

OCT 24 2019

Docket No. 50-364

NL-19-1296

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555-0001Joseph M. Farley Nuclear Plant – Unit 2  
Refueling Outage 2R26 Steam Generator Tube Inspection Report

Ladies and Gentlemen:

In accordance with the requirements of Joseph M. Farley Nuclear Plant Technical Specification 5.6.10, Southern Nuclear Operating Company submits the enclosed report of the steam generator tube inspections performed during the twenty-sixth refueling outage on Unit 2 (2R26.)

This letter contains no NRC commitments. If you have any questions, please contact Jamie Coleman at 205.992.6611.

Respectfully submitted,

  
Cheryl A. Gayheart  
Regulatory Affairs Director

CAG/was/sm

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cc: Regional Administrator, Region II  
NRR Project Manager – Farley Nuclear Plant  
Senior Resident Inspector – Farley Nuclear Plant  
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**Joseph M. Farley Nuclear Plant – Unit 2  
Refueling Outage 2R26 Steam Generator Tube Inspection Report**

**Enclosure**

**2R26 Steam Generator Tube Inspection Report**

JOSEPH M. FARLEY NUCLEAR PLANT – UNIT 2  
2R26 STEAM GENERATOR TUBE INSPECTION REPORT

The Joseph M. Farley Nuclear Plant (Farley) – Unit 2 Refueling Outage 26 (2R26) was conducted after a steam generator (SG) service equivalent to 4.13 effective full power years (EFPY) from the previous SG eddy current inspections. No tube leakage was reported during this operating interval comprised of cycles 24, 25 and 26. No tubes were plugged during Farley 2R26. Based on steam generator (SG) eddy current and visual inspection data, there are two existing degradation mechanisms in the Farley Unit 2 Replacement Steam Generators (RSGs). The existing degradation mechanisms are:

- Mechanical Wear at Anti-Vibration Bar (AVB) Tube Supports
- Mechanical Wear at Tube Support Plate (TSP) Intersections

A. The Scope of Inspections Performed on Each Steam Generator:

The inspection program, as required by EPRI PWR SG Examination Guidelines, addressed the potential and existing degradation mechanisms for Farley Unit 2 RSGs. The defined scope for Farley Unit 2, implemented during refueling outage 2R26, included the following:

1. Bobbin Exams (all 3 SGs)
  - 100% full length tube-end to tube-end except row 1 U-bends
2. Array Probe Examinations (all 3 SGs)
  - Tubesheet periphery 3-tubes deep, tube-end to first support
  - No-tube lane Rows 1-3, tube-end to first support
  - 20% of dents and dings  $\geq 2.0$  Volts
  - Affected and bounding tubes for foreign objects
  - Sample of hot leg inner bundle tubes, tube end to first support hot
  - Select tubes in SG A only acquired for potential deposit mapping analyses, seventh support cold (07C) to tube end hot
3. + Point™ rotating pancake coil (RPC) (all 3 SGs)
  - 100% Row 1 U-bend regions, seventh support hot (07H)-1.0" to 07C-1.0"
  - Sample of tubes to bridge the gap between Array and +Point™ including:
    - All bulge (BLG) between the tube-end +10" to the Top of Tube Sheet (TTS) that are included in the periphery and no-tube lane array inspections (SG A and SG B hot and cold leg, SG C cold leg only)
    - All TSP wear indications in SG A
4. Primary Side Visual Inspections (all 3 SGs)
  - All tube plugs (only one plugged tube in SG B)
  - SG channel head bowl cladding and internal surfaces in accordance with Westinghouse NSAL-12-1, which consisted of the entire channel head

internal surfaces, namely the entire tubesheet, cladding, divider plate, and associated welds/components.

5. Secondary Side Inspections (all 3 SGs)

- TTS water lancing
- Visual inspections and Foreign Object Search and Retrieval (FOSAR) on all foreign objects
- Post-lancing TTS visual inspections to assess material condition, structural integrity, deposit accumulation and foreign objects, including:
  - Annulus region and no-tube lane
  - Inner bundle passes in the sludge region (every 5th column)

B. Active Degradation Mechanisms Found:

Anti-Vibration Bar (AVB) Wear

Two (2) indications of AVB wear were identified in two different tubes in SG B during Farley 2R26. The two indications of AVB wear were repeats and had been identified previously in 2R23. The bobbin probe sizing of the larger of the two indications was measured at 14% through-wall (TW) while the other was 8% TW. Based on the inspection data, structural integrity requirements have been met at the 2R26 inspection. The complete listing of AVB wear indications are in Table 1.

Tube Support Plate (TSP) Wear

Nine (9) indications of mechanical wear at or near tube intersections with TSP were identified during 2R26. The bobbin inspection program performed identified six new wear indications in six different tubes and three previously identified wear indications in two different tubes. There were six such wear indications in SG A and three in SG B. Based on the inspection data, structural integrity requirements have been met at the 2R26 inspection. The complete listing of TSP wear indications is in Table 2.

C. Nondestructive Examination Techniques Utilized for Each Degradation Mechanism

Degradation Mechanism(s)	Probe	EPRI ETSS
AVB Wear	Bobbin	96041.1 (Rev. 6) App. I
	+Point™	10908.4 (Rev. 1)
	Array	17908.2 (Rev. 1) App. I 17908.5 (Rev. 1) App. I 17909.2 (Rev. 1) App. I 17909.5 (Rev. 1) App. I

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Degradation Mechanism(s)	Probe	EPRI ETSS
TSP/Flow Distribution Baffle Wear	Bobbin	96004.1 (Rev. 13)
	+Point™	96910.1 (Rev. 11)
	Array	11956.1 (Rev 3) 11956.2 (Rev 2)
Foreign Object Wear	Bobbin	27091.2 (Rev. 2)
	+Point™	27901.1 (Rev. 1) 27902.1 (Rev. 2) 27903.1 (Rev. 1) 27904.1 (Rev. 2) 27905.1 (Rev. 2) 27906.1 (Rev. 1) 27907.1 (Rev. 2)
	Array	17901.1 (Rev. 0) – Ax. 17901.3 (Rev. 0) – Cir. 17902.1 (Rev. 0) – Ax. 17902.3 (Rev. 0) – Cir. 17903.1 (Rev. 0) – Ax. 17903.3 (Rev. 0) – Cir. 17904.1 (Rev. 0) – Ax. 17904.3 (Rev. 0) – Cir. 17905.1 (Rev. 0) – Ax. 17905.3 (Rev. 0) – Cir. 17906.1 (Rev. 0) – Ax. 17906.3 (Rev. 0) – Cir.

- D. Location, Orientation (if linear) and Measured sizes (if available) of Service Induced Indication

**Table 1: Farley 2R26 AVB Wear Indications - Bobbin**

SG	Row	Column	% TWD	Location
B	36	60	14	AV3
B	41	44	8	AV4

% TWD- Percent Through-wall Depth

AV#- Location of AVB intersection with the tube



**Table 2: Farley 2R26 TSP Wear Indications - Bobbin**

SG	Row	Column	% TWD	Location
A	4	20	8	05C
A	4	20	4	06C
A	4	25	5	05C
A	34	77	6	07C
A	41	60	7	07C
A	47	50	6	05C
B	1	1	6	03C
B	1	94	5	05C
B	3	2	7	03C

% TWD- Percent Through-wall Depth

E. Number of Tubes Plugged During the Inspection Outage

There were no tubes plugged during 2R26 refueling outage.

F. Total Number or Percentage of Tubes Plugged to Date

**Table 3: Farley Unit 2 SG Plugged Tubes**

SG	Number of tubes	Tubes plugged in 2R26	Total tubes plugged	Percent plugged
A	3592	0	0	0%
B	3592	0	1	0.03%
C	3592	0	0	0%
<b>Total</b>	<b>10776</b>	<b>0</b>	<b>1</b>	<b>0.01%</b>

G. The results of Condition Monitoring, including the results of Tube Pulls and In-Situ Testing.

Based on the inspection data, AVB wear and TSP wear were the only active degradation mechanism observed in 2R26. No indications of AVB and TSP wear were found to be in excess of the condition monitoring limits. No tubes exhibited degradation that required in situ pressure testing and there was no primary to secondary leakage prior to the end of the inspection interval. No tube pulls were planned, and none were performed. During the SG channel head bowl visual examination there were no abnormal conditions identified. No secondary side tube damage was attributed to the foreign objects identified from 2R26 top of tubesheet visual inspections and FOSAR. The SG performance criteria for

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operating leakage and structural integrity were confirmed to have been satisfied for the preceding Farley Unit 2 RSG operating interval.