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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001Joseph M. Farley Nuclear Plant - Unit 1
Refueling Outage 1R29 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-ninth outage on Unit 1 (1R29).

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

Respectfully submitted,

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Regulatory Affairs Director

CAG/dsp/sm

Enclosure: 1R29 Steam Generator Tube Inspection Report

cc: Regional Administrator, Region II
NRR Project Manager – Farley Nuclear Plant
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**Joseph M. Farley Nuclear Plant - Unit 1
Refueling Outage 1R29 Steam Generator Tube Inspection Report**

Enclosure

1R29 Steam Generator Tube Inspection Report

JOSEPH M. FARLEY NUCLEAR PLANT – UNIT 1
1R29 STEAM GENERATOR TUBE INSPECTION REPORT

The Joseph M. Farley Nuclear Plant (Farley) – Unit 1 Refueling Outage 29 (1R29) was conducted after steam generator (SG) service equivalent to 4.05 effective full power years (EFPY) from the previous SG eddy current inspections. No tube leakage was reported during this operating interval comprised of cycles 27, 28, and 29. No tubes were plugged during Farley 1R29. Based on SG eddy current and visual inspection data, there are two existing degradation mechanisms in the Farley Unit 1 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 1 RSGs. The defined scope for Farley Unit 1 implemented during refueling outage 1R29 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
 - Select tubes from tube-end-hot (TEH) to the top support on the cold leg (07C) for SGA only acquired for potential deposit mapping analyses
 - Sample of hot leg inner bundle tubes (~9%), tube end to first support hot (01H)
 - All bulge (BLG) in SGC and all BLG in SGA and SGB between the tube-end +10 inch to the top of tube sheet (TTS)
 - All new AVB and TSP wear $\geq 10\%$ through wall (TW)
 - All dents and dings ≥ 2.0 Volts
 - Affected and bounding tubes for foreign objects identified
3. + Point rotating pancake coil (RPC) (all 3 SGs)
 - 100% Row 1 U-bend regions, seventh support hot (07H)-1.0" to seventh support cold (07C)-1.0"
 - Sample of tubes to bridge the gap between Array and +Point™ including:
 - Dent/Dings (DNT/DNG) > 5 Volts
 - All DNT/DNG in SGC tube 42-72

4. Primary Side Visual Inspections (all 3 SGs)
 - 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 identified
 - 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

During 1R29, there were no new indications of AVB wear identified. AVB wear was identified only in SGC tube Row 38 Column 59. In this tube, five AVB wear indications were identified with bobbin depths ranging from 7%TW to 20%TW. Based on the inspection data structural integrity requirements have been met at the 1R29 inspection. The complete listing of AVB wear indications are in Table 1.

Tube Support Plate (TSP) Wear

TSP wear was identified in all Farley SGs. Between all three SGs, twenty-five TSP wear indications were identified, in total, with bobbin depths ranging from 3%TW to 14%TW. The bobbin inspection program performed identified two new wear indications in two different tubes and twenty-three previously identified wear indications in nineteen different tubes. Based on the inspection data structural integrity requirements have been met at the 1R29 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
	Array	17909.2 (Rev. 1) App. I
TSP/Flow Distribution Baffle Wear	Bobbin	96004.1 (Rev. 13)

Degradation Mechanism(s)	Probe	EPRI ETSS
	Array	11956.1 (Rev 3)
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 1R29 AVB Wear Indications - Bobbin

SG	Row	Column	Indication	% TWD	Location
C	38	59	TWD	7	AV1
C	38	59	TWD	15	AV2
C	38	59	TWD	19	AV3
C	38	59	TWD	20	AV4
C	38	59	TWD	11	AV5

TWD – Through Wall Depth / Volumetric Indication Sizing

AV#- Location of AVB intersection with the tube

% TWD - Percent Through-wall Depth

Table 2: Farley 1R29 TSP Wear Indications - Bobbin

SG	Row	Column	Indication	% TWD	Location
A	1	20	TWD	8	04C
A	1	20	TWD	8	05C
A	1	20	TWD	5	06C
A	1	41	TWD	10	06C
A	1	75	TWD	4	05C
A	1	75	TWD	8	06C
A	3	4	TWD	8	05C
A	46	37	TWD	5	05H
B	1	7	TWD	7	06C
B	1	22	TWD	4	05C
B	1	76	TWD	10	06C
B	2	1	TWD	4	04C
B	2	77	TWD	6	05C
B	4	2	TWD	4	04C
B	4	2	TWD	5	05C
B	4	70	TWD	5	05C
B	6	1	TWD	5	05H
B	30	55	TWD	5	03H
B	46	53	TWD	6	07H
C	1	34	TWD	5	06C
C	1	45	TWD	14	05C
C	1	74	TWD	9	06C
C	4	2	TWD	5	05C
C	10	4	TWD	4	04H
C	16	4	TWD	3	05C

TWD – Through Wall Depth / Volumetric Indication Sizing

% TWD - Percent Through-wall Depth

0#C/0#H = Location at TSP intersection with the tube on the hot and cold leg

E. Number of Tubes Plugged During the Inspection Outage

There were no tubes plugged during the 1R29 refueling outage.

F. Total Number or Percentage of Tubes Plugged to Date

Table 3: Farley Unit 1 SG Plugged Tubes

SG	Number of tubes	Tubes plugged in 1R29	Total tubes plugged	Percent plugged
A	3592	0	0	0%
B	3592	0	0	0%
C	3592	0	0	0%
Total	10776	0	0	0%

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 1R29. 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. 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 1R29 top of tubesheet visual inspections and FOSAR. The SG performance criteria for operating leakage and structural integrity were confirmed to have been satisfied for the preceding Farley Unit 1 RSG operating interval.