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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

March 23, 1989

Docket Nos. 50-327/328

Mr. Oliver D. Kingsley, Jr.  
Senior Vice President, Nuclear Power  
Tennessee Valley Authority  
6N 38A Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

Dear Mr. Kingsley:

SUBJECT: RELIEF FROM ASME BOILER AND PRESSURE VESSEL CODE, SECTION XI,  
INSERVICE TESTING PROGRAM - BORIC ACID TRANSFER PUMP FLOW RATE  
MEASUREMENT (TAC R00479/R00480) - SEQUOYAH NUCLEAR PLANT,  
UNITS 1 AND 2.

By letters dated October 3, 1988 and January 31, 1989, the Tennessee Valley Authority (TVA) submitted a request for relief, for Sequoyah, Unit 2 from certain American Society for Mechanical Engineers (ASME) Boiler and Pressure Code, Section XI, testing requirements. This request was for interim relief from a requirement contained in the staff's Safety Evaluation (SE) dated April 5, 1985, to be measuring flow during quarterly pump performance tests for the boric acid transfer pumps (BATP) by the Unit 2 Cycle 3 refueling outage. This request is for an extension of the implementation date for this requirement to the Unit 2 Cycle 4 refueling outage. The Unit 2 Cycle 4 refueling outage is scheduled for the Fall of 1990.

Interim relief from this requirement has been granted for Unit 1, by the SER dated April 5, 1985, until the next inservice testing program upgrade. TVA stated that the program upgrade for Unit 1 is scheduled for 1993; however, TVA also stated it plans to implement the Code requirements on Unit 1 in the Unit 1 Cycle 4 refueling outage scheduled for Spring 1990.

The staff has reviewed the request for interim relief for Unit 2 and finds it acceptable. The basis for our conclusion is provided in the enclosed staff SE. The staff concludes that the Code testing requirements are impractical to perform on the BATP until the Unit 2 Cycle 4 refueling outage and the proposed alternative to the requirement will provide an acceptable level of quality and safety in the interim. The staff also concludes that granting this relief where the Code requirements are impractical to perform (1) is authorized by law and (2) will not endanger life or property, or the common defense and security and is in the public interest considering the burden that could result upon TVA if the Code requirements were imposed immediately upon Unit 2. Accordingly, pursuant to 10 CFR 50.55a(g)(6)(i) of the Commission's regulations, TVA is granted the requested interim relief until the Unit 2 Cycle 4 refueling outage, as

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documented in the enclosed staff SE, from the Code test requirements for the B ATP. This relief is granted on the condition that TVA fulfills the commitments on compensatory measures set forth in its letter of January 31, 1989. These commitments are discussed in the enclosed SE.

Sincerely,

Original signed by

Suzanne C. Black, Assistant Director  
for Projects  
TVA Projects Division  
Office of Nuclear Reactor Regulation

Enclosure:  
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Mr. Oliver D. Kingsley, Jr.

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Sequoyah Nuclear Plant

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NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

ENCLOSURE

SAFETY EVALUATION REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PUMP AND VALVE INSERVICE TESTING PROGRAM

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-328

1.0 INTRODUCTION

Section 50.55a "Codes and Standards," of 10 CFR Part 50 requires, in part, that certain safety-related pumps and valves meet the requirements of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (hereafter "the Code"). In order to meet the requirements of this regulation, the Tennessee Valley Authority (TVA) has submitted to the NRC its first ten-year Inservice Testing (IST) program on pumps and valves for the Sequoyah Nuclear Plant (SQN), Units 1 and 2. The staff issued Safety Evaluation Reports (SER) concerning the SQN IST program on April 5, 1985; October 23, 1987; January 19, 1988; March 14, 1988 (Unit 2 only), August 18, 1988 (Unit 1 only) and September 15, 1988. This SER addresses one relief request made in submittals dated October 3, 1988 and January 31, 1989.

Regulation 10 CFR 50.55a(g)(6)(i) authorizes the Commission to grant relief from these requirements upon making the necessary findings. This SER contains NRC staff's findings with respect to granting or not granting relief submitted as part of TVA's IST program.

The evaluation below is based on the Technical Evaluation Report (TER) written by the staff's contractor, Oak Ridge National Laboratory. The staff has reviewed the TER Number ORNL/NRC/LTR-89/4 dated February 17, 1989 and agrees with the conclusions of the contractor.

2.0 EVALUATION

This SER addresses a relief request (for Unit 2 only) on the Boric Acid Transfer Pump (BATP) to measure the flow rate using a rate or quantity meter installed in the pump circuit. By letter dated April 5, 1985, in which the staff issued its SER on the SQN IST program for pumps and valves, TVA was granted a similar relief request on SQN, Unit 1.

Code Requirement - Article IWP-4600 of Section XI of the ASME Code requires that, for pump tests, the pump flow rate shall be measured "using a rate or quantity meter installed in the pump circuit."

Relief Request - TVA has requested interim relief from the requirements of IWP-4600 to measure the flow rate of the SQN BATPs using a rate or quantity meter installed in the pump circuit.

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TVA's Basis for Requesting Relief - The current plant configuration contains only one flow measuring instrument in the boric acid system. This device is a flow rotameter with an accuracy of  $\pm 5$  to  $\pm 10$  percent of full scale. The flow meter is not designed to be removed from the piping, and no means exist to calibrate the meter in place. Consequently, the existing flow meter does not provide consistent data of sufficient accuracy to detect degradation in pump performance. TVA considers this option to be impractical.

The use of external flow measurement has been investigated. The boric acid system is heat traced to prevent solidification of boron in the piping. Two layers of heat tracing cables and insulation preclude the use of external flow measuring devices such as ultrasonics. The installation of a permanently mounted ultrasonic flow measurement device on the heat-traced piping and re-routing of the heat trace cables was not practical in this case.

An in-line flow orifice and test flange arrangement was considered. Because of the high concentration of boric acid in this system, a modification of the system to install a new flow measurement device would not provide the accuracy needed to detect pump degradation. TVA experience with solidification of boron in instrument sensing lines and plating of boron on piping inner walls indicates that the use of a flow measuring orifice or flow rotameter would be difficult, if not impossible, to maintain in an accurate condition.

TVA, therefore, plans to make the necessary modifications to the Boric Acid System to permit measurement of pump flow in accordance with the ASME Code. However, because of the magnitude of the task (selecting a suitable flow measurement device, procurement, engineering analysis, and installation), the completion of the modification would extend beyond the current Unit 2 Cycle 3 refueling outage. If TVA had to complete this modification before the restart of Unit 2 from the current Cycle 3 refueling outage, this modification would be the critical path for restart and it would delay restart of the unit from the outage. TVA is requesting interim relief from implementing the Code requirement on Unit 2 until the Unit 2 Cycle 4 refueling outage. TVA was granted interim relief to make the same modification to Unit 1 by the next IST program outage as documented in a letter from T. Novak (NRC) to H. Parris (TVA) dated April 5, 1985. In its letter dated January 31, 1989, TVA stated that it plans to make this modification to Unit 1 in the Unit 1 Cycle 4 refueling outage. This outage is scheduled for the spring of 1990.

During Unit 2 Cycle 4 operation, TVA proposes to perform pump testing by recirculating to the boric acid tank through the normal recirculation flow path with all valves in the full open position to provide a constant system resistance. By maintaining the system resistance constant, any degradation in pump performance will produce a corresponding change in both delivered flow and developed head. Based on the pump manufacturer's head-versus-capacity curve, significant performance degradation would be detectable by a measured drop in pump developed head. The pump suction and discharge pressures will be measured using test gauges, which will have greater sensitivity than existing plant instruments. The pump bearing vibration readings will be recorded, which will also provide indication of pump degradation.

The BATPs are required by plant Technical Specifications (TS) to be capable of delivering ten gallons per minute (gpm) to the reactor coolant system by way of the charging pumps. This requirement is provided for reactivity control to ensure that shutdown margin is maintained within the required TS limits.

Each BATP is a dual-speed pump designed to deliver 37.5 gpm in slow speed and 75 gpm in fast speed. The pumps normally operate at slow speed to recirculate boric acid between the boric acid tanks and boron injection tank.

The pumps will automatically switch to fast speed for automatic makeup to the volume control tank or the operator can manually switch them to fast speed from the control room, if desired. The design flow rates at either speed provide a large margin over the 10 gpm TS-required flow rate. Any significant change in pump performance that would reduce this flow rate margin would be detectable through changes in pump differential pressure and/or bearing vibration measurements.

For these reasons, TVA is requesting interim relief from the Code requirement and requests acceptance of the proposed alternate test method. An immediate plant modification to install a flow instrument that is compatible with the boron heat tracing system is impractical. The hydraulic characteristics of the BATPs cannot be determined without measurement of pump flow rate in accordance with the ASME Code. Since acceptable flow rate instrumentation does not presently exist in the pump recirculation lines, pump flow rate cannot be measured in accordance with the requirements of the Code for these pumps. Therefore, TVA has committed to make the necessary plant modifications during the Unit 2 Cycle 4 refueling outage to permit flow rate measurement for these pumps in accordance with the ASME Code. This outage is scheduled for the Fall of 1990

TVA's proposal to perform BATP testing by recirculating to the boric acid tank through the normal recirculation flow path with all valves in the full open position to provide a constant system resistance is judged to be adequate on an interim basis to demonstrate pump operability. Although the proposed measurement of pump differential pressure and vibration parameters without simultaneous measurement of flow rate through the pumps is not sufficient to establish the hydraulic performance of the pumps, it is acceptable on an interim basis. The measurement of pump vibration amplitude is a Code requirement separate from the measurement of pump hydraulic characteristics and does not provide a basis for relief from flow rate measurement. The hydraulic characteristics of the pump could degrade independent of vibration amplitude levels.

This proposal will provide an acceptable level of quality and safety because degradation of pumps' performance can be measured and each BATP can deliver far more than the minimum flow rate requirements for the pumps in the TS.

### 3.0 CONCLUSION

Based on the staff review of the above relief request for the Sequoyah Nuclear Plant, Unit 2, the staff concludes that TVA's request for relief from certain specific requirements of Section XI of the ASME Code until the Unit 2 Cycle 4 refueling outage is acceptable. The staff concludes that the Code testing requirements are impractical to perform and the proposed alternative to the described requirement will provide an acceptable level of quality and safety until the modifications are made in the Unit 2 Cycle 4 refueling outage. TVA is required to comply with the IST program defined above in accordance with the relief granted as discussed above.

Pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted from the above testing requirement which the staff has determined to be impractical to perform until the Unit 2 Cycle 4 refueling outage and which will not endanger life or property, or the common defense and security. The staff has also concluded that granting relief is in the public interest considering the undue burden that could result if the requirements were immediately imposed on the facility.

Review of the overall IST program has been completed by the staff. Any additional program changes such as revisions or additional relief requests or deletion of any components from the IST program shall be submitted for staff review and shall not be implemented prior to approval by the staff.

Principal Contributor: J. Lombardo

Dated: March 23, 1989