Sequoyah Nuclear Plant (SQN) Unit 1

Pre-submittal Meeting for Inservice Testing (IST) Program Request for Alternative for the Centrifugal Charging Pump 1B-B Testing per ISTB-3310 (RP-12)

July 20, 2022

TVA TENNESSEE VALLEY AUTHORITY

Agenda

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Introduction

- The purpose of the meeting is to provide information for a planned proposed alternative to the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Subsection ISTB-3310 with regards to the SQN Unit 1 Centrifugal Charging Pump (CCP) 1B-B in accordance with 10 CFR 50.55a(z)(2).
- On July 18, 2022, SQN Unit 1 declared the CCP 1B-B inoperable due to reduced pump capacity. Subsequently, on July 18, 2022, at 2230 Eastern Daylight Time (EDT), SQN Unit 1 entered Technical Specification (TS) 3.5.2, “EMERGENCY CORE COOLING SYSTEMS (ECCS),” Condition A, which requires that with one or more ECCS trains inoperable in Modes 1, 2, and 3, then an ECCS train(s) must be restored to operable status within 72 hours. The cause of the failure of the 1B-B CCP is still under investigation, but troubleshooting indicates an issue with the pump rotating element.
- Corrective maintenance requires, as a minimum, replacement of the pump rotating element.
- SQN Unit 1 is currently in Mode 1, operating at 100 percent power.

Introduction (cont'd)

- ASME OM Code ISTB-3310, and Code Case OMN-16, Revision 2, subsection 16-3310 requires a preservice test to be performed following pump replacement to establish new reference values and acceptance criteria before declaring the pump operable. Performing the ISTB-3100 and ISTB-3310 required comprehensive or preservice tests is not possible in Mode 1 and would require a unit shutdown with the reactor vessel head removed to perform these tests.
- TVA is proposing to defer the ISTB-3100, ISTB-3310, and Code Case OMN-16, subsection 16-3310 required tests until the upcoming refueling outage commencing in October 2022 (U1R25).
- The proposed alternative is a one-time alternative request until the ISTB-3100 and ISTB-3310 required comprehensive or preservice test is completed for the CCP 1B-B during U1R25.
- TVA is requesting verbal approval of the proposed alternative request prior to completion of the 72-hour completion time for SQN Unit 1 TS 3.5.2 Condition A (2230 EDT on July 21, 2022).

Applicable Code Requirement

- The code of record for SQN and WBN is the ASME OM Code 2004 Edition through 2006 Addenda.
- ASME OM Code, Subsection 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).”*

Applicable Code Requirement

- ASME OM Code, Code Case OMN-16, Revision 2, subsection 16-3310, “Effect of Pump Replacement, Repair, and Maintenance on Reference Values,” states:

> *“When a reference curve(s) may have been affected by repair, replacement, or routine servicing of a pump, a new reference curve shall be determined in accordance with para. 16-3300, or the previous curve(s) 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 curves, apply. Deviations between the previous and new set of reference curves shall be identified, and verification that the new curves represent acceptable pump operation shall be placed in the record of tests (see section ISTB-9000).”*

Applicable Technical Specification (TS) Requirements

- SQN Unit 1 TS 3.5.2, Condition A requires that with one or more ECCS trains inoperable in Modes 1, 2, and 3, then an ECCS train(s) must be restored to operable status within 72 hours.
- SQN Unit 1 Surveillance Requirement (SR) 3.5.2.4 states “Verify each ECCS pump's developed head at the test flow point is greater than or equal to the required developed head.” The frequency is in accordance with the Surveillance Frequency Control Program.
- No changes are being made to the above TS requirements.

ASME OM Code Components Affected

Site/Unit	Pump ID	Pump Description	Pump Type	Code Class	OM Group
SQN Unit 1	SQN-1-PMP-062-0104	CCP 1B-B	Centrifugal Horizontal, Fixed Speed	2	A

Reason for Request

- Currently, SQN Unit 1 is in Mode 1 operating at 100 percent power. Performing the ISTB-3100 required preservice test is not possible in Mode 1 and would require a unit shutdown with reactor vessel head removed in Mode 6 to perform the test.
- Maneuvering the plant from Mode 1 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 1 to Mode 6, and subsequently back to Mode 1 would introduce the potential to challenge both primary and secondary systems, such as safety valves simmering.
- Performing a mid-cycle outage in July 2022 simply to perform the required comprehensive or preservice tests is not desirable due to high peak electrical load demands and would result in unnecessary plant transients and unnecessary radiological dose to plant personnel.

Reason for Request (cont'd)

- TVA is already in a Conservative Operations Alert (COA) in preparation for high temperatures and record-setting load forecasts that are expected to continue for at least the next eight days, and potentially longer.
- Furthermore, SQN Unit 1 is scheduled to commence a refueling outage in October 2022 (U1R25) at which time the ISTB-3100 required comprehensive or preservice tests would be performed. Therefore, commencing a shutdown of SQN Unit 1 to perform the ISTB-3100 and ISTB-3310 required comprehensive or preservice tests would result in undue increase in risk with no corresponding benefit to public health and safety.
- Compliance with ISTB-3100 and ISTB-3310 under the circumstances previously described 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).
- Proposed alternative is needed to prior to restoring the SQN Unit 1 1B-B CCP to operable status.

Proposed Alternative

1. Following repair of the 1B-B CCP, initial pump operability for compliance with SQN Unit 1 TS LCO 3.5.2 and Surveillance Requirement (SR) 3.5.2.4 will be established by performance of a Group A pump test. The Group A pump test will be performed in accordance with Code Case OMN-16, Revision 2, Use of a Pump Curve for Testing. The reference curve will be established in accordance with OMN 16 subsection 16-3310 for the range of flow rates achievable during Mode 1 operation. Differential pressure, flow rate and vibration shall be determined and compared with the associated reference values from the reference curve. All deviations from the associated reference values shall be compared with the limits given in Table ISTB-5121-1 and corrective action taken as specified in OMN 16 subsection 16-6200. This acceptance criterion is truncated, if necessary, to ensure the pump minimum design limits are met.

2. The ISTB-3310 required comprehensive or preservice test will be performed during U1R25. Testing will be performed in accordance with ISTB-3100, ISTB-3300, ISTB-5110, and Table ISTB-5121-1, as applicable.

3. In accordance with ISTB-3100, the preservice test method is in accordance with ISTB-5110, which requires flow and differential pressure to be measured at a minimum of five points. If practicable, these points shall be from pump minimum flow to at least pump design flow. The Group A reference value for flow and differential pressure will be essentially the same point as the minimum flow and differential pressure used as the minimum flow point for the preservice test. Acceptance criteria will be established in accordance with Table ISTB-5121-1.

Basis for Proposed Alternative

- SQN Unit 1 TS Bases for SR 3.5.2.4 states:

  "Periodic surveillance testing of ECCS pumps to detect gross degradation caused by impeller structural damage or other hydraulic component problems is required by the ASME Code. This type of testing may be accomplished by measuring the pump developed head at only one point of the pump characteristic curve. This verifies both that the measured performance is within an acceptable tolerance of the original pump baseline performance and that the performance at the test flow is greater than or equal to the performance assumed in the plant safety analysis. SRs are specified in the Inservice Testing Program of the ASME Code. The ASME Code provides the activities and Frequencies necessary to satisfy the requirements."

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

Basis for Proposed Alternative (cont'd)

- The performance of SR 3.5.2.4 is adequate to identify any significant issues resulting from a repair, replacement, or routine servicing and provides reasonable assurance the CCP is capable of performing its safety-related function until the performance of the ISTB-3310 required comprehensive or 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.

Duration of Proposed Alternative Precedents

- This alternative request is a one-time alternative request until the ISTB-3100 and ISTB-3310 required comprehensive or preservice test is completed for the CCP 1B-B during U1R25.

Precedents

The following precedents are similar to the proposed alternative request in that they approved deferring the comprehensive or preservice test until suitable plant conditions existed to perform the test.

- NRC letter to TVA dated October 1, 2021 (ML21152A125) approved a similar one-time alternative request for the SQN Unit 1 MDAFW pump 1B-B to perform the preservice test of the 1B-B motor driven auxiliary feedwater pump, required by ISTB-3310, in Mode 1 during power ascension of SQN Unit 1, up to 95 percent power level, but no later than 10 days from the Group A test.
- 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 approved by the NRC for Virgil C. Summer Nuclear Station, Unit 1 on April 28, 2017 (ML17088A256 and ML17103A533).

Schedule for Submittal

- TVA to submit request for alternative to NRC by 1800 hours on July 20, 2022.
- July 21, 2022, telecon with NRC to discuss any NRC comments or questions (if applicable).
- TVA requests NRC verbal approval on July 21, 2022, prior to completion of the 72-hour completion time for SQN Unit 1 TS 3.5.2 Condition A (2230 hours).


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