



1101 Market Street, Chattanooga, Tennessee 37402

CNL-22-049

April 26, 2022

10 CFR 50.55a

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

Sequoyah Nuclear Plant, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 50-328

Watts Bar Nuclear Plant, Units 1 and 2  
Facility Operating License Nos. NPF-90 and NPF-96  
NRC Docket Nos. 50-390 and 50-391

**Subject: Sequoyah Nuclear Plant (SQN), Units 1 and 2 and Watts Bar Nuclear Plant (WBN) Units 1 and 2, American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternatives RP-11 (SQN) and IST-RR-9 (WBN)**

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, Subsection 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) pumps for the Sequoyah Nuclear Plant (SQN), Units 1 and 2 (alternative request RP-11) and the Watts Bar Nuclear Plant (WBN), Units 1 and 2 (alternative request IST-RR-9).

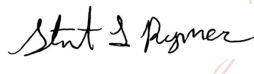
If repair, replacement, or routine servicing that could affect reference values of an MDAFW pump is performed during an outage, then ISTB-3310 requires a Group A, comprehensive, or preservice test to be performed to confirm existing reference values or establish new reference values before declaring the pump operable. 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 alternative relief 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 approval of this alternative request by October 15, 2022, in order to support the upcoming SQN Unit 1 Cycle 25 refueling outage (U1R25) scheduled for October 22, 2022.

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There are no new regulatory commitments associated with this submittal. Please address any questions regarding this request to Stuart L. Rymer, Senior Manager, Fleet Licensing, at [slymer@tva.gov](mailto:slymer@tva.gov).

Respectfully,

 Digitally signed by Rymer,  
Stuart Loveridge  
Date: 2022.04.26 17:28:44  
-04'00' for

James T. Polickoski  
Director, Nuclear Regulatory Affairs

Enclosure:

Sequoyah Nuclear Plant (SQN), Units 1 and 2 and Watts Bar Nuclear Plant (WBN), Units 1 and 2, American Society of Mechanical Engineers Operation and Maintenance Code Request for Alternatives RP-11 (SQN) and IST-RR-9 (WBN), Motor Driven Auxiliary Feedwater Pump Testing Following Maintenance During an Outage

cc (Enclosure):

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

**Sequoyah Nuclear Plant (SQN), Units 1 and 2  
Watts Bar Nuclear Plant (WBN), Units 1 and 2  
American Society of Mechanical Engineers Operation and  
Maintenance Code Request for Alternatives RP-11 (SQN) and  
IST-RR-9 (WBN)**

**Motor Driven Auxiliary Feedwater Pump Testing Following  
Maintenance During an Outage**

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

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

**II. ASME Code Edition and Addenda**

SQN Unit 1 & 2

Fourth ten-year interval - September 1, 2016 to June 30, 2026

ASME OM Code 2004 Edition through 2006 Addenda

WBN Unit 1

Third ten-year interval - October 19, 2016 to October 18, 2026

ASME OM Code 2004 Edition through 2006 Addenda

WBN Unit 2

First ten-year interval - October 19, 2016 to October 18, 2026

ASME OM Code 2004 Edition through 2006 Addenda

### III. Applicable Code Requirement

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)."*

### IV. Background

Nuclear Regulatory Commission (NRC) letter to Tennessee Valley Authority (TVA) dated October 1, 2021 (Reference 1), approved a one-time alternative request for the SQN Unit 1 MDAFW pump 1B-B [verbal authorization granted on May 29, 2021 (ML21152A125)] to perform the preservice test of the MDAFW pump 1B-B, required by ISTB-3310, in Mode 1 during power ascension of SQN Unit 1, up to 95 percent power level, but no later than ten days from the Group A test. This request was needed due to having to replace the SQN Unit 1 MDAFW pump 1B-B due to a fire in its inboard pump bearing. This alternative request applied until the preservice test for the MDAFW pump 1B-B was completed following SQN Unit 1 entering Mode 1, no later than ten days from the performance of the Group A test.

NRC letter to TVA dated August 26, 2019 (Reference 2), approved an alternative request for the turbine driven auxiliary feedwater (TDAFW) pumps for SQN Units 1 and 2, and WBN Units 1 and 2, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2). This alternative request stated 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 SQN and WBN Technical Specifications (TS) Limiting Condition of Operation (LCO) 3.7.5, "Auxiliary Feedwater (AFW) System," and Surveillance Requirement (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. This alternative request also stated that if repair, replacement, or routine servicing that could affect reference values of a TDAFWP is performed during an outage, 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. This alternative request was approved for the duration of the current SQN and WBN inservice testing (IST) intervals.

### V. Reason for Request

If repair, replacement, or routine servicing that could affect reference values of an MDAFW pump 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 TS LCO 3.7.5 requires the MDAFW pump to be operable in Modes 1, 2, 3, and 4 when

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steam generator (SG) 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. Performing the comprehensive or preservice test in Mode 6 or 5, with no heat load from the primary side, risks overfilling the SG, and can cause interruptions of testing to drain the SG. Additionally, 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 SG 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.

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).

As noted in Reference 3, the SQN Unit 1 MDAFW pump 1B-B was replaced on May 31, 2021, due to a fire in the inboard pump bearing on MDAFW pump 1B-B, while operating in support of a forced outage with SQN Unit 1 in Mode 3. The replacement pump is a low margin pump and is scheduled to be replaced with an improved efficiency pump during the upcoming SQN Unit 1 Cycle 25 refueling outage (U1R25) scheduled for October 2022. The proposed alternative is needed to support the SQN Unit 1 MDAFW pump 1B-B replacement and any future repairs or replacements of the SQN and WBN MDAFW pumps. The vendor's qualification process of the replacement pump involves the submittal of a repair plan by the vendor to TVA for review and approval. Once the pump has been repaired or refurbished, the pump is tested to ensure it can meet the TVA design test curve prior to acceptance. A new design test curve has been submitted for this replacement pump to regain operating margin. The vendor will submit a final report once acceptance testing is complete.

## **VI. Proposed Alternative and Basis for Use**

### Proposed Alternative

1. If repair, replacement, or routine servicing that could affect reference values of an MDAFW pump 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 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.

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2. If repair, replacement, or routine servicing that could affect reference values of an MDAFW pump is performed during an outage, following the Group A test in Modes 4 or 5, 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.
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 Use

SQN Unit 1 and Unit 2 and WBN Unit 1 and Unit 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 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 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 MDAFW pump 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 Subsection ISTB-3313, “Baseline Test Deferral,” of the ASME OM Code 2020 Edition.

### **VII. Duration of Proposed Alternative**

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.



### VIII. Precedents

- As noted in Section IV of this enclosure, in Reference 1 NRC approved a similar one-time alternative request for the SQN Unit 1 MDAFW pump 1B-B.
- As noted in Section IV of this enclosure, in Reference 2 NRC approved a similar alternative request for the SQN Units 1 and 2, and the WBN Units 1 and 2 TDAFW pumps.
- A similar alternative (RR-4-12) was approved by the NRC for Virgil C. Summer Nuclear Station, Unit 1 for the Turbine Driven Emergency Feedwater Pump on April 28, 2017 (ML17088A256 and ML17103A533).

### IX. Comparison to Past Precedent

In Reference 4, the NRC requested that “TVA provide brief explanations if the proposed request differs from the previously authorized one-time request for Sequoyah, Unit 1” (References 1 and 3). The requested information, along with a comparison to Reference 5, is provided below.

In Reference 3 regarding the alternative request for the MDAFW pump 1B-B, TVA stated:

*Following the replacement of the MDAFW 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 rationale was that SQN Unit 1 was in Mode 3 at the time and could not transition to a higher Mode of operation until the MDAFW pump 1B-B was declared operable.

In Reference 5, regarding the alternative request for the SQN and WBN TDAFW pumps, TVA stated:

*If repair, replacement, or routine servicing that could affect reference values of a TDAFW 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 Mode 3 with the required steam pressure test conditions.*

The rationale was that Mode 3 provides sufficient steam pressure for establishing initial pump operability for the TDAFW pump. As noted in Reference 5, this rationale is consistent with the SQN and WBN Unit TS Bases for SR 3.7.5.2, which state, in part:

*This SR is modified by a Note indicating that the SR should be deferred until suitable test conditions are established. This deferral is required because there may be insufficient steam pressure to perform the test.*

The proposed alternative request for the SQN and WBN MDAFW pumps applies whenever repair, replacement, or routine servicing that could affect reference values of an MDAFW pump is performed during an outage. SQN Units 1 and 2 and WBN Units 1 and 2 TS 3.7.5 requires the MDAFW pump to be operable in Modes 1, 2, 3, and Mode 4 when SG is relied upon for heat removal. Therefore, it is appropriate to establish the initial pump operability for compliance with TS LCO 3.7.5 and SR 3.7.5.2 by performance of a Group A pump test

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in Modes 4 or 5 prior to transitioning to a higher Mode of operation.

Additionally, in Reference 3, TVA stated:

*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.*

The proposed alternative for the SQN and WBN MDAFW pumps deviates from the above quoted paragraph in that 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. The reference to ISTB-3100 was deleted and instead the following paragraph was added, consistent with Reference 6:

*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.*

The rationale for the 95% power level in Reference 3, was that in order to perform the comprehensive test in Mode 1, reactor power level has to be less than 96%. The proposed alternative for the SQN and WBN MDAFW pumps allows operational flexibility in power levels to assure the required conditions are met for performing the applicable OM code testing. Additionally, the proposed alternative for the SQN and WBN MDAFW pumps states that the required comprehensive or preservice test will be performed in Mode 1 within ten days of reaching Mode 1 rather than from the performance of the Group A test. ISTB-3310 allows performance of a comprehensive or Group test before declaring the pump operable and TVA is proposing to perform the ISTB-3310 required comprehensive or preservice test in Mode 1.



**X. References**

1. NRC letter to TVA, "Sequoyah Nuclear Plant, Unit 1 – Authorization of Alternative Request RP-10 for the 1B-B Motor Driven Auxiliary Feedwater Pump (EPID L-2021-LLR-0039)," dated October 1, 2021 (ML21266A383)
2. NRC letter to TVA, "Sequoyah Nuclear Plant, Units 1 And 2, and Watts Bar Nuclear Plant, Units 1 and 2 – Alternative Request for the Turbine Driven Auxiliary Feedwater Pumps 10-Year Interval Inservice Testing Program (EPID L-2019-LLR-0005)," dated August 26, 2019 (ML19227A110)
3. TVA letter to NRC, CNL-21-059, "Sequoyah Nuclear Plant (SQN), Unit 1, American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternative RP-10," dated May 28, 2021 (ML21148A301)
4. NRC letter to TVA, "Summary of April 14, 2022, Meeting with Tennessee Valley Authority Regarding a Proposed Alternative Request Related to Testing of the Motor-Driven Auxiliary Feedwater Pumps at Sequoyah and Watts Bar Nuclear Plants (EPID L-2022-LRM-0026)," dated April 20, 2022 (ML22109A004)
5. TVA letter to NRC, CNL-19-068, "Response to Request for Additional Information Regarding the Sequoyah Nuclear Plant (SQN) Units 1 and 2 and Watts Bar Nuclear Plant (WBN) Units 1 and 2, American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternatives RP-09 (SQN) and IST-RR-7 (WBN) (EPID L-2018-LLR-0005)," dated July 22, 2019 (ML19203A314)
6. TVA letter to NRC, CNL-21-060, "Supplement to Sequoyah Nuclear Plant (SQN), Unit 1, American Society of Mechanical Engineers Operation and Maintenance Code, Request for Alternative RP-10," dated May 28, 2021 (ML21148A311)