



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

April 11, 2022

Ms. Cheryl A. Gayheart
Regulatory Affairs Director
Southern Nuclear Operating Co., Inc.
3535 Colonnade Parkway
Birmingham, AL 35243

SUBJECT: VOGTLE ELECTRIC GENERATING PLANT, UNIT 2 – SUMMARY OF
CONFERENCE CALL REGARDING THE SPRING 2022 STEAM GENERATOR
TUBE INSPECTIONS (EPID L-2022-NFO-0002)

Dear Ms. Gayheart:

On March 18, 2022, the U.S. Nuclear Regulatory Commission staff participated in a conference call with representatives of Southern Nuclear Operating Company regarding the ongoing steam generator tube inspection activities at Vogtle Electric Generating Plant, Unit 2.

A summary of the conference call is provided in the enclosure.

If you have any questions, please contact me at (301) 415-3100 or via email at John.Lamb@nrc.gov.

Sincerely,

John G. Lamb, Senior Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-425

Enclosure:
Conference Call Summary

cc: Listserv

SUMMARY OF CONFERENCE CALL HELD ON MARCH 18, 2022,
REGARDING SPRING 2022 STEAM GENERATOR TUBE INSPECTIONS AT
VOGTLE ELECTRIC GENERATING PLANT, UNIT 2
DOCKET NO. 50-425

Introduction

On March 18, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff participated in a conference call with representatives of Southern Nuclear Operating Company (SNC, the licensee), regarding the ongoing steam generator (SG) tube inspection activities at Vogtle Electric Generating Plant (Vogtle), Unit 2, during refueling outage (RFO) 22.

The NRC provided the request for the conference by emails dated February 9 and 23, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML22040A045 and ML22055A099, respectively). The discussion points for the conference call held on March 18, 2022, were contained in the email dated February 23, 2022. The attendees for the conference call are contained in Attachment 1.

Background

The previous time the NRC staff selected Vogtle, Unit 2, for a conference call regarding the SG tube inspection activities was March 2013. The summary of the 2013 conference calls is dated April 25, 2013 (ADAMS Accession No. ML13112A225).

By letter dated September 10, 2019 (ADAMS Accession No. ML19255F170), SNC submitted information summarizing the results of the spring 2019 SG inspections at Vogtle, Unit 2; these inspections were performed during the RFO 20. By letter dated November 15, 2019 (ADAMS Accession No. ML19282A235), the NRC staff performed a review of RFO 20 SG inspections for Vogtle, Unit 2.

By letter dated January 5, 2022 (ADAMS Accession No. ML21316A055), the NRC staff issued Amendment No. 194 to Vogtle, Unit 2. The amendment revised revise the Vogtle "Steam Generator (SG) Program" and the "Steam Generator Tube Inspection Report" technical specifications based on Technical Specifications Task Force (TSTF) Traveler TSTF-577, Revision 1, "Revised Frequencies for Steam Generator Tube Inspections" (TSTF-577) (ADAMS Accession No. ML21060B434), and the associated NRC staff safety evaluation (SE) of TSTF-577 (ADAMS Accession No. ML21098A188).

Vogtle, Unit 2, has four Westinghouse Model F SGs, each of which contains 5,626 U-bend thermally treated Alloy 600 tubes. Each tube has a nominal outside diameter (OD) of 0.688 inches and a nominal wall thickness of 0.040 inches. During SG fabrication, the tubes were hydraulically expanded, at both ends, over the full depth of the tubesheet. Type 405 stainless steel support plates, which have broached quatrefoil holes, support the vertical section of the tubes, and anti-vibration bars support the U-bend section of the tubes.

Enclosure

Conference Call Held on March 18, 2022

Information provided by the licensee in support of the March 18, 2022, conference call is provided as Attachment 2. The NRC staff notes that the inspection information is preliminary and subject to change upon final data analysis.

- At the time of the call approximately 67 percent of the eddy current data acquisition and 64 percent of the eddy current analysis had been completed.
- The eddy current inspection scope for each SG includes:
 - A 100 percent full-length bobbin/array combination probe examination of all in-service tubes.
 - +Point™ probe inspections on:
 - All Row 1 and 2 U-bends
 - All hot leg (HL) top of tubesheet (TTS) tubes +3 inches to H* depth
 - All bobbin/array I-Codes
 - All dents/dings greater than or equal to 2 volts in the HL straight length and U-bend tube portion
 - 50 percent dents/dings greater than 5 volts in cold leg (CL) straight length
 - 25 percent dents/dings between 2-5 volts in CL straight length
 - All high stress (-2 sigma) HL/CL tube support plate (TSP) intersections, HL/CL TTS transitions, and greater than or equal to 2-volt dents/dings
 - All existing and new possible loose parts (PLP) signals (+Point™ and array probe), including a two-tube circumference around PLP signals
- At the time of the call, the licensee had identified:
 - A total of 316 anti-vibration bars (AVB) wear indications in all SGs with the greatest wear depth measured as 42 percent through-wall.
 - A total of six indications of historical foreign object wear or secondary side cleaning wall loss.
 - Three potential crack indications that were going to be tested with a Ghent probe to resolve the indications. One indication was located at the HL TTS in SG1. The other two indications were located in SG 4, at the 7th HL TSP and at the HL TTS. These indications are not historical.
 - Following the call, the licensee informed the NRC that the potential crack indications discussed in the previous bullet were confirmed to be cracks. Based on the screening results, *in situ* pressure testing was not required.
- At the time of the call all indications met the condition monitoring limits demonstrating that tube integrity was maintained. No *in-situ* pressure tests had been performed and none are planned.
- No inspections were planned for the secondary side steam drum. In response to an NRC staff question, the licensee stated that there was no history of degradation in the moisture separators and that some flow accelerated corrosion has occurred in the feedwater distribution ring.
- The licensee estimated all SG work would be completed by March 23, 2022.

Summary

The NRC staff did not identify any issues that required follow-up action at this time. The NRC staff asked to be notified in the event that any new degradation mechanisms were detected or *in-situ* pressure testing of tube indications was planned.

ATTACHMENT 1

ATTENDEES OF CONFERENCE CALL HELD ON MARCH 18, 2022,

REGARDING SPRING 2022 STEAM GENERATOR TUBE INSPECTIONS AT

VOGTLE ELECTRIC GENERATING PLANT, UNIT 2

DOCKET NO. 50-425

NAME	ORGANIZATION
John G. Lamb	U.S. Nuclear Regulatory Commission (NRC)
Paul Klein	NRC
Greg Makar	NRC
Andrew Johnson	NRC
Leslie Terry	NRC
Steve Bloom	NRC
Chris Safouri	NRC
Michael Magyar	NRC
DeLisa Pournaras	Southern Nuclear Operating Company (SNC)
Ryan Joyce	SNC
Cheryl Gayheart	SNC
Chris Gamblin	SNC
Cotasha Blackburn	SNC
Keith Walden	SNC
Brett Evans	SNC
Jonathan Thompson	SNC
Michael Krinock	SNC
Bob Chappo	SNC
Jim Rockovich	SNC

ATTACHMENT 2

PRELIMINARY STEAM GENERATOR TUBE INSPECTION DISCUSSION POINTS

Vogtle, Unit 1, Refueling Outage 22 (2R22)

1. Discuss any trends in the amount of primary-to-secondary leakage observed during the recently completed cycle.

a. No primary-to-secondary leakage during previous inspection cycle.

2. Discuss whether any secondary side pressure tests were performed during the outage and the associated results.

a. None

3. Discuss any exceptions taken to the industry guidelines.

a. None

4. For each steam generator (SG), provide a description of the inspections performed including the areas examined and the probes used (e.g., dents/dings, sleeves, expansion-transition, U-bends with a rotating probe), the scope of the inspection (e.g., 100 percent of dents/dings greater than 5 volts and a 20 percent sample between 2 and 5 volts), and the expansion criteria.

Exam	Percentage	Probe	Extent	Expansion Criteria
Full Length	100%	X-Probe (Bobbin/Array)	Tube End to Tube End	None
Low Row U-Bend	100%	Bobbin	Candy Cane from Hot Leg (HL) Rows 3-5	None
		Array Only		
		+Point	Row 1 and 2 U-bends from the top tube support plate (TSP) on the HL to the top TSP on the Cold Leg (CL)	
HL Top of Tubesheet	100%	+Point	HL tubes from top of tubesheet (TTS) to licensed H* ARC depth (+3/-15.2 inches) / HL bulge and	None

Exam	Percentage	Probe	Extent	Expansion Criteria
			overexpansion populations	
Special Interest				
I-Codes	100%	+Point		None
Dings/Dents ≥ 2 volts in HL straight Lengths and U-Bends (New and Existing)	100%	+Point	HL Straight Lengths and U-Bends (New and existing)	None
Dings/Dents > 5.0 Volts in CL straight lengths (New and Existing)	50%	+Point	CL Straight Length (New and Existing)	Expansion on an as needed basis
Dings/Dents between 2.0-5.0 Volts in CL Straight Lengths (New and Existing)	25%	+Point	In CL Straight Lengths (New and Existing)	Expansion on an as needed basis
2-Sigma High Stress Tubes	100%	+Point	TSP HL/CL Intersections, TTS HL/CL Expansion Transitions, and ≥ 2 Volts	None
Existing Possible Loose Parts (PLPs)	100%	+Point / X-Probe	TTS	None
New PLPs	100%	+Point / X-Probe	TTS	None

5. For each area examined (e.g., tube supports, dent/dings, sleeves, etc.), provide the following:
 - a. A summary of the number of indications identified to date for each degradation mode (e.g., number of circumferential primary water stress corrosion cracking indications at the expansion transition).
 - i. **Anti-Vibration Bar Wear [AVB]:**
 - SG1: ~94 indications
 - SG2: ~76 indications
 - SG3: ~40 indications
 - SG4: ~106 indications
 - ii. **Historical Foreign Object Wear [FOW] / Secondary Side [SS]**
 - Cleaning Loss:
 - SG1: 5 indications
 - SG4: 1 indication

iii. **Other indications of interest:**

SG1: One I-code awaiting Ghent probe retest on Tube support hot leg side (TSH), not historical

SG4: Two I-codes awaiting Ghent probe retest on 7th tube support on hot leg side (7H) and TSH, both are not historical.

- b. For the most significant indications in each area, provide an estimate of the severity of the indication (e.g., voltage, depth, and length of the indication), including whether SG tube integrity (structural and accident induced leakage integrity) was maintained during the previous operating cycle. In addition, discuss any analyses performed specifically for the most significant indications to demonstrate tube integrity.

i. **Structural and leakage integrity was maintained during the previous inspection interval**

ii. **Max AVB wear, 42% through wall (TW), less than CM [condition monitoring] limit**

iii. **Max historical FOW / SS Cleaning Loss 22% TW, less than CM limit**

- c. Discuss whether any location exhibited a degradation mode that had not previously been observed at this location at Vogtle, Unit 2 (e.g., observed circumferential primary water stress corrosion cracking at the expansion transition for the first time at this unit).

i. **Pending special interest exams**

6. Describe repair/plugging plans.

- a. **Any tube wear $\geq 40\%$ TW will be plugged on detection, any confirmed crack will be plugged on detection, and any additional tubes will be plugged on an as-needed basis to support the operational assessment. Circumferential cracks or accelerated growth rates will be stabilized.**

7. Describe in-situ pressure test and tube pull plans and results (as applicable and if available).

- a. **As of the data at 0800 EST [Eastern Standard Time], there are no indications that require in-situ pressure testing. For any confirmed cracks, line-by-line sizing will be completed to start the screening process. The line by line sizing information will then be used in parallel with the Vogtle 2R22 DA's [degradation assessment] instructions for in-situ pressure test screening.**
- b. **No tube pulls are planned to be performed.**

8. Discuss the following regarding loose parts:
 - a. The inspections performed to detect loose parts.
 - i. **TTS Visual Inspection in all SGs**
 - ii. **Sludge Lance in all SGs**
 - iii. **Foreign object search and retrieval (FOSAR) TTS in all SGs**
 - iv. **Top Support Plate Visual Inspection SG2**
 - b. A description of any loose parts detected and their location within the SG (including the source or nature of the loose part, if known).
 - i. **See Table 1**
 - c. If the loose parts were removed from the SG.
 - i. **See Table 1**
 - d. Indications of SG tube damage associated with the loose parts.
 - i. **There have been no new instances of FOW, only indications from previous inspections**
9. Discuss the scope and results of any secondary side inspection and maintenance activities (e.g., in-bundle visual inspections, feedring inspections, sludge lancing, assessing deposit loading, etc.).
 - a. **See response to Question 8**
 - b. **Additionally, sludge profiling will be completed post-outage from SG4 sludge.**
10. Discuss any unexpected or unusual results.
 - a. **None**
11. Provide the schedule for SG-related activities during the remainder of the current outage
 - a. **ECT [eddy current testing] in all SGs is estimated to be completed on Wednesday, March 23.**

TABLE 1

SG No.	Foreign Object No.	Retrieval Status	Foreign Object Description	Leg / Region	Height above Support (In.)	Beginning Row	End Row	Beginning Column	End Column	Is Legacy	Length (In.)	Width (In.)	Height (In.)
SG1	1001	Will Not Retrieve	Sludge Rock	Tubelane	0.01	0	0	75	76	New	0.25	0.25	0.3
SG1	1002	Will Not Retrieve	Sludge Rock	Tubelane	0.01	0	1	63	64	New	0.3	0.25	0.5
SG1	1003	Will Not Retrieve	Sludge Rock	Tubelane	0.01	36	37	20	20	New	0.292	0.292	0.292
SG1	1004	Will Not Retrieve	Sludge Rock	Tubelane	1.5	44	44	97	98	New	0.292	0.292	0.292
SG2	2001	Will Not Retrieve	Sludge Rock	Hot Leg	0.01	21	22	8	8	New	0.29	0.29	0.29
SG2	2004	Will Not Retrieve	Other - Unkown	Hot Leg	0.01	21	21	61	62	Legacy	0.175	0.03	0.175
SG2	2002	Will Not Retrieve	Sludge Rock	Cold Leg	0.01	51	52	33	33	New	0.29	0.2	0.29
SG4	4001	Will Not Retrieve	Sludge Rock	Hot Leg	0.001	21	22	5	6	New	0.292	0.292	0.35
SG4	4002	Will Not Retrieve	Sludge Rock	Cold Leg	0.001	49	50	87	88	New	0.25	0.25	0.25

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TUBE INSPECTIONS (EPID L-2022-NFO-0002) DATED APRIL 11, 2022

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ADAMS Accession No. ML22095A229

OFFICE	NRR/DORL/LPL2-1/PM	NRR/DORL/LPL2-1/LA	NRR/DNRL/NCSSG/BC
NAME	JLamb	KGoldstein	SBloom
DATE	4/5/2022	04/06/2022	4/4/2022
OFFICE	NRR/DORL/LPL2-1/BC	NRR/DORL/LPL2-1/PM	
NAME	MMarkley	JLamb	
DATE	4/11/2022	4/11/2022	

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