TENNESSEE VALLEY AUTHORITY

1101 Market Street, Chattanooga, Tennessee 37402

CNL-21-059

May 28, 2021

10 CFR 50.55a

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Sequoyah Nuclear Plant, Unit 1
Renewed Facility Operating License No. DPR-77
NRC Docket No. 50-327

Subject: Sequoyah Nuclear Plant (SQN), Unit 1, American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternative RP-10

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a, "Codes and Standards," paragraphs (z)(2), Tennessee Valley Authority (TVA) requests an alternative to the inservice testing requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code, Section ISTB-3310, “Effect of Pump Replacement, Repair, and Maintenance on Reference Values.” This alternative request applies to testing of the Motor Driven Auxiliary Feedwater (MDAFW) Pump 1B-B for the Sequoyah Nuclear Plant (SQN), Unit 1 (alternative request RP-10).

Due to a fire in inboard pump bearing on MDAFW Pump 1B-B, while operating in support of a forced outage with SQN Unit 1 in Mode 3, replacement of the pump is necessary. The ASME OM Code ISTB-3310 requires a preservice test to be performed following pump replacement to establish new reference values and acceptance criteria before declaring the pump operable. As discussed in the enclosure to this letter, compliance with ISTB-3310 would cause a hardship or unusual difficulty without a compensating increase in the level of quality or safety. Therefore, TVA is submitting this one-time alternative request in accordance with 10 CFR 50.55a(z)(2). The enclosure to this letter describes the proposed alternative and the basis for use.

TVA requests verbal approval of this alternative request within 24 hours from the time and date of this submittal in order to support the timeline for restoring the MDAFW Pump 1B-B to operable status prior to completion of the 72-hour completion time for SQN Unit 1 TS 3.7.5 Condition B.

There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Kimberly D. Hulvey, Senior Manager, Fleet Licensing, at (423) 751-3275.

Respectfully,

James T. Polickoski
Director, Nuclear Regulatory Affairs

Enclosure:

American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternative RP-10

cc (w/Enclosure):

NRC Regional Administrator - Region II
NRC Senior Resident Inspector - Sequoyah Nuclear Plant
NRC Project Manager - Sequoyah Nuclear Plant

Enclosure

American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternative RP-10

Motor Driven Auxiliary Feedwater Pump 1B-B Alternative Test

I. American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code Components Affected

Site/Unit	Pump ID	Pump Description	Pump Type	Code Class	OM Group
Sequoyah Nuclear Plant (SQN) Unit 1	SQN-1-PMP-003-0128	Motor Driven Auxiliary Feedwater (MDAFW) Pump 1B-B	Centrifugal-Horizontal, Fixed Speed	3	A

II. ASME Code Edition and Addenda

SQN Unit 1
Fourth ten-year interval - September 1, 2016 to June 30, 2026
ASME OM Code 2004 Edition through 2006 Addenda

III. Applicable Code Requirement

ISTB-3310, "Effect of Pump Replacement, Repair, and Maintenance on Reference Values," states:

> *"When a reference value or set of values may have been affected by repair, replacement, or routine servicing of a pump, a new reference value or set of values shall be determined in accordance with ISTB-3300, or the previous value reconfirmed by a comprehensive or Group A test run before declaring the pump operable. The Owner shall determine whether the requirements of ISTB-3100, to reestablish reference values, apply. Deviations between the previous and new set of reference values shall be evaluated, and verification that the new values represent acceptable pump operation shall be placed in the record of tests (see ISTB-9000)."*

IV. Reason for Request

On May 24, 2021, at 0915 Eastern Daylight Time (EDT), SQN Unit 1 experienced a reactor trip due to a control rod failure, which resulted in SQN Unit 1 entering Mode 3. The MDAFW Pump 1B-B started coincident with the reactor trip. At 1301 EDT on May 27, 2021, flames were observed coming out of the inboard pump bearing of the MDAFW Pump 1B-B. The pump was immediately secured and the flames were extinguished. SQN Unit 1 entered Technical Specification (TS) 3.7.5, "Auxiliary Feedwater (AFW) System," Condition B, which requires that with one AFW train inoperable in Mode 1, 2, or 3, for reasons other than Condition A, then an AFW train must be restored to operable status within 72 hours. The 72-hour completion time expires at 1301 EDT on May 30, 2021. The cause of the failure of the MDAFW Pump 1B-B is still under investigation, but initial troubleshooting indicates an inboard bearing failure.

The MDAFW Pump 1B-B is being replaced and Owner review of ISTB-3310 determined that ISTB-3100 is applicable and a preservice test is required to develop a pump curve and establish new reference values and acceptance criteria before declaring the MDAFW Pump 1B-B operable. In accordance with SQN Unit 1 TS Limiting Condition for Operation (LCO) 3.0.4, MDAFW Pump 1B-B must be restored to operable status before the unit can transition from Mode 3 to a higher Mode. Therefore, the preservice test must be performed in Mode 3. The following information justifies why performing the preservice test in Mode 3 poses a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Currently, SQN Unit 1 is in Mode 3 with Tavg of 547.5 degrees Fahrenheit (°F), pressurizer level of 25 percent (%), and AFW flow of 100-125 gallons per minute (gpm) to maintain stable plant conditions due to low decay heat levels.

In order to perform the MDAFW Pump 1B-B pre-service test, flow from the MDAFW Pump 1B-B must be stabilized between 480 and 490 gpm for two minutes prior to data collection, then flow must be lowered to four other data point locations between full flow, and minimum flow for the pump. The 1B-B pump provides flow to Steam Generators (SG) 3 and 4 only. Cycling of flow to the SG is not desirable due to potential stresses placed on the SG nozzles. With such high flows required for extended durations for data collection on SG 3 and 4, flow must be isolated to SG 1 and 2 to provide sufficient time for the required data collection. Given that Unit 1 is in Mode 3, the SGs would be thermally cycled as the operators would most likely be required to repeatedly terminate the test to prevent loss of pressurizer level (as discussed below) and to maintain required SG levels below feedwater isolation setpoint of 81%.

In Mode 3 above permissive P-11, the pressurizer level is maintained below 30% due to inadvertent safety injection termination criteria requirements. The high AFW flows required by the preservice test could potentially cause letdown isolations on low pressurizer level as well as reactor coolant system (RCS) Tavg temperature drops. Letdown isolation will cause a rise in pressurizer level until operators can restore letdown potentially challenging the 30% level requirement.

Conversely, performance in Mode 1 allows sufficient reactor heat and main steam flow to support main feedwater flow. Flow from the MDAFW Pump is marginal in comparison to the flow volume from main feedwater. The SG level change from inducing full flow from one MDAFW Pump is controlled automatically by the main feed water regulating valves and main feed pump (MFP) speed controller (i.e., does not require operator action). The operator challenges of manual control of plant parameters are not necessary in Mode 1 due to the availability of the MFPs.

If the MDAFW Pump 1B-B is not able to be restored to operable status within the 72-hour Completion Time of SQN Unit 1 TS 3.7.5, Condition B, then SQN Unit 1 TS 3.7.5, Condition D would require the unit to transition from Mode 3 to Mode 4 within 18 hours. Transition to Mode 4 is not a desirable operation from a plant transient aspect for the following reasons.

Maneuvering the plant from Mode 3 to lower modes of operation introduces additional shutdown risks, infrequent field and control room operations, and an increase in the volume of critical parameter monitoring. Cycling plant temperature and pressure from Mode 3 to Mode 4, and subsequently back to Mode 3 would introduce the potential to challenge both primary and secondary systems, such as safety valves simmering.

Performing this test in the lower mode of Mode 4 would present the same challenges in plant control during the test, but would actually result in more risk to the plant as it would first require

the operators to maneuver the plant to Mode 4, perform the test, and then maneuver back to Mode 3 normal operating pressure and temperature to resume plant startup.

Based on simulator data, the preservice test could be performed in Mode 3; however, this would place the unit in a hardship with management of critical parameters of RCS temperature, SG level, and pressurizer level. Pressurizer pressure, pressurizer level, and SG levels have pre-established parameters that must be maintained outside of normal ranges to allow for full flow testing impacts. In addition, these parameters must be controlled manually because automatic controllers cannot maintain these parameters in band during test conditions. Even with ideal initial starting conditions and manual operator control, the test cannot be completed in its entirety without halting approximately every 20 minutes due to reaching maximum SG levels (70%) and requires approximately 100 minutes to drain back to initial conditions. There are five pump curve data points to be obtained during the full flow test. This risk cannot be eliminated and could only be mitigated by establishing clear abort criteria and performing just in time training.

Based on the above rationale, compliance with ISTB-3100 and ISTB-3310 represents a hardship or unusual difficulty without a compensating increase in the level of quality and safety. Therefore, this request for alternative is being submitted in accordance with 10 CFR 50.55a(z)(2).

V. Proposed Alternative and Basis for Use

Proposed Alternative

Following the replacement of the MDAFWP Pump 1B-B, initial pump operability for compliance with TS LCO 3.7.5 and Surveillance Requirement (SR) 3.7.5.2 will be established by performance of a Group A pump test in Mode 3. The Group A pump test will be performed using the pump minimum flow recirculation path in which pump flow is set, then differential pressure and vibration are measured and compared to acceptance criteria established in accordance with ISTB-3300, ISTB-5121, and Table ISTB-5121-1. This acceptance criteria is truncated if necessary to ensure the pump minimum design limits are met.

The ISTB-3100 and ISTB-3310 required preservice test will be performed in Mode 1 during power ascension up to 95% power level, but no later than ten days from the performance of the Group A test. Testing will be performed in accordance with ISTB-3100, ISTB-3300, ISTB-5110, and Table ISTB-5121-1, as applicable. If the required preservice test is not performed within these timeframes, the unit will enter the required Action Statement of TS 3.7.5 Condition B.

Basis for Use

SQN Unit 1 TS Bases for SR 3.7.5.2 state:

> *"Verifying that each AFW pump's developed head at the flow test point is greater than or equal to the required developed head ensures that AFW pump performance has not degraded during the cycle. Flow and differential head are normal tests of centrifugal pump performance required by the ASME Code (Ref 2). Because it is undesirable to introduce cold AFW into the steam generators while they are operating, this testing is performed on recirculation flow. This test confirms one point on the pump design curve and is indicative of overall performance. Such inservice tests confirm component OPERABILITY, trend performance, and detect incipient failures by indicating abnormal performance. Performance of inservice*

testing discussed in the ASME Code (Ref. 2) (only required at 3 month intervals) satisfies this requirement."

The TS Bases provided above demonstrate the inservice test performed at the recirculation flow point on the pump design curve is adequate to confirm component operability. The TS SR and Bases do not place additional requirements on AFW pumps that have undergone repair, replacement, or routine servicing.

The performance of a Group A pump test is adequate to identify any significant issues resulting from replacement of the MDAFW Pump 1B-B and provides reasonable assurance that the MDAFW Pump 1B-B is capable of performing its safety-related function until plant conditions are stable enough to complete the ISTB-3310 required preservice test.

It should also be noted that the proposed alternative is consistent with recent ASME approved methodology in Section ISTB-3313, "Baseline Test Deferral," of the ASME OM Code 2020 Edition.

VI. Duration of Proposed Alternative

This alternative request is a one-time alternative request until the ISTB-3100 and ISTB-3310 required preservice test is completed for the MDAFW Pump 1B-B following SQN Unit 1 entering Mode 1.

VII. Precedents

- NRC letter to TVA dated August 26, 2019 (ML19227A110) approved a similar alternative request for the turbine driven auxiliary feedwater (TDAFW) pumps for SQN Units 1 and 2, and the Watts Bar Nuclear Plant (WBN), Units 1 and 2. The proposed alternative in Section IV of this alternative request is similar to the proposed alternative approved by the NRC for the TDAFW pumps in lieu of performing the ISTB-3310 required Group A comprehensive, or preservice test.

- A similar alternative (RR-4-12) was also approved by the NRC for Virgil C. Summer Nuclear Station, Unit 1 on April 28, 2017 (ML17088A256 and ML17103A533).