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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Joseph M. Farley Nuclear Plant – Unit 1
Refueling Outage 1R26 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 1 (1R26.)

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

Sincerely,

C. R. Pierce

C.R. Pierce
Regulatory Affairs Director

CRP/JMC

Enclosure: 1R26 Steam Generator Tube Inspection Report

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Joseph M. Farley Nuclear Plant – Unit 1
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Enclosure

1R26 Steam Generator Tube Inspection Report

The Joseph M. Farley Nuclear Plant (Farley) – Unit 1 Refueling Outage 26 (1R26) was conducted after cumulative Replacement Steam Generators (RSG) service equivalent to approximately 13.7 effective full power years (EFPY). The service from previous RSG eddy current inspections at 1R23 was approximately 4.15 EFPY. No tube leakage was reported during this operating interval comprising of cycles 24, 25, and 26. Based on steam generator (SG) eddy current and visual inspection data, there are two existing degradation mechanisms in the Farley Unit 1 RSGs, and one was observed for the first time during the 1R26 inspection. The existing degradation mechanisms are:

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

A. The Scope of Inspections Performed on Each Steam Generator

The inspection program, as required by EPRI PWR SG Examination Guidelines, addressed the existing and potential degradation mechanisms for Farley Unit 1 RSGs. The defined scope for Farley Unit 1 implemented during refueling outage 1R26 included the following:

1. Bobbin exams (all 3 SGs)

   - 50% Bobbin full length examination of tubes in all SGs not inspected at 1R23, except for Rows 1 and 2 which were inspected from tube end to the top TSP from both the hot leg (HL) and cold leg (CL), such that all tubes were inspected in the combined two inspection cycles 1R23 and 1R26.

2. +Point rotating pancake coil (RPC) (all 3 SGs)

   - 50% +Point examination of Rows 1 and 2 U-bends in all SGs not inspected at 1R23 such that all tubes were inspected in the combined two inspection cycles 1R23 and 1R26.
   - +Point probe examination of the TTS periphery tubes consisting of every other tube three tubes deep on both the HL and CL side at the top of tube sheet (TTS) +/-3 inches in all the SGs. The total number of tests represents at least a 20% +Point probe sample.
   - 100% +Point probe examination of all dents and dings ≥ 2 volts in the straight lengths and U-bends of all SGs.
   - +Point tests of Special Interest tube locations in both the HL and CL of possible flaw from the bobbin program.

3. Visual inspection in all SGs channel head primary side HL and CL, inclusive of the entire divider plate to channel head weld and all visible clad surfaces. Specifically, visual inspections of the steam generator hot leg and cold leg divider plates and drain lines were performed, inclusive of the entire divider plate to channel head weld and all visible clad surfaces.

4. TTS Foreign Object Search and Retrieval (FOSAR) (all 3 SGs)

   - Visual examination of tube bundle periphery tubes from both the annulus and tube lane on both the HL and CL.
   - An in-bundle visual inspection with a focus on regions where objects have been previously identified.
   - Previous loose part locations and any PLP indications identified by the eddy current program.

5. Steam drum and feedring inspection (all 3 SGs)

   The steam drum and feedring were inspected for structural integrity, degradation, excessive deposits, flow accelerated corrosion, erosion, blockage, and overall condition.

B. Active Degradation Mechanisms Found

AVB Wear

Five indications of AVB wear were identified in one tube, R38 C59, in SG C during Farley 1R23. The tube was tested again during Farley 1R26. The bobbin probe sizing of the largest of the five indications was measured at 20% through-wall (TW) while the others were 19% TW, 19% TW, 12% TW, and 10% TW. This is a change from 16% TW, 16% TW, 15% TW, 10% TW, and 8% TW, respectively. The sixth AVB intersection in SG C was again categorized as a distorted support signal. The bobbin probe sizing results for this degradation mechanism is presented in Table 1 in Section D.

Tube Support Plate Wear

Twenty-eight indications of mechanical wear at or near tube intersections with Tube Support Plates (TSP) were identified during 1R26. The bobbin inspection program performed identified the indications in eighteen different tubes- four in SG A, nine in SG B, and five in SG C.

The indications were subsequently examined with the +Point probe for characterization. The +Point examination allowed the eddy current data analysts to confirm these bobbin calls as volumetric tube wear at TSP intersections. The +Point probe sizing results for this degradation mechanism is presented in Table 2 in Section D. Some of the indications showed interaction with the full 1.12 inch length of the TSP intersection while others were limited to either the top or bottom of the tube intersection with the TSP land.

C. Nondestructive Examination Techniques Utilized for Each Degradation Mechanism

Bobbin and +Point RPC eddy current probes were used to detect both existing and potential degradation mechanisms.

D. Location, Orientation (if Linear) and Measured Sizes (if available) of Service Induced Indication

Table 1: Farley 1R26 AVB Wear Indications: Bobbin

SG	Row	Column	Indication	% TWD	Location
C	38	59	PCT	10	AV1
C	38	59	PCT	19	AV2
C	38	59	PCT	19	AV3
C	38	59	PCT	20	AV4
C	38	59	PCT	12	AV5
C	38	59	DSS	-	AV6

% TWD- Percent Through-Wall Depth
PCT- Volumetric Indication Sizing
AV#- Location of AVB Intersection with the Tube
DSS- Distorted Support Signal

Table 2: Farley 1R26 TSP Wear Indications: +Point

SG	Row	Column	Indication	% TWD	Location
A	1	20	PCT	11	4C
A	1	20	PCT	5	4C
A	1	20	PCT	9	5C
A	1	20	PCT	8	5C
A	1	20	PCT	9	6C
A	1	41	PCT	12	6C
A	1	75	PCT	9	5C
A	1	75	PCT	15	6C
A	46	37	PCT	6	5H
B	1	7	PCT	11	6C
B	1	7	PCT	10	6C
B	1	22	PCT	6	5C
B	2	1	PCT	7	4C
B	2	77	PCT	10	5C
B	2	77	PCT	4	5C
B	4	2	PCT	5	4C
B	4	2	PCT	4	4C
B	4	2	PCT	6	5C
B	4	70	PCT	11	5C
B	6	1	PCT	6	5H
B	30	55	PCT	10	3H
B	46	53	PCT	10	7H
C	1	34	PCT	8	6C
C	1	74	PCT	5	6C
C	1	74	PCT	8	6C
C	4	2	PCT	11	5C
C	10	4	PCT	9	4H
C	16	4	PCT	6	5C

E. Number of Tubes Plugged During the Inspection Outage

No tubes were plugged in SG 1A, SG 1B, or SG 1C during the 1R26 refueling outage.

F. Total Number of Percentage of Tubes Plugged to Date

No tubes have been plugged in SG 1A, SG 1B, or SG 1C to date.

Table 3: Farley Unit 1 SG Plugged Tubes

SG	# of Tubes	Tubes Plugged in 1R26	Total Tubes Plugged	% Plugged
A	3,592	0	0	0.00%
B	3,592	0	0	0.00%
C	3,592	0	0	0.00%
Total	10,776	0	0	0.00%

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 mechanisms observed in 1R26. 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 secondary side tube degradation was attributed to the foreign objects identified from 1R26 TTS 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.

The visual inspection of the steam generator channel head bowl was performed satisfactory with no degradation observed in the channel heads of all three steam generators. The steam drum and feedring inspections discovered no structural anomalies, and no degradation was observed in any of the steam drum and feedring components.