structural integrity such that component failure will not damage primary safety equipment. Some of these air cooling units serve essential safety-related equipment (safety injection system (SIS) pumps, containment spray system (CCS) pumps, etc.) required for accident mitigation. The designer was incorrect in his determination that TVA class G would be representative of the design requirements. This error also resulted in incorrect information being transmitted to TVA's Division of Construction (CONST).

Safety Implications

Had this condition remained uncorrected, a potential would exist for failure of the air cooling units during a seismic event. Failure of these units would cause overheating of essential safety-related equipment, degrading and/or preventing the performance of its safety function.

Corrective Action

The primary safety-related HVAC equipment was procured under contracts 77K35-83153-1, 77K35-83119-2, 76K35-83230-1, and 76K35-83190. This equipment was not procured to a specific TVA classification (A, B, C, etc.) as had been indicated on the TVA ERCW system flow diagrams.

This equipment was procured to the seismic category I design requirement specified in WBN-DC-40-36.1 which was in effect at the time of purchase and met the highest commercial quality feasible at the time of procurement.

TVA has reviewed the contract files and found sufficient documentation to verify that the equipment meets the requirements of 10 CFR 50 Appendix B and is suitable for use in a TVA safety class C system (which is the TVA equivalent to ANS Safety Class 2b).

The secondary safety-related HVAC equipment was procured under contracts 77K38-821351 and 76K38-83225. This equipment was not procured to a specific TVA classification (A, B, C, etc.) as had been indicated on the TVA ERCW system flow diagrams.

The equipment was procured as seismic category I(L) with pressure boundary design requirements specified in WBN-DC-40-36.1 that were in effect at the time of purchase and met the highest commercial quality feasible at the time of procurement. (This equipment is required to maintain its pressure boundary integrity because of its interface with the ERCW system.)

TVA has determined that the control rod drive mechanism coolers (CRDMC), the lower compartment vent coolers (LCVC), and the upper compartment vent coolers (UCVC) (components located inside containment and purchased on contract 77K38-821351) are not seismically qualified to maintain pressure boundary integrity. TVA has determined there was no quality assurance program in effect on the subject contract to certify that the equipment met the requirements of 10 CFR 50, Appendix B. The equipment does meet the structural integrity requirements of seismic category I(L) components. The existing equipment met the highest commercial quality available at the time of procurement and has been hydrostatically tested at a pressure of 300 lb/in^2g which exceeds the ERCW system hydrostatic test pressure of 200 lb/in^2g. However, the lack of pressure boundary integrity resulting from a seismic event may cause appreciable leakage from the ERCW system not accounted for in the initial design. This condition has been identified by NCR WBN QAB 8203. TVA has evaluated the effects of this condition on the operability of the ERCW system for the time period before manual action can be taken to isolate the affected components and determined the ERCW system will continue to operate satisfactorily, during and after a seismic event. (WBN Units 1 and 2, Interim Time Period (LOCA Phase A) Analysis)

Flow measurement instrumentation in the supply and return lines and valves used for containment isolation (FSAR Figure 9.2.3) would facilitate the detection and isolation of components which have incurred a loss of pressure boundary integrity. In addition, existing level instrumentation in the reactor building sump will detect any increase in the rate of leakage that results from the pressure boundary failure.

The containment is designed such that water can be up to 14 feet deep without affecting the function of any required safety system. In addition, there are two means of detecting a leak. First, the containment floor and equipment drain sump which is designed to detect a 1-gallon per minute leak within an hour. However, this instrumentation is not safety grade (i.e., not 1E). The other means of detecting a leak is the containment floor level detectors which are 1E. They can detect the water level inside the containment from 6 inches to 20 feet.

In the event a small break LOCA (Phase A, Containment Isolation) occurs when the HVAC equipment pressure boundary integrity has failed, containment boundary integrity would be maintained since the ERCW system operating pressure exceeds the maximum containment pressure experienced during a Phase A containment isolation signal. The Phase B containment isolation

signal automatically closes the containment boundary isolation valves in the ERCW system supply and return lines (FSAR Figure 9.2.3). This action automatically isolates the reactor building equipment from the remainder of the ERCW system and ensures the containment boundary integrity and system operability during a LOCA.

The reactor building instrument room water chiller bought on contract 76K38-83225 was seismically qualified in accordance with WB-DC-40-31.13, including pressure boundary integrity of the condenser water system (ERCW water boundary) and water regulating valve (TVA installed in ERCW piping). The pressure boundary integrity of the refrigerant system was waived since these units are not safety-related.

Although these chillers were not specified to be built under a QA program, the detailed specifications required conformance to ASTM, ANSI, ARI, NEMA, AISI, and IEEE (112) industry standards. In addition, the chiller condenser was designed and built for an operating pressure of 150 psig in accordance with ASME Section VIII and is so stamped and certified. The condenser was hydro tested at 225 lb/in^2 in accordance with ASME Section VIII requirements.

The chillers were also built at the same time and in the same shop as equipment from contracts 76K35-83190 (WBN), 76K36-83237 (WBN), and 77K38-821350 (WBN), all of which were built under an approved 10 CFR 50, Appendix B, QA program. TVA conducted source inspection at established hold points for this and all of the above contracts. Also, a QA documentation package including pressure test results for the condenser was shipped with the chillers and is on file. Therefore, it is our conclusion that the units were therefore constructed under sufficient quality control procedures and to sufficient detailed technical requirements (ASME VIII and seismic I(L)) to assure the pressure boundary integrity of the chiller condenser.

TVA is continuing with the closure of engineering change notice (ECN) 3842 and will complete the drawing revisions required to show the correct classification of the HVAC equipment by October 15, 1983. These changes will be documentation only, and will not require construction activity. Also appropriate wording representing changes necessitated by this deficiency will be incorporated in the FSAR revision to be issued by March 1984. Table 3.2-2a will be revised to show the correct ERCW system classifications and section 9.2.1.7 will be revised to refer to table 3.2-2a for the ERCW system classifications.

Action Required to Prevent Recurrence

TVA has reviewed all safety-related piping system drawings to identify all vendor-supplied equipment that is required to meet ANS safety classification (as defined in the FSAR) requirements. To prevent recurrence of this deficiency, a specification revision notice SRN-N3M-868-2 to construction specification N3M-868, which defines system classifications, has been issued. TVA drawings 47B21-1 and 47B21-1A (mechanical piping systems classification) have been issued to define "vendor-supplied safety-related equipment packages."

Also, a revision to design criteria WB-DC-40-36 to show the correct ERCW system classifications will be issued by December 1983. TVA has implemented an on-going training program in which the designers and checkers are trained in the applicable engineering procedures concerning design responsibilities and control of design drawings. As engineering procedures are revised, the designers and checkers are retrained to the current revision of that procedure. This training program and the revisions to the design documents referenced above will prevent recurrence of this deficiency.

Description of Deficiency WBN NEB 8317

TVA has conducted a design review of vendor-supplied equipment in TVA class A, B, C, and D systems (ASME Section III, Class 1, 2, and 3). This review is a result of the action to prevent recurrence implemented for deficiency WBN SWP 8219 and described in the action to prevent recurrence section of deficiency WBN NEB 8106. It has been discovered that the RCP motor coolers, procured under contract 71C62-54114-1, which interface with the TVA class C portion of the ERCW system were not manufactured to ASME Section III code requirements. The coolers are commercial grade with no seismic design, or 10 CFR 50 Appendix B quality assurance requirements.

This condition developed because of an incomplete design review of equipment associated with the Reactor Coolant Pump. The system designer mistakenly assumed the coolers would be compatible with ASME Section III Class 3 requirements.

Safety Implications

Had this condition remained uncorrected, a potential would exist for failure of the air cooling units during a seismic event. Failure of these units would cause overheating of essential safety-related equipment, degrading and/or preventing the performance of its safety function.

Corrective Action

This deficiency is similar to the deficiencies described in WBN NEB 8106 involving the control rod drive mechanism coolers (CRDMC), the lower containment vent coolers (LCVC), and the upper containment vent coolers (UCVC). Refer to the Corrective Action section for deficiency WBN NEB 8106 for the evaluation of the effects of having a non-ASME code component interfacing with the ERCW system inside the Reactor Building containment. The evaluation performed for deficiency WBN NEB 8106 included the RCP motor coolers.

TVA is revising the appropriate drawings to show the correct classification of the Reactor Coolant Pump Motor Coolers under ECN 4264. The drawing revisions will be complete by November 15, 1983. These changes will be documentation only, and will not require construction activity.

The general training activities described in deficiency WBN NEB 8106, will prevent recurrence of this deficiency. FSAR table 3.2-2 will be revised to show the correct RCP motor cooler classification.