TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

April 24, 1981

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U.S. NUCLEAR REGULATORY COMMISSION

Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Region II - Suite 3100
101 Marietta Street
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - DEFICIENT KEROTEST Y-TYPE GLOBE VALVES - NCR 2501R - FINAL REPORT

The subject condition was initially reported to NRC-OIE Inspector F. Cantrell on August 19, 1980, in accordance with 10 CFR 50.55(e). Interim reports were submitted on September 18 and November 7, 1980, and January 21, 1981. Enclosed is our final report.

If you have any questions, please get in touch with D. L. Lambert at FTS 857-2581.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Enclosure
cc: Mr. Victor Stello, 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
DEFICIENT KEROTEST Y-TYPE GLOBE VALVES
NCR 2501R
10 CFR 50.55(e)
FINAL REPORT

Description of the Deficiency

The Tennessee Valley Authority (TVA) has installed at its Watts Bar Nuclear Plant (WBN) several hundred 3/4", 1", and 2" valves manufactured by Kerotest Manufacturing Corporation (Kerotest) of Pittsburgh, Pennsylvania. These valves function in both safety and nonsafety-related systems as isolation, root, vent, and throttle valves. Due to the fluids which these systems contain: air, nitrogen, CO_2, and water, the valves are "hard seat" valves.

During testing of the systems, construction employees at WBN experienced extensive seat leakage across these "hard seat" valves. The leakage was the result of foreign material in the lines being trapped between the seat and hardfaced disc. In the process of disassembling these valves to remove the foreign material and inspect the body and disc seats for scoring, construction employees noted, on a majority of the valves, some buildup of corrosion above the diaphragm.

As a result of the corrosion identified on the installed valves, four unused Kerotest valves were removed from dry warehouse storage and disassembled. The inspection revealed a similar corrosion problem with these valves. Other conditions were identified, including varying amounts of moisture throughout the valve interior, moisture-saturated packing, and diaphragms which failed to flex back to their normal positions. To document the deficiencies identified as a result of the inspection, NRC 2501R was written for the four valves inspected.

TVA immediately communicated with Kerotest concerning the problems identified during the inspection of the valves. It was determined that after hydrotesting the valves at the Kerotest plant, the saturated packing was not replaced. The excess water ultimately condensed on the diaphragms and bearing assemblies causing corrosion. This problem was unforeseen and the replacement of the saturated packing was not addressed in either Kerotest's shop procedures or TVA's specifications. As stated above, NCR 2501R identifies only the four valves inspected and the associated deficiencies. However, TVA believes that the corrosion problem is generic to all Kerotest valves installed at WBN.

The flexed diaphragms have been identified by Kerotest as a normal occurrence when a valve is disassembled in the closed or partially closed position. TVA is evaluating this information and will disassemble additional valves to reach its own conclusions (see Corrective Action).

Safety Implications

While some of the subject Kerotest valves are installed in essential safety-related systems: CVCS, SIS, RHR, UHI, RCS, and CSS, operation of the valves is not required for the safe shutdown of the plant during a loss of coolant accident. As a result, TVA could identify no valves that perform a safety function. However, to document this, a failure effect analysis was performed. The analysis identified no detrimental effect on plant safety as a result of the failure of any of these valves.

TVA has reviewed its other facilities for generic applicability of the corrosion problem. It has been established that valves procured from Kerotest for the Sequoyah (SQN) and Bellefonte (BLN) Nuclear Plants were not required to have the packing replaced after hydrotesting. Verbal discussions with employees at SQN indicated that during normal disassembly for maintenance, they have identified no Kerotest valves with what they consider excessive corrosion. However, TVA will institute a program at BLN to inspect Kerotest valves and issue NCR's if required. TVA is continuing its investigation at Browns Ferry and Sequoyah Nuclear Plant. For TVA's remaining plants, all valves procured by TVA for the balance-of-plant are required to have the packing replaced after hydrotesting. This is specified in the specification. TVA is investigating applicability of those valves supplied by the Nuclear Steam Supply System vendor.

TVA does not consider this condition to represent a breakdown in a portion of the quality assurance program of the plant or the vendor. The valves were inspected prior to shipment from Kerotest and found free of corrosion. TVA had no reason to reinspect the valves until the corrosion problem was identified.

Corrective Action

As stated, TVA does not consider the valves to perform a safety function; however we do believe that the corrosion identified with the valves could result in a maintenance problem during the life of the plant. Therefore, TVA has instituted a maintenance program to dismantle, inspect, and replace parts as required for those valves installed at WBN. Priority has been assigned to each valve with respect to its position during plant operation, system it is located in, etc. Those valves which are installed in systems that are related to the plant's operational safety will be inspected and refurbished before respective unit fuel loading. Those valves which are installed in systems that are not related to the plant's operational safety will be inspected and refurbished on a priority basis, with as many as possible being inspected and refurbished before fuel loading and the remainder after fuel loading. Due to location and access limitation, some of the valves in systems not related to the plant's operational safety may not be inspected. However, this will require proper evaluation. Those valves not presently installed will be inspected and refurbished before installation in the plant.

In addition, during the maintenance program, a sufficient number of valves will be disassembled in both the open and closed position to establish if the flexed diaphragm is a natural occurrence for a valve disassembled in the closed position. Any discrepancy will be noted and brought to the attention of the Division of Engineering Design.

TVA has also instructed employees involved in the procurement of Kerotest valves to specify in the specification that the wet packing must be removed after hydrotesting, the valve thoroughly dried, and a new packing installed. This should preclude recurrence of a similar problem.