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# Sequoyah Nuclear Plant and Watts Bar Nuclear Plant

Sequoyah Nuclear Plant (SQN) and Watts Bar Nuclear Plant (WBN)  
Pre-submittal Meeting for Inservice Testing (IST) Program Request for Alternative for the  
Motor Driven Auxiliary Feedwater Pump Testing Following Maintenance During an Outage per  
ISTB-3310

April 14, 2022

# Agenda

- Introduction
- Applicable Code Requirement
- Applicable Technical Specification (TS) Requirements
- Background
- ASME OM Code Components Affected
- Reason for Request
- Proposed Alternative
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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 and WBN motor driven auxiliary feedwater pump (MDAFWP) in accordance with 10 CFR 50.55a(z)(2).
- This alternative request is similar to a previous Nuclear Regulatory Commission (NRC) approved one-time alternative request for the SQN MDAFWP 1B-B, except that this will be a permanent request (for the duration of the current IST intervals) and apply to the SQN and WBN MDAFWPs.
- Following repair, replacement, or routine servicing that could affect reference values of an MDAFWP during an outage, the proposed alternative would allow deferral of the OM Code required comprehensive or preservice test to be performed in Mode 1 during power ascension.

# Introduction (cont'd)

- The proposed alternative would apply for the duration of the SQN Units 1 and 2 fourth IST ten-year interval, which is scheduled to end on June 30, 2026, and the WBN Unit 1 third ten-year interval and the WBN Unit 2 first ten-year interval, which are scheduled to end on October 18, 2026.
- The proposed alternative is needed to support the upcoming SQN Unit 1 Cycle 25 refueling outage (U1R25) scheduled for October 2022, when the SQN MDAFWP 1B-B is scheduled to be replaced.

# 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-33310, “Effect of Pump Replacement, Repair, and Maintenance on Reference Values,” which 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 Technical Specification (TS) Requirements

- SQN Units 1 and 2 and WBN Units 1 and 2 Technical Specification (TS) 3.7.5, “Auxiliary Feedwater (AFW) System,” requires the MDAFWP to be operable in Modes 1, 2, 3, and Mode 4 when steam generator is relied upon for heat removal.
- SQN Units 1 and 2 and WBN Units 1 and 2 Surveillance Requirement (SR) 3.7.5.2 states: “Verify the developed head of each AFW pump at the flow test 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.

# Background

- On August 26, 2019 (ML19227A110), NRC approved an alternative request for SQN Units 1 and 2 and WBN Units 1 and 2 for the turbine driven auxiliary feedwater pumps (TDAFWP), pursuant to 10 CFR 50.55a(z)(2), in order if repair, replacement, or routine servicing that could affect reference values of a TDAFWP is performed during an outage, then initial pump operability for compliance with TS LCO 3.7.5 and SR 3.7.5.2 will be established by performance of a Group A pump test in Mode 3 with the required steam pressure test conditions.
  - The ISTB-3310 required comprehensive or preservice test will be performed in Mode 1 during power ascension at approximately 30 to 50% power level, but no later than ten days from entering Mode 3. Testing will be performed in accordance with ISTB-3100, ISTB-3300, ISTB-5123, and Table ISTB-5121-1, as applicable. If the required comprehensive or preservice test is not performed within these timeframes, the unit will enter the required Action Statement of TS 3.7.5. If for some unforeseen reason, the unit needs to shutdown and cooldown below Mode 3 before completing the Group A, comprehensive, or preservice test, the ten-day period will restart upon re-entering Mode 3 ascension.
  - The above alternative request was approved for the duration of the SQN Units 1 and 2 fourth IST ten-year interval, the WBN Unit 1 third ten-year interval, and the WBN Unit 2 first ten-year interval.

## Background (cont'd)

- On October 1, 2021 (ML21266A389), NRC approved a similar alternative request for the SQN Unit 1 1B-B MDAFWP [verbal authorization granted on May 29, 2021 (ML21152A125)]. SQN Unit 1 was in Mode 3 during a start-up from a forced outage and the 1B-B MDAFWP experienced a fire in its inboard pump bearing and had to be replaced. Similar to the approved alternative request for the TDAFWP, the alternative request for the 1B-B MDAFWP allowed the preservice test of the 1B-B MDAFWP to be performed 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.
- The above alternative request was for a one-time use until completion of the preservice test of the 1B-B MDAFWP following SQN Unit 1, entering Mode 1, no later than 10 days from the performance of the Group A test.



## ASME OM Code Components Affected

Site/Unit	Pump ID	Pump Description	Pump Type	Code Class	OM Group
<b>SQN Unit 1</b>	SQN-1-PMP-003-0118	MDAFW Pump 1A-A	Centrifugal	3	<b>A</b>
<b>SQN Unit 1</b>	SQN-1-PMP-003-0128	MDAFW Pump 1B-B	Centrifugal	3	<b>A</b>
<b>SQN Unit 2</b>	SQN-2-PMP-003-0118	MDAFW Pump 2A-A	Centrifugal	3	<b>A</b>
<b>SQN Unit 2</b>	SQN-2-PMP-003-0128	MDAFW Pump 2B-B	Centrifugal	3	<b>A</b>
<b>WBN Unit 1</b>	WBN-1-PMP-003-0118-A	MDAFW Pump 1A-A	Centrifugal	3	<b>A</b>
<b>WBN Unit 1</b>	WBN-1-PMP-003-0128-B	MDAFW Pump 1B-B	Centrifugal	3	<b>A</b>
<b>WBN Unit 2</b>	WBN-2-PMP-003-0118-A	MDAFW Pump 2A-A	Centrifugal	3	<b>A</b>
<b>WBN Unit 2</b>	WBN-2-PMP-003-0128-B	MDAFW Pump 2B-B	Centrifugal	3	<b>A</b>

# Reason for Request

- If repair, replacement, or routine servicing that could affect reference values of an MDAFWP is performed during an outage, then ISTB-3310 requires a Group A, comprehensive, or preservice test to be performed to confirm existing reference values or establish new reference values before declaring the pump operable.
- SQN and WBN Technical Specifications (TS) Limiting Condition of Operation (LCO) 3.7.5, “Auxiliary Feedwater (AFW) System,” requires the MDAFWP to be operable in Modes 1, 2, 3, and 4 when steam generator is relied upon for heat removal. Previous efforts to perform the periodic MDAFW comprehensive test during start-up from a refueling outage have experienced difficulty in maintaining consistent and stable test conditions.

# Reason for Request (cont'd)

- Performing the comprehensive or preservice test in Mode 6 or 5, with no heat load from the primary side, risks overflowing the steam generators, and can cause interruptions of testing to drain them. In addition, performing the comprehensive or preservice test in Mode 4 risks excessive cooldown which could lead to an inadvertent mode change. Performance of a Group A test with a flow rate high enough to fully assess the mechanical and hydraulic performance or a preservice test both require flow to the steam generators and are expected to have the same issues as the comprehensive test.
- 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.

# Reason for Request (cont'd)

- Compliance with ISTB-3310 under the circumstances described above 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).
- The SQN Unit 1 MDAFWP 1B-B is scheduled to be replaced during the upcoming SQN Unit 1 Cycle 25 refueling outage (U1R25) scheduled for October 2022. After installation and testing of the pump on May 31, 2021, it was identified that the pump is a low margin pump.
- Proposed alternative is needed to support the SQN Unit 1 MDAFWP 1B-B replacement and any future repairs or replacements of the SQN and WBN MDAFWPs.

# Proposed Alternative

- If repair, replacement, or routine servicing that could affect reference values of an MDAFWP is performed during an outage, then 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 Modes 4 or 5. The Group A pump test will be performed using the fixed resistance pump minimum flow recirculation path in which pump flow is set, and 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 criterion is truncated, if necessary, to ensure the pump minimum design limits are met.
- If repair, replacement, or routine servicing that could affect reference values of an MDAFWP is performed during an outage, the ISTB-3310 required comprehensive or preservice test will be performed in Mode 1 during power ascension at an appropriate power level within ten days of reaching Mode 1. If the required comprehensive or preservice test is not performed within these timeframes, the unit will enter the required Action Statement of TS 3.7.5. If for some unforeseen reason, the unit needs to shutdown and cooldown below Mode 3 before completing the Group A, comprehensive, or preservice test, the ten-day period will restart upon re-entering Mode 3 ascension.
- 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.

# Basis for Proposed Alternative

- SQN Units 1 and 2 and WBN Units 1 and 2 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 cited TS Bases 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 MDAFW pumps that have undergone repair, replacement, or routine servicing.

# Basis for Proposed Alternative (cont'd)

- The performance of SR 3.7.5.2 is adequate to identify any significant issues resulting from a repair, replacement, or routine servicing and provide reasonable assurance the MDAFWP is capable of performing its safety-related function until plant conditions are stable enough to complete 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 for the duration of SQN Units 1 and 2 fourth IST ten-year interval and the WBN Unit 1 third IST ten-year interval and the WBN Unit 2 first IST ten-year interval.



# Precedents

- 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 April 30, 2022.
- TVA requests NRC approval by October 15, 2022, to support SQN U1R25, scheduled to commence October 22, 2022.

**TVA**

**TENNESSEE  
VALLEY  
AUTHORITY**