



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

November 3, 2021

Mr. James Barstow
Vice President, Nuclear Regulatory Affairs
and Support Services
Tennessee Valley Authority
1101 Market Street, LP 4A-C
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – SUMMARY OF CONFERENCE
CALLS REGARDING THE FALL 2021, MID-CYCLE STEAM GENERATOR
TUBE INSPECTIONS (EPID L-2021-NFO-0011)

Dear Mr. Barstow:

On September 24 and 28, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff and representatives from the Tennessee Valley Authority (TVA, the licensee) participated in conference calls regarding the steam generator tube inspection activities at Watts Bar Nuclear Plant, Unit 2, during mid-cycle outage 4a. A list of participants is provided as Enclosure 1. A summary of the conference calls is provided as Enclosure 2.

If you have any questions, please contact me at 301-415-1627 or via e-mail at Kimberly.Green@nrc.gov.

Sincerely,

/RA/

Kimberly J. Green, Senior Project Manager
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-391

Enclosures:
As stated

cc: Listserv

LIST OF PARTICIPANTS
SEPTEMBER 24 AND 28, 2021, CONFERENCE CALLS
WITH TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR PLANT, UNIT 2
FALL 2021 MID-CYCLE STEAM GENERATOR INSPECTIONS

U.S. Nuclear Regulatory Commission

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SUMMARY OF SEPTEMBER 24 AND 28, 2021, CONFERENCE CALLS

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-391

FALL 2021 MID-CYCLE STEAM GENERATOR TUBE INSPECTIONS

On September 24 and 28, 2021, U.S Nuclear Regulatory Commission staff participated in conference calls with Tennessee Valley Authority (the licensee) and its vendor, Westinghouse Electric Company, LLC (Westinghouse), regarding the ongoing steam generator (SG) tube inspection activities at Watts Bar Nuclear Plant, Unit 2, during mid-cycle outage 4a.

The four Model D3 SGs at Watts Bar Nuclear Plant, Unit 2, were designed by Westinghouse. Each SG contains 4,674 mill-annealed tubes with a nominal outside diameter of 0.75 inches and a nominal wall thickness of 0.043 inches. The SGs have an integral preheater with flow distribution baffles. The tubes are supported by carbon steel drilled tube support plates (TSP).

Information provided by the licensee during the September 24 and 28, 2021, conference calls is summarized below:

- The licensee indicated that the preliminary assessment of SG condition was that the condition monitoring criteria were met, and that the preliminary operational assessment would support operation until the next refueling outage (spring 2022), when the SGs are scheduled for replacement.
- No indications of primary-to-secondary leakage were observed during operation since the previous refueling outage, no exceptions were taken to the industry guidelines, and no in-situ pressure tests, tube pulls, or secondary-side pressure tests were planned or performed during the current outage.
- Inspections were performed in all four SGs. During the September 24, 2021 call, the licensee stated that the SG tube inspections were substantially complete, and the licensee expected to finish the inspections within the next few shifts. The inspection scope included:
 - A 100 percent full-length bobbin probe examination in all open tubes, except for the row 1-4 U-bends, which were inspected with a +Point™ probe from the top TSP on hot leg (HL) side to the top TSP on the cold leg (CL) side.
 - A greater number of dents and dings were included in the baseline inspection scope than in the previous outage.
 - 100 percent +Point™ examination at the top-of-tubesheet (TTS), at distorted support indications (DSIs) with bobbin probe >1 volt, at dents >2 volts, and dings >5 volts in the HL, CL, and U-bend portions of the tubes.
 - 50 percent array examination of dings >2 volts in SGs 2 and 4, which was expanded to 100 percent of dings >2 volts in SGs 1 and 3.
 - The licensee did not perform foreign object search and retrieval after sludge lancing, based on the lack of loose part indications.

- SG 4 is the limiting SG for stress corrosion cracking (SCC) mechanisms based on having the highest operational temperature.
- Sixty-five anti-vibration bar wear indications and 64 TSP wear indications were identified in the outage but neither form of degradation was a challenge to the structural integrity performance criteria.
- The licensee reported finding:
 - Circumferential outside diameter stress corrosion cracking (ODSCC) at HL TTS – 153 single circumferential indications and 15 multiple circumferential indications (see below for updated number)
 - Axial ODSCC at HL TTS – 6 single axial indications
 - Axial primary water SCC at HL TTS – 2 indications
 - Stress corrosion cracks at dents – 5 indications
 - Circumferential ODSCC associated with freespan dings – 1 indication (see below)
 - Oblique SCC – 1 indication (see below)
 - Axial ODSCC TSP indications addressed by GL 95-05 alternate repair criteria:
 - 205 axial indications either single or multiple axial indications
 - 1581 DSIs
 - 4 DSIs greater than the upper repair limit of 2.8 volts
 - No DSIs excluded from the 95-05 alternate repair criteria
- A single oblique crack indication (SOI) was found at the HL 03 (H03) TSP in the tube in row 1 column 4 (R1C4). This was a new degradation mechanism for the SGs at Watts Bar, Unit 2. The SOI initiated at a scratch in between two dings. The licensee believes the stress field created by the two dings influenced the growth of the crack such that it grew at an approximately 45-degree angle to the long axis of the tube. Based on this finding, the inspection scope of dings from two to five volts was expanded to 100 percent.
- One circumferential ODSCC at a freespan ding near TSP H07 in SG3 in the tube in R13C57. It had a percent degraded area (PDA) of 10 percent, a maximum depth of 65 percent through-wall, and a 44.6 degree circumferential extent.
- There was no plan to install sleeves during this outage.
- One historical loose part in SG 3 at TSP CL 06 (C06) with 4.34 volt signal was going to have the adjacent surrounding tubes plugged.
- At the time of the September 24, 2021, call, the licensee planned to stabilize 32 tubes and to plug 382 tubes. The final list was revised to 34 stabilizers and 384 plugs at the time of the September 28, 2021, call.
- The final count of TTS circumferential ODSCC indications was 174 (39 in SG 1, 2 in SG 2, 54 in SG 3, 79 in SG 4) with PDAs that ranged from 10.27 to 43.09 percent.
- At the time of the September 28, 2021, call, the licensee stated that the normal T_{hot} temperature would only allow an operating cycle of 90 days and that a reduced T_{hot} would be required for the operational assessment to support a cycle length that would last until the next planned refueling outage.

- On September 30, the licensee reported that a reduced T_{hot} of ~7 degrees Fahrenheit would be used for operating cycle 4b.

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