March 23, 2015

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

Re: St. Lucie Unit 2
Docket No. 50-389
Response to Request for Additional Information Regarding the Spring 2014 Steam Generator Tube Inspections

References:

1. FPL letter L-2014-291 dated September 18, 2014: Steam Generator Tube Inspection Report (NRC ADAMS Ascension # ML14279A237)
2. NRC Email Letter dated January 27, 2015: St. Lucie Plant, Unit 2 – Request for Additional Information (RAI) Regarding the Spring 2014 Steam Generator Tube Inspections. (NRC ADAMS Ascension # ML15028A007)

Per Reference 1 above, Florida Power and Light Company (FPL) submitted information summarizing the results of the spring 2014 steam generator tube inspections performed at St. Lucie, Unit 2. These inspections were performed during refueling outage 21.

By email dated January 27, 2015 (Reference 2), the NRC Staff requested additional information regarding the spring 2014 steam generator tube inspections. The attachment to this letter provides the detailed response to the requests for additional information.

Please contact Richard Sciscente at (772) 467-7156 if there are any questions about this submittal.

Sincerely,

Eric Katzman
Licensing Manager
St. Lucie Plant

ESK/rcs

Attachment

cc: USNRC Regional Administrator, Region II
USNRC Senior Resident Inspector, St. Lucie Units 1 and 2

A001
NRR

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING THE SPRING 2014 STEAM GENERATOR TUBE INSPECTIONS

By letter dated September 18, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14279A237), Florida Power & Light Company submitted information summarizing the results of the Spring 2014 steam generator tube inspections performed at St. Lucie, Unit 2. These inspections were performed during refueling outage 21.

The NRC staff has reviewed the information the licensee provided and determined that the following additional information is needed in order to complete the review.

RAI-1

Clarify whether the U-bends of rows 1 and 2 were inspected with the bobbin probe.

RESPONSE

Yes, all Row 1 and 2 tubes were inspected full length with the bobbin probe.

RAI-2

Discuss the results of the Plug Visual Inspections. Were all plugs confirmed to be present and free of degradation?

RESPONSE

Prior to starting the eddy current examination at the End-of-Cycle 20 (EOC-20) refueling outage in 2014, all of the previously installed hot-leg and cold-leg plugs in Steam Generator 2A and Steam Generator 2B were confirmed to be present in their correct locations. In addition, all of the hot-leg and cold-leg plugs were confirmed to be free from degradation and visible signs of leakage based on the visual examination.

RAI-3

Discuss the results of the Supplemental Primary Side Inspections to address Westinghouse NSAL 12-01. Was any degradation of the channel head cladding detected?

RESPONSE

Visual inspection of the steam generators (SGs) at a Westinghouse designed plant showed indications of degradation in the cladding and/or divider plate-to-channel head weld, with exposure and wastage of the channel head base. Westinghouse issued NSAL 12-01 "Steam Generator Channel Head Degradation" on January 5, 2012 and included recommended actions for the visual inspection at other plants. Although the degradation described in NSAL 12-01 is not directly applicable to St. Lucie Unit 2 (per Table 1 of NSAL 12-01), a visual inspection of the primary side channel head bowl (in both SGs) was performed in accordance with the requirements presented in Westinghouse NSAL 12-01. No channel head degradation related to NSAL 12-01 was detected.

RAI-4

Discuss the results of the following Secondary Side Inspection and cleaning activities:

a. Upper Bundle Flush
b. Sludge Lance
c. Foreign object search and retrieval
d. Upper internals visual inspection

RESPONSE

Upper Bundle Flush and Sludge Lancing were performed in both SGs. A total of 89.5 lbs of sludge was removed from the SGs; 36 lbs. from SG 2A and 53.5 lbs. from SG 2B.

Foreign Object Search and Retrieval (FOSAR) was performed on both SGs at the top-of-tubesheet location. One small piece of foreign material was removed from SGA H/L top-of-tubesheet; no tube wear was associated with the foreign object. The lens and cover from an indexing camera were discovered to be missing during dis-mounting of the water lancing equipment used in SG 2B. A search was performed within and outside of the steam generator but the lens and cover were not found. These parts collectively weigh 4.05 grams and were conservatively assumed to be inside the SG; their impact on SG tube integrity has been evaluated within the corrective action program.

The upper steam drum components listed below were visually examined (in both SGs):

- Stabilizers and Water Level Taps
- Recirculation Pipe Flange Assembly
- Feedring inspection port covers
- Wrapper Room Hatches
- Manway Hatch to Top of Dryers
- SG-B Lower Separator Support Stuck Studs
- SG-A Lower Separator Support Stuck Studs
- Loose Parts Trapping System

Additional inspections included a sample of primary separators, secondary separator perforated plates, drain pipes, the feedring nozzles, other access hatches and inspection ports, and support structures.

The loose part trapping system screens were examined for foreign objects in both SGs. The Loose Parts Trapping Systems remain structurally sound with no signs of structural damage. Three foreign objects were retrieved from the screens. One retrieved foreign object (in SG 2B) was a piece of gasket material of unknown origin. The other two retrieved foreign objects (one in each SG) were determined to be part of the support system for the feedrings. Additional inspections identified that the feedring supports for both SGs had been damaged due to a water hammer event caused by a steam void in the feedring system. Denting to a j-tube stiffener and some j-tubes was also identified. The damaged supports were repaired during the outage. The function of the feedring was not impacted. The St. Lucie Unit 2 feedrings have a split design (not a full donut) and had bolted inspection ports installed at the ends of each pipe section. The four feedring inspection port covers were found to be loose. All four inspection port covers were replaced with welded end caps during SL2-21 to prevent loosening during future operation. No other abnormalities were observed during the Upper Internals visual inspection.

RAI-5

Summarize the number of tubes and the number of indications associated with the tube support structures (anti-vibration bars, tube support plates, V-shaped pads, apex of anti-vibration bars).

RESPONSE

EOC-20 Number of Affected Tubes at associated Tube Support Structures

Location	Mechanism	S/G 2A	S/G 2B	Total
Anti-Vibration Bars	Wear	2523	1788	4311
U-Bend Apex (AV4/5)	Wear	16	6	22
AVB - Transition Tube	Wear/Volumetric	1	0	1
V-Shaped Support Pads	Wear	1	1	2
V-Shaped Support Bar	Wear	1	0	1
Tube Support Plates	Wear	97	107	204
Foreign Objects	Volumetric	0	0	0

EOC-20 Number of Indications at associated Tube Support Structures

Location	Mechanism	S/G 2A	S/G 2B	Total
Anti-Vibration Bars	Wear	8734	5061	13795
U-Bend Apex (AV4/5)	Wear	16	6	22
AVB - Transition Tube	Wear/Volumetric	1	0	1
V-Shaped Support Pads	Wear	1	1	2
V-Shaped Support Bar	Wear	1	0	1
Tube Support Plates	Wear	127	122	249
Foreign Objects	Volumetric	0	0	0
S/G Total:		8880	5190	14070

Note: In the above tables,

- The Location listed as "AVB – Transition Tube" refers to the wear indication in SG-A, in Row 41 Column 154, which is discussed in RAI # 7.
- The Location listed as "V-Shaped Support Bar" refers to the wear indication in SG-A, in Row 91 Column 24, which is discussed in RAI # 6.

RAI-6

One tube was plugged since it had wear associated with a neighboring tube's V-shaped support pad. Has this phenomenon been observed in the past? Are the V-shaped support pads in close proximity to the neighboring tubes? Would this occurrence be expected given the design (rigidity) of the anti-vibration bar support structure and the spacing between the tubes?

RESPONSE

The tube discussed in the RAI is in Row 91 Column 24 (R91C24) in SG-A of the St. Lucie 2 RSGs and had a wear indication created by contact with the side of the adjacent (neighboring) V-shaped support pad at AV7+18.38, which is in close proximity to the AV8 location. The tube that is supported by the V-shaped support pad is Row 90 Column 23 (R90C23).

This indication (R91C24) is the first reported occurrence of this type of wear. The V-shaped support pads are designed to be in very close proximity to the adjacent tubes (i.e. neighboring tubes). The AVB bars and V-shaped support pads are located at different axial elevations. Contact between a V-shaped support pad and the adjacent tubes is not expected by design. The contact between the V-shaped support pad and the neighboring tube is most likely due to a misalignment of the V-shaped support pad during manufacturing. With this misalignment, it is then possible that the V-shaped pad that is supporting tube R90C23 to induce wear on the adjacent tube (R91C24).

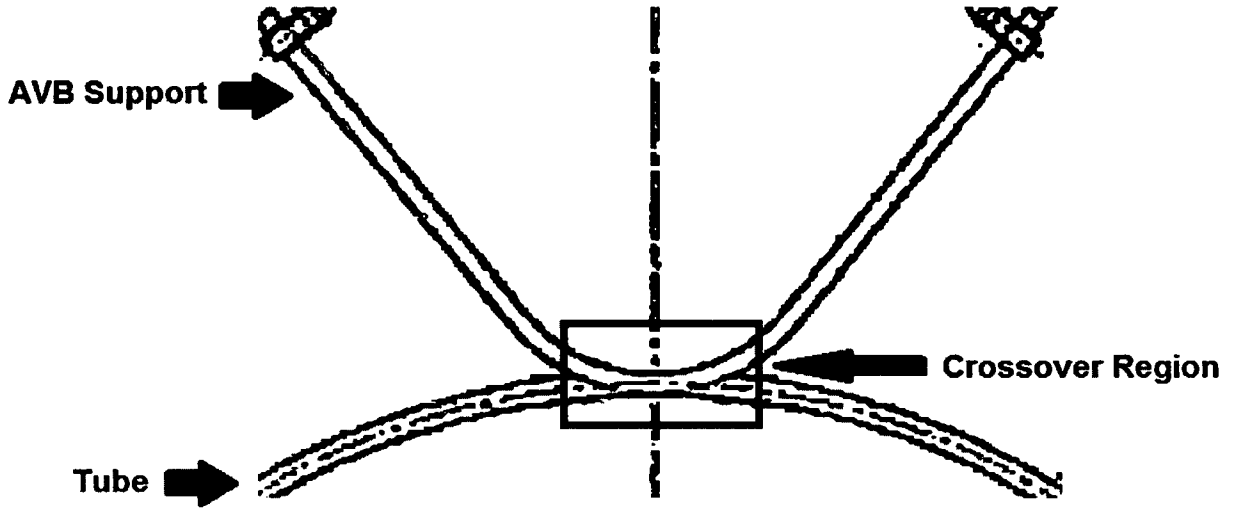
RAI-7

One tube was plugged since the length of the indication associated with the anti-vibration bar was shorter than most anti-vibration bar wear indications. Discuss any insights on this occurrence.

RESPONSE

The indication referred to in RAI-7 is located in the St Lucie Unit-2, steam generator A (SG-A), tube Row 41 Column 154. To clarify, note that the tube was plugged because the indicated depth measurement using the +Point probe was 41% TW, as discussed in Note 4 of Section "e" of the SL2-21 SG Tube Inspection Report (ML 14279A237), not because it had a short axial length. The indication was reported as a single volumetric indication (SVI) at location AV3 +2.02".

This indication is at a location where the top of the U-bend is in close proximity to the bottom of the AVB bar. This location is referred to as the "crossover region" as shown in the sketch below.



The SVI is due to mechanically-induced wear occurring between the tube and AVB support. Normally, this indication would be reported and sized as a wear indication, but it was conservatively reported as an "SVI" to give it a unique reporting code in the database. The short axial length of the indication (0.15") is most likely attributed to tube-to-AVB contact over a short span in the "crossover region" as shown in the sketch above.