From: Green, Kimberly
Sent: Thursday, April 1, 2021 2:37 PM
To: Wells, Russell Douglas
Cc: Haeg, Luke
Subject: Revised Draft RAI --Combined RAI Set for Watts Bar Unit 2 90-Day Report and Thot LAR (EPIDs L-2021-LRO-0003 and L-2021-LLA-0026)
Attachments: Watts Bar 2 Combined RAI Set Revised.docx

Dear Mr. Wells:

By letter dated, February 11, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21042B342), the Tennessee Valley Authority (TVA) submitted the fall 2020 Generic Letter (GL) 95-05 Voltage-Based Alternate Repair Criteria Steam Generator (SG) Report for Watts Bar Nuclear Plant (Watts Bar), Unit 2. By letter dated February 25, 2021 (ADAMS Accession No. ML21056A623), TVA submitted a license amendment request (LAR) to change Section 5.5.2.4, "Tests and Inspections," of the Updated Final Safety Analysis Report for Watts Bar, Unit 2.

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittals concurrently and has identified areas where additional information is needed to complete its reviews.

A draft request for additional information (RAI) for the 90-day report was previously transmitted to you via email on March 22, 2021, and a draft RAI for the LAR was transmitted to you via NRC's BOX – Enterprise File Synchronization and Sharing service due to the potential presence of proprietary information. At your request, a clarification call to discuss both draft RAI sets was held on March 31, 2021, to clarify the NRC staff's request. As a result of the call, it was determined that RAI 1b from the LAR set should be revised to add clarification of the information the NRC staff is seeking. Additional changes were made by the NRC staff to other RAIs based on TVA's statement about the planned start date of mid-cycle outage. Attached, please find a revised draft RAI that combines both sets of RAIs. The changes are shown in redline/strikeout. Please note that the draft RAI 90-day report RAI set sequentially follows the Thot LAR draft RAI set, i.e., is now numbered as RAIs 5 through 9.

The revised draft RAI is being sent to ensure that the revised requests are understandable and the basis for the requests is clear. This email and the attachment do not convey or represent an NRC staff position regarding TVA's request.

Please let me know if TVA needs a call to clarify the NRC staff's revised requests.

Regards,
Kim Green
(301) 415-1627
kimberly.green@nrc.gov

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DRAFT REQUEST FOR ADDITIONAL INFORMATION

REGARDING REQUEST FOR APPROVAL TO USE A GROWTH RATE TEMPERATURE ADJUSTMENT WHEN IMPLEMENTING GENERIC LETTER 95-05 ANALYSIS FOR THE STEAM GENERATORS AND REFUELING OUTAGE 3 GENERIC LETTER 95-05 VOLTAGE-BASED ALTERNATE REPAIR CRITERIA FINAL REPORT

WATTS BAR NUCLEAR PLANT, UNIT 2

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-391

INTRODUCTION

By letter dated February 11, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21042B342), Tennessee Valley Authority (TVA, the licensee) submitted the fall 2020 Generic Letter (GL) 95-05 Voltage-Based Alternate Repair Criteria (ARC) Steam Generator (SG) Report for Watts Bar Nuclear Plant (Watts Bar), Unit 2. The SG tube inspections were performed during the third refueling outage (U2R3). When the voltage-based ARC methodology is applied during an inspection of the SGs performed in accordance with Technical Specification (TS) 5.7.2.12, "Steam Generator (SG) Program," TS 5.9.9, "Steam Generator Tube Inspection Report," requires that a report be submitted within 90 days after the initial entry into hot shutdown (MODE 4) following completion of the inspection. TS 5.7.2.12 requires that an SG Program be established and implemented to ensure SG tube integrity is maintained.

By letter dated February 25, 2021 (ADAMS Accession No. ML21056A623), TVA submitted a license amendment request (LAR) to change Section 5.5.2.4, "Tests and Inspections," of the Updated Final Safety Analysis Report (UFSAR) for Watts Bar, Unit 2. The proposed changes would allow the use of a temperature adjustment in calculating the voltage growth rate and end-of-cycle voltage distribution for bobbin probe stress corrosion cracking eddy current indications in steam generator tubes evaluated according to GL 95-05, "Voltage-Based Repair Criteria for Westinghouse Steam Generator Tubes Affected by Outside Diameter Stress Corrosion Cracking [ODSCC]." These growth rate calculations are used to demonstrate SG tubes meet the technical specification performance criteria for structural and leakage integrity. TVA supplemented its request by letter dated March 23, 2021 (ADAMS Accession No. ML21082A118), and submitted Westinghouse Report, SG-CDMP-20-23-P, Revision 2, "Watts Bar U2R3 Steam Generator Condition Monitoring and Final Operational Assessment [CMOA]," which is the operational assessment for the SG inspection conducted during U2R3.

Fundamental regulatory requirements with respect to the integrity of the SG tubing are established in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. Specifically, the general design criteria (GDC) in Appendix A, "General Design Criteria for Nuclear Power

Plants," to 10 CFR Part 50 provide regulatory requirements that state the reactor coolant pressure boundary shall have "an extremely low probability of abnormal leakage, of rapidly propagating failure, and of gross rupture" (GDC 14), "shall be designed with sufficient margin" (GDCs 15 and 31), shall be of "the highest quality standards practical" (GDC 30), and shall be "designed to permit periodic inspection and testing…to assess their structural and leak tight integrity" (GDC 32). Section 3.1.2 of the Watts Bar UFSAR addresses conformance with the GDC in Appendix A to 10 CFR Part 50 (ADAMS Accession No. ML19176A129).

INFORMATION REQUESTED

In order to complete its review of the GL 95-05 final report and the evaluation of whether the proposed UFSAR changes meet the SG Program requirements described above, the U.S. Nuclear Regulatory Commission (NRC) staff requests the following information.

1. The scope of the request is not clear to the NRC staff because it does not identify the operating temperature or actual temperature reduction value for Cycle 4a. The effect of the temperature adjustment methodology is presented as an example based on a temperature reduction of 4 degrees Fahrenheit (°F). Provide the following requested information to clarify the scope and operating conditions for the requested amendment.

    a. On page 40 of 90 of the CMOA report, it states that the hot-leg temperature (T_{hot}) during Cycle 4a is 612°F, compared to 617°F for Cycle 3. Section 3.2, "Technical Analysis," of Enclosure 1 of the LAR states than an operating interval extension of 27 calendar days for Cycle 4a was calculated based on applying the temperature adjustment equation described in Enclosure 2 for a 4°F reduction. State ~~if a 5°F~~the temperature reduction that will be applied to Cycle 4a~~,~~ and ~~and if so, state to which~~the calendar ~~day~~ date ~~operation will be extended~~at which the mid-cycle outage will begin.

    b. The Westinghouse report, LTR-CDMP-21-4 NP-Attachment, Enclosure 3 to the LAR, states that "Changing T_{hot} at any point would affect the calculation of the temperature adjustment factor which would consequently affect the operating interval calculations." The proposed UFSAR revision states, in part, "when operating temperature differences exist from cycle-to-cycle," could be interpreted as one temperature adjustment per cycle. Please confirm ~~that~~ if this should be interpreted as only one temperature difference will be applied during Cycle 4a (and possibly a second single temperature difference in Cycle 4b). ~~In other words, confirm that multiple operating RCS temperature differences will not be applied and integrated within one mid-cycle period.~~If multiple temperatures are intended within an operating cycle, please discuss if the UFSAR wording should be revised. In addition, please provide any supporting data (e.g., plant or laboratory) for Alloy 600 that provides the effect of cycling on stress corrosion crack growth.

    c. State whether the application of the temperature adjustment equation will be limited to one-degree Fahrenheit increments. If not, justify that a fraction of a degree can be applied in a calculation of a temperature adjustment.

2. The proposed UFSAR Section 5.5.2.4 language states that, "This same temperature adjustment methodology will be used to modify the average growth rate used to determine the upper voltage repair limits." The justification for applying the temperature adjustment to the upper voltage repair limit is not clear to the NRC staff. Generic Letter 95-05,

Section 2.a.2, "Determination of the Upper Voltage Repair Limit for [Tube Support Plate] TSP Intersections," notes that the method for determining the flaw growth allowance is discussed in Section 2.b.2(2) and should be a plant-specific average growth rate or 30 percent per effective full power year, whichever is larger. Section 2.b.2(2) states, in part, that, "If both of the two previous inspections employed similar guidelines, the most limiting of the two previous growth rate indications should be used to estimate the voltage growth for the next inspection cycle." In addition, it is not clear to the staff that applying a temperature-reduced growth to the upper voltage repair criteria would be conservative if ~~cycle 4b~~subsequent plant operation returned to the ~~cycle~~ Cycle 3 T_{hot} value. Justify why it is appropriate to apply the temperature adjustment to the upper voltage repair limit.

3. The Watts Bar, Unit 2, GL 95-05 90-day report (ADAMS Accession No. ML21042B342) states in Section 6.4, "Cycle Operating Period," that 285 days (T_{hot} temperature not specified) is calculated to be the maximum number of days SG-3 could operate into the current cycle (Cycle 4) and meet the acceptance criterion for conditional burst probability. Section 3.2, "Technical Analysis," of Enclosure 1 of the LAR states that accounting for a 4°F temperature adjustment enables an operating interval extension of 27 calendar days. This suggests that the leakage and burst criteria can be met for operation 312 days into Cycle 4. However, the Westinghouse CMOA Section 4.3, "Stress Corrosion Cracking," when discussing a 5°F T_{hot} temperature reduction states that a mid-cycle outage is scheduled to begin on September 15, 2021, corresponding to 303 calendar days of operation. Clarify the differences between the GL 95-05 report and CMOA calendar days of operation. Discuss the best estimate margin in calendar days between the planned outage start date and reaching the performance criteria limits contained in GL 95-05.

4. The Watts Bar, Unit 2, CMOA Section 4, "Operational Assessment," states that, "This OA performs an evaluation for degradation mechanisms not covered under GL 95-05 voltage-based alternate repair criteria for axial ODSCC at TSP intersections. The GL 95-05 evaluation is documented in Reference 22 and Reference 29." Although CMOA Section 4.3, "Stress Corrosion Cracking," discusses how the Cycle 4a temperature reduction mitigates growth of axial ODSCC at TSP intersections evaluated through GL 95-05, it does not provide tube integrity results for the temperature adjusted operating duration provided. Therefore, it is not clear to the NRC staff which document will serve as the updated design basis if this LAR is approved. If the LAR is approved, discuss how the operational assessment for axial ODSCC at TSP intersections covered under GL 95-05 will be updated for the remainder of Cycle 4a and Cycle 4b.

5. Section 3.2, "Voltage Growth Rates," of the GL 95-05 final report describes how the voltage growth rates were determined in both the preliminary and GL 95-05 report operational assessments (OAs) using indications identified in successive inspections. It states, "For the U2R3 preliminary GL 95-05 OA evaluation, there were a total of 155 growth data points used for all four SGs combined." According to Tables 3-11 through 3-14, 964 indications were identified in successive inspections and used to determine growth rates.

    a. Describe the historical data review (lookback) processes performed in the GL 95-05 final report to determine when the second refueling outage (U2R2) indication was present and how the voltage was determined to calculate a growth rate.

    b. Explain the large difference in the number of repeat indications from U2R2 to U2R3 between the GL 95-05 final report and the preliminary OA.

c. During U2R2, a total of 193 distorted support indications (DSIs) were reported. During U2R3, using the GL 95-05 methodology, a total of 1240 DSIs were reported, including indications exceeding the upper voltage repair limit (DSVs), with 1041 indications returned to service. Table 7-2 "Operational Assessment Leak and Burst Results for EOC-4a," projects a total of 1854 indications. Discuss how the number of new indications during the current operating cycle (Cycle 4a) was projected for each SG.

6. Section 2.b.2(2) of GL 95-05 states that voltage growth rates should only be evaluated for those intersections at which bobbin indications can be identified at two successive inspections, except if an indication changes from non-detectable to a relatively high voltage (e.g., 2.0 volts). Table 3-16, Figure 3-6, and Figure 3-7 of the GL 95-05 final report indicate newly detected indications with relatively high voltage were used in the growth rate distributions, but this is not stated in the description in Section 3.2 of how growth rates were determined. Clarify if the Table 3-16 indications shown as 0.00 Vpp (volts peak-to-peak) in U2R2 were used in determining voltage growth rates and if there were any exceptions taken to the high voltage growth indications.

7. Describe the strategy used in supplemental testing of bobbin probe DSIs with a +Point™ rotating probe compared to the guidance in Section 3.b of GL 95-05. In addition, identify any exceptions to the guidance in Section 3.b of GL 95-05.

8. According to Section 3.1, "U2R3 Inspection Results," all DSIs with a bobbin probe voltage amplitude greater than or equal to 0.75 volts were tested with a +Point™ probe. Tables 3-2 through 3-5 show that additional +Point™ inspections were performed on DSIs with bobbin probe voltage less than 0.75 volts. Clarify the criteria used to select DSI indications less than 0.75 volts for +Point™ probe inspection.

9. During the November 17, 2020, public meeting (ADAMS Accession No. ML20337A040) discussing the Watts Bar 2 ~~outside diameter stress corrosion cracking (~~ODSCC~~)~~ at tube support plates, TVA stated that preliminary results showed that Unit 2 could operate for 240 days if a probability of detection (POD) of 1 was applied to all ODSCC indications in the scope of GL 95-05 equal to or greater than 3.2 volts. Using a POD of 0.95 (indications greater than or equal to 6 volts) and 0.9 (for indications between 3.2 and 6.0 volts), the GL 95-05 final report (Table 7-2) indicates that operation for 285 days will meet the acceptance criteria. Discuss any differences in the preliminary and final evaluations that resulted in the different calculated operating times.