



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

August 26, 2019

Mr. Joseph W. Shea
Vice President, Nuclear Regulatory
Affairs and Support Services
Tennessee Valley Authority
1101 Market Street, LP 3R-C
Chattanooga, TN 37402-2801

SUBJECT: 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)

Dear Mr. Shea:

By letter dated January 18, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19018A118), as supplemented by letter dated July 22, 2019 (ADAMS Accession No. ML19203A314), Tennessee Valley Authority (the licensee), submitted alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) associated with pump inservice testing (IST) at Sequoyah Nuclear Plant (Sequoyah), Units 1 and 2, and Watts Bar Nuclear Plant (Watts Bar), Units 1 and 2.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee requested to use the proposed alternative to test the turbine driven auxiliary feedwater pumps in Request RP 09 for Sequoyah, Units 1 and 2, and Request IST-RR-7 for Watts Bar, Units 1 and 2. The request is on the basis that the ASME OM Code requirements present an undue hardship, without a compensating increase in the level of quality or safety.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluation, that the licensee has adequately addressed all the regulatory requirements set forth in 10 CFR 50.55a(g)(5)(iii). Therefore, pursuant to 10 CFR 50.55a(z)(2), the NRC authorizes the use of alternative request RP 09 for Sequoyah, Units 1 and 2, for the duration of the fourth 10-year IST program interval, which began on September 1, 2016, and is scheduled to end on June 30, 2026. The NRC staff authorizes the use of alternative request IST-RR-7 for Watts Bar, Unit 1, for the duration of the third 10-year IST program interval, which began on October 19, 2016, and is scheduled to end on October 18, 2026, and for Watts Bar, Unit 2, for the duration of the first 10-year IST program interval, which began on October 19, 2016, and is scheduled to end on October 18, 2026.

All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests remain applicable.

J. Shea

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If you have any questions, please contact the Project Manager, Andrew Hon, at 301-415-8480 or by email to Andrew.Hon@nrc.gov.

Sincerely,

/RA/

Undine Shoop, Chief
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-327, 50-328, 50-390,
and 50-391

Enclosure:
Safety Evaluation

cc: Listserv



UNITED STATES
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ALTERNATIVE REQUESTS RP 09 AND IST-RR-7

REGARDING TURBINE DRIVEN AUXILIARY FEEDWATER PUMPS

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT, UNITS 1 AND 2

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2

DOCKET NOS. 50-327, 50-328, 50-390, AND 50-391

1.0 INTRODUCTION

By letter dated January 18, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19018A118), Tennessee Valley Authority (the licensee) submitted alternatives to the requirements of the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) associated with pump inservice testing (IST) at Sequoyah Nuclear Plant (Sequoyah or SNP), Units 1 and 2, and Watts Bar Nuclear Plant (Watts Bar or WBN), Units 1 and 2. In response to a request for additional information, the licensee provided supplemental information by letter dated July 22, 2019 (ADAMS Accession No. ML19203A314). The supplement provided a revised alternative request with revised information for proposed alternative testing.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee requested to use the proposed alternative in Request RP 09 for Sequoyah, Units 1 and 2, and Request IST-RR-7 (which supersedes IST-RR-6) for Watts Bar, Units 1 and 2, on the basis that the ASME OM Code requirements present an undue hardship, without a compensating increase in the level of quality or safety.

2.0 REGULATORY EVALUATION

The regulation in 10 CFR 50.55a(f), states, in part, that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with the specified ASME OM Code and applicable addenda incorporated by reference in the regulations.

The regulation in 10 CFR 50.55a(z) states that alternatives to the requirements of 10 CFR 50.55a(f) may be used when authorized by the U.S. Nuclear Regulatory Commission (NRC) if the licensee demonstrates (1) the proposed alternatives would provide an acceptable level of quality and safety or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Alternative Request RP 09 for Sequoyah, Units 1 and 2, and Alternative Request IST-RR-7 for Watts Bar, Units 1 and 2

The licensee requested an alternative to the pump testing requirements of the ASME OM Code.

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).

The licensee has requested to use the proposed alternative described below for testing the pumps listed Table 1 below.

Table 1

Site/Unit	Pump ID	Description	Pump Type	ASME Code Class	ASME OM Pump Category
SNP Unit 1	SQN-1-PMP-003-0142	Turbine Driven Auxiliary Feedwater (TDAFW) Pump 1A-S	Centrifugal	3	B
SNP Unit 2	SQN-2-PMP-003-0142	TDAFW Pump 2A-S	Centrifugal	3	B
WBN Unit 1	WBN-1-PMP-003-0001A-S	TDAFW Pump 1A-S	Centrifugal	3	B
WBN Unit 2	WBN-2-PMP-003-0002A-S	TDAFW Pump 2A-S	Centrifugal	3	B

The Sequoyah, Units 1 and 2, fourth 10-year IST program interval began on September 1, 2016, and is scheduled to end on June 30, 2026. The Watts Bar, Unit 1, third 10-year IST program interval and the Watts Bar, Unit 2, first 10-year IST program interval both began on October 19, 2016, and are scheduled to end on October 18, 2026. The applicable ASME OM Code edition and addenda for the Sequoyah, Units 1 and 2, fourth 10-year IST program interval, the Watts Bar, Unit 1, third 10-year IST program interval, and the Watts Bar, Unit 2, first 10-year IST program interval is the 2004 Edition through 2006 Addenda.

Reason for Request

The licensee stated:

If repair, replacement, or routine servicing that could affect reference values of a TDAFWP [turbine driven auxiliary feedwater] 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 TDAFWP to be operable in Modes 1, 2, and 3. Previous efforts to perform the periodic TDAFW comprehensive test in Mode 3 during start-up from a refueling outage have experienced difficulty in maintaining consistent and stable test conditions (e.g., speed, flow) long enough to complete the test due to decreasing steam pressure as result of the high flow rate of relatively cold AFW injection into the steam generators. 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 in Mode 3 as the comprehensive test.

In response to the NRCs request for additional information, the licensee stated:

WBN currently performs a Group A Test, consistent with the requirements of the OM Code, during the quarterly pump testing of WBN Unit 1 and Unit 2 TDAFW pumps, which obtains vibration data.

During the last quarterly pump testing of the SQN Unit 1 and Unit 2 TDAFW pumps (June 3, 2019 and June 18, 2019, respectively), SQN demonstrated the ability to obtain acceptable, stable vibration data when pump speed was reduced below full rated speed. With the ability to obtain acceptable vibration data at reduced speed, SQN is also able to perform a Group A pump test in accordance with ISTB-5121 in Mode 3 using the fixed resistance pump minimum flow recirculation path to establish initial pump operability. Therefore, Enclosure 2 contains a revised alternative request to state 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 revised alternative request provided in Enclosure 2 supersedes the one provided in the referenced letter.

Proposed Alternative

The licensee 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 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 Group A pump test will be performed using the fixed resistance pump minimum flow recirculation path in which pump speed is set, then flow, 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.

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. 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.

Sequoyah, 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.

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 is insufficient steam pressure to perform the test.

Watts Bar, 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 American Society of Mechanical Engineers (ASME) OM 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 OM Code (Ref. 2) (only required at 3 month intervals) satisfies this requirement. The 31 day Frequency on a STAGGERED TEST BASIS results in testing each pump once every 3 months, as required by Reference 2.

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 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 a repair, replacement, or routine servicing and provide reasonable assurance the TDAFWP is capable of performing its safety-related function until plant conditions are stable enough to complete the ISTB-3310 required comprehensive or preservice test.

NRC Staff Evaluation

The TDAFW pumps are classified as a Group B pumps in accordance with the requirements in ISTB-1400 and ISTB-2000. Table ISTB-3400-1 requires that Group B pumps be tested quarterly and biennially. Requirements for the quarterly Group B test are less rigorous than the requirements for the quarterly Group A test and the biennial comprehensive pump test.

ISTB-3310 states that for a reference value or set of values that may have been affected by repair, replacement, or routine servicing of a pump, a new reference value or set of values shall be determined, or the previous value reconfirmed by a comprehensive or Group A test run before declaring the pump operable.

The licensee proposes that if repair, replacement, or routine servicing that could affect reference values of a TDAFW pump is performed during an outage, 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 Group A test requires measurement of pump vibrations. Following the Group A pump test, a comprehensive pump test or a preservice test will be performed in Mode 1 at approximately 30 to 50 percent power, or within 10 days of entering Mode 3. If the comprehensive pump test or preservice test does not occur within this timeline, the action statement of TS 3.7.5 shall apply. Also, if the unit needs to shut down and cool down below Mode 3 before completing the comprehensive pump test or preservice test, the 10-day period will restart upon entering the Mode 3 ascension. The Group A pump test performed in Mode 3 will provide assurance of acceptable pump operation until the comprehensive pump test or preservice test is performed in Mode 1. Per ISTB-5000, a preservice test may be substituted for any inservice test.

Based on the above discussion, the NRC staff finds that the proposed alternative provides reasonable assurance that the TDAFW pumps are operationally ready.

4.0 CONCLUSION

As set forth above, the NRC staff determines that for alternative request RP 09 for Sequoyah, Units 1 and 2, and IST-RR-7 for Watts Bar, Units 1 and 2, the proposed alternatives provide reasonable assurance that the TDAFW pumps listed in Table 1 above are operationally ready. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the

regulatory requirements set forth in 10 CFR 50.55a(z)(2) for requests RP 09 and IST-RR-7. Therefore, the NRC staff authorizes the use of alternative request RP 09 for Sequoyah, Units 1 and 2, for the duration of the fourth 10-year IST program interval, which began on September 1, 2016, and is scheduled to end on June 30, 2026. The NRC staff authorizes the use of alternative request IST-RR-7 for Watts Bar, Unit 1, for the duration of the third 10-year IST program interval, which began on October 19, 2016, and is scheduled to end on October 18, 2026, and for Watts Bar, Unit 2, for the duration of the first 10-year IST program interval, which began on October 19, 2016, and is scheduled to end on October 18, 2026.

All other ASME OM Code requirements for which relief was not specifically requested and approved in the subject requests remain applicable.

Principal Contributor: Robert Wolfgang

Date: August 26, 2019

SUBJECT: 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

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