



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

January 30, 2020

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 – REVIEW OF THE SPRING 2019  
STEAM GENERATOR TUBE INSPECTION REPORT (EPID L-2019-LRO-0068)

Dear Mr. Barstow:

By letter dated August 27, 2019, (Agencywide Documents Access and Management Systems Accession No. ML19239A131), Tennessee Valley Authority (TVA) submitted information summarizing the results of the spring 2019 steam generator tube inspections that were performed at Watts Bar Nuclear Plant, Unit 2 during refueling outage 2.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed its review of the information provided and concludes that TVA provided the information required by the Watts Bar Nuclear Plant, Unit 2 technical specifications and that no follow-up is needed at this time. The staff's review summary is enclosed.

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

Enclosure: As stated

cc: Listserv



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

REVIEW OF THE SPRING 2019 STEAM GENERATOR TUBE INSPECTION REPORT

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT, UNIT 2

DOCKET NO. 50-391

By letter dated August 27, 2019, (Agencywide Documents Access and Management Systems Accession No. ML19239A131), Tennessee Valley Authority (TVA, the licensee) submitted information summarizing the results of the spring 2019 steam generator (SG) tube inspections that were performed at Watts Bar Nuclear Plant, Unit 2 during refueling outage (RFO) 2.

Watts Bar, Unit 2 has four Westinghouse Model D3 SGs, each of which contains 4,674 mill-annealed Alloy 600 tubes. Each tube has a nominal outside diameter of 0.75 inches and a nominal wall thickness of 0.043 inches. The tubes are supported by anti-vibration bars (AVBs) and carbon steel drilled tube support plates (TSPs). Each SG has an integral preheater section with flow distribution baffle plates.

The licensee provided the scope, extent, methods, and results of its SG tube inspections. In addition, the licensee described corrective actions, such as tube plugging, taken in response to the inspection findings.

After reviewing the information provided by the licensee, the staff has the following comments/observations:

- In addition to pre-service volumetric indications, the existing degradation mechanisms at Watts Bar, Unit 2 include mechanical wear at AVBs and TSPs. All in-service volumetric wear indications were located at tube intersections with either TSPs or AVBs.
- Two degradation mechanisms were newly observed at Watts Bar, Unit 2 during RFO 2. Circumferential outside diameter stress corrosion cracking (ODSCC) at the hot leg top of tubesheet and axial ODSCC at TSPs are new degradation mechanisms for Watts Bar, Unit 2.
- The licensee performed hot leg top of tubesheet (TTS) inspections in all tubes using +Point™ from two inches below to two inches above the hot leg TTS. The licensee identified 2 and 3 circumferential ODSCC indications at the hot leg TTS in SGs 3 and 4, respectively. The indications were characterized with through-wall (TW) depths, circumferential extents, and percent degraded area (PDA) as follows:

Enclosure

SG	Row	Column	%TW	Circ. Extent	PDA
3	17	53	99	155°	25.5
3	49	37	83	182°	19.2
4	10	72	70	86°	10.4
4	21	70	62	104°	8.4
4	21	71	59	187°	12.9

The most limiting indication has a PDA of 25.5, while the condition monitoring limit for circumferential cracking is a PDA of 55.

- The licensee identified 1, 5, and 2 axial ODS-CC indications at TSPs in SGs 1, 3, and 4, respectively. The largest indication of axial cracking had an equivalent average depth of 65.4 percent TW and an average length of 0.313 inches, which correlates to a burst pressure of 4300 psig and a ligament tearing pressure of 4143 psig. This calculated burst pressure exceeds the condition monitoring limit of 3840 psi and therefore in-situ pressure testing was not required.
- During RFO 1, the primary side inspections performed in accordance with Nuclear Safety Advisory Letter 2012-01 identified evidence of minor indications of degradation of the cladding on the hot leg side in SG 1 just above the primary manway opening. The licensee performed an engineering evaluation which concluded that acceptable margin exists to maintain structural integrity of the channel head base metal for at least six cycles of operation. During RFO 2, no new indications were reported from the visual examinations of the channel head cladding; moreover, the licensee confirmed that the engineering evaluation remains applicable following the RFO 2 inspection.

Based on a review of the information provided, the staff concludes that the licensee provided the information required by the Watts Bar Nuclear Plant, Unit 2 technical specifications. In addition, the staff concludes that there are no technical issues that warrant follow-up action currently, because the inspections appear to be consistent with the objective of detecting potential tube degradation and the inspection results appear to be consistent with industry operating experience at similarly designed and operated units.

SUBJECT: WATTS BAR NUCLEAR PLANT, UNIT 2 – REVIEW OF THE SPRING 2019  
STEAM GENERATOR TUBE INSPECTION REPORT (EPID L-2019-LRO-0068)  
DATED JANUARY 30, 2020

**DISTRIBUTION:**

PUBLIC

PM File Copy

RidsACRS\_MailCTR Resource

RidsNrrDorLpl2-2 Resource

RidsNrrPMWattsBar Resource

RidsNrrLABAbeywickrama Resource

RidsRgn2MailCenter Resource

RidsNrrDnrINcsg Resource

AHuynh, NRR

**ADAMS Accession No.: ML20016A248**

**\*by e-mail**

OFFICE	NRR/DORL/LPL2-2/PM	NRR/DORL/LPL2-2/LA	NRR/DNRL/NCSSG/BC*
NAME	KGreen	BAbeywickrama	SBoom (GMakar for)
DATE	01/23/2020	01/17/2020	12/31/2019
OFFICE	NRR/DORL/LPL2-2/BC	NRR/DORL/LPL2-2/PM	
NAME	UShoop	KGreen	
DATE	01/29/2020	01/30/2020	

**OFFICIAL RECORD COPY**