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OCT 03 1988

U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555

Gentlemen:

In the Matter of	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

SEQUOYAH NUCLEAR PLANT (SQN) - RELIEF REQUEST FROM AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE, SECTION XI, REGARDING BORIC ACID TRANSFER PUMP (BATP) FLOW MEASUREMENT

References: 1. TVA letter to NRC dated November 4, 1982

2. NRC letter to TVA dated April 5, 1985, "Safety Evaluation Report on Sequoyah Inservice Test Program for Pumps and Valves (IST)"

3. TVA letter to NRC dated August 16, 1985

By reference 1, TVA requested relief from the ASME code requirement to measure flow rate from SQN's BATPs during quarterly pump performance tests. The basis for relief was due to flow indication not being available for these pumps. NRC, by reference 2, transmitted their safety evaluation report (SER) for SQN's in-service test (IST) program. Paragraph 2.3.2.4 of this SER contained a denial of TVA's relief request. Because modifications were considered necessary in order to meet the code requirement, interim relief was granted for unit 2 until the unit 2 cycle 3 refueling outage. Interim relief was granted for unit 1 until the 10-year update of the SQN unit 1 IST program.

TVA, by reference 3, stated that an alternate lineup was being examined for the BATPs, which would allow alignment through existing plant flow instrumentation. TVA examined the alternate system configuration and other types of flow instrumentation to determine a method of complying with the SER determination. Under the existing system configuration and flow instrumentation constraints, TVA is unable to accurately measure the flow rate from these pumps. TVA requests that, in consideration of the revised justification presented in enclosure 1, the subject relief be reconsidered.

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Please direct questions concerning this issue to D. V. Goodin at (615) 870-7734.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

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ENCLOSURE 1

DESCRIPTION OF RELIEF REQUEST

The SQN pump and valve in-service test program is contained in the SQN Final Safety Analysis Report (FSAR), section 6.8, appendix 6.8a. Table A of appendix 6.8a lists those pumps that are tested to meet the ASME Section XI requirements. Each code-required pump parameter is given at the top of table A. Where conditions exist that preclude the measurement of a specific parameter, a note is provided to explain the basis for relief. Note 2 served as the relief request for the BATPs when SQN's program was submitted to NRC in November 1982. Note 2 reads as follows:

> Flow rate is not required since this pump is tested in a fixed resistance pathway. Relief is requested from the 1977 Edition through Summer 1978 Addenda for Unit 2 since flow indication is not available.

It is important to note that the subject relief request was only applicable to unit 2, which is under the 1977/1978 Edition of the Section XI Code. This edition requires measurement of pump flow rate, whereas the 1974 Edition (unit 1) does not, provided the pump is operated in a fixed resistance system.

NRC evaluated TVA's basis for relief in section 2.3.2.3 of the April 5, 1985 SER. The staff's evaluations and conclusions are as follows:

> Evaluation. Given the present system configurations, pump flow rate cannot be measured in accordance with the requirements of Section XI for these pumps. However, the licensee may not be able to adequately monitor the hydraulic characteristics of these pumps without measurement of pump flow rate. The current NRC staff position is that the licensee should measure both flow rate and differential pressure in accordance with the requirements of current editions of Section XI. The 1974 edition of Section XI is considered to be incorrect in this regard and later editions properly require measurement of both parameters. Therefore, relief should not be granted from the Section XI requirement of measuring flow rate for these pumps. Further, when Sequoyah unit 1 is due for Section XI update of its IST program*, the staff will require measurement of both flow rate and differential pressure at Unit 1.
>
> Conclusion. The licensee must measure pump flow rate in accordance with the requirements of Section XI for Sequoyah Unit 2. The licensee should also consider future modifications to Unit 1 which will become necessary when the IST for Unit 1 is upgraded*. The licensee is required to make these modifications prior to startup at the end of the next refueling outage.**

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*The 10-year update for the unit 1 IST program is currently projected for 1993.

**Unit 2 cycle 3 refueling outage, which is projected for January 1989.

> For the balance of the period of the current fuel cycle, interim relief is granted to test the pumps as proposed by the licensee. The pumps will be monitored on a quarterly basis for vibrations, amplitude, inlet pressure and differential pressure. Requiring the licensee to make these modifications for Unit 2 prior to the next refueling outage would impose unnecessary hardsnip on the licensee without compensating increase in the level of safety. Taking into account the inservice tests that will be performed as well as the relatively short operational time that the pumps have been in service to date, it is concluded that this interim relief will not endanger life or property or the common defense and security of the public.

Following receipt of the staff's evaluation, TVA investigated three options for measuring flow from the BATPs. These options included: (1) ultrasonics; (2) an alternate system alignment to allow the use of an existing plant-installed flow device (rotometer); and (3) a modification to install a flow orifice within the pump test circuit. The following evaluation discusses the results of TVA's investigation into each of these options.

(1) Ultrasonics

TVA evaluated the use of ultrasonics as a means of measuring flow from the BATPs. The use of ultrasonics requires mounting a set of transducers to the outer pipe wall. The boric acid system at SQN is completely lined with two layers of heat tracing cables surrounded by wrapped fiberglass insulation that ensure the temperature of the boric acid solution remains above the technical specification (TS) limit of 145 degrees Fahrenheit (F). To facilitate the use of ultrasonics would require removal of the insulation and heat tracing cables every quarter for testing one BATP (SQN has two pumps per unit). This would place an unnecessary burden on the maintenance staff for frequent removal of the insulation and heat tracing. In addition, the plant would be required to enter a limiting condition of operation (LCO) if the temperature of the boric acid solution drops below the TS limit. For these reasons, TVA considers the use of ultrasonics to be impractical. Note that this conclusion was provided in enclosure 2, section 2.3.2, of TVA's August 16, 1985 response.

(2) Rotometer

TVA investigated an alternate lineup for the boric acid pump test that would align existing plant flow instrumentation. The only flow instrumentation within the boric acid system is a flow rotometer with an accuracy of ±5 percent of full scale. This flowmeter is not designed to be removed from the system piping, and no means exist to calibrate the meter in place. This constraint precludes periodic calibration to verify rotometer accuracy. Consequently, the rotometer has not demonstrated sufficient accuracy to provide meaningful data for consistent trending to determine degradation in pump performance. TVA thereby considers this option to be impractical.

(3) Flow Orifice

TVA evaluated the installation of a flow orifice within the pump test circuit. Experience has shown that this type of flow measuring device would be difficult, if not impossible, to maintain in an accurate condition. The high concentration of boric acid requires the flow orifice to be thoroughly flushed after each use to preclude solidification of boron on the orifice plates and instrument sense lines. Flushing the boric acid from the system would require a modification to install a heat-traced collection tank to allow storage of the boric acid during the flushing process. Frequent flushing of the boric acid system would create additional operational burdens for maintaining a borated water source. SQN TSs 3.1.2.5 and 3.1.2.6 require that minimum volume, concentration, and temperature of the boric acid storage system be maintained while in modes 1 through 6. Based on the above evaluation, TVA concludes that the installation of a flow orifice, for the purpose of measuring BATP flow, is impractical and would result in undue hardship.

In light of TVA's examination of the three options above, TVA requests that the subject relief be reconsidered by the NRC staff. Attachment A of this enclosure provides TVA's revised basis regarding the request for relief and the proposed alternate testing.

ATTACHMENT A

I. BATPs

A. Code Requirements — Article IWP-3100 of Section XI of the ASME Code requires that, for Section XI pump tests, the pump flow rate be measured.

B. Relief Request — TVA requests relief from the requirements of IWP-3110 to measure the flow rate during testing of the SQN BATPs. TVA proposes to test the BATPs in a constant resistance flow path and to measure the other hydraulic and vibration parameters to detect pump degradation.

C. Basis for Relief — The current plant configuration contains only one flow measuring instrument in the boric acid system. This flow device is a flow rotometer with an accuracy of ±5 to ±10 percent of full scale. This flow meter is not designed to be removed from the system piping, and no means exist to calibrate the meter in place. Therefore, the existing flow meter does not provide meaningful data of sufficient accuracy with which to detect degradation in pump performance.

The use of external flow measurement has been investigated. The boric acid system is required to be heat traced to prevent the solidification of boron in the piping. The two layers of heat tracing cables and the insulation covering preclude the use of external flow measuring devices such as ultrasonics.

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 the solidification of boron in instrument sensing lines and the plating of boron on the inner walls of the piping indicates that any flow measuring orifice or flow rotometer would be difficult, if not impossible, to maintain in an accurate condition.

D. Alternate Testing

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

E. Conclusion

The BATPs (two per unit - A train/B train) are required by TSs to be capable of delivering 10 gallons per minute (gal/min) to the reactor coolant system by 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 (fast speed/slow speed) that, by design, will deliver 37.5 gal/min on slow speed and 75 gal/min on fast speed. Normally these pumps operate at slow speed to recirculate the boric acid between the boric acid tanks and boron injection tank. These 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 gal/min 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 finds the code requirement to be impractical and the proposed alternate test method acceptable. In conclusion, a plant modification to install a flow instrument that is compatible with the boron heat tracing system, if one exists, would result in an undue hardship without a commensurate increase in the level of quality or safety.