FPL

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L-2004-253

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Request for Additional Information -
Steam Generator Tube Inspection Summary Reports

By letter dated October 7, 2004, NRC issued a Request for Additional Information regarding Units 3 and 4 steam generator tube inspection summary reports. The attachment to this letter provides the information requested.

Please contact Walter Parker at (305) 246-6632 if there are any questions.

Very truly yours,

Terry Jones

Terry O. Jones
Vice President
Turkey Point Nuclear Plant

OIH

Attachment

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant

A047

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
STEAM GENERATOR TUBE INSPECTION REPORTS
FOR THE SPRING AND FALL 2003 OUTAGES
FLORIDA POWER AND LIGHT (FPL)
TURKEY POINT, UNITS 3 AND 4
DOCKET NOS. 50-250 AND 50-251**

1) a. In Attachment 1 of the Unit 3 in-service inspection summary (ISI) report, it was indicated that one tube (R1C86) in steam generator (SG) 3B was plugged due to a restriction (i.e., it would not pass a +Point™ rotating probe). Describe the nature and location of the restriction. Include a discussion of whether the restriction was service induced and the extent of it (e.g., what was the largest size probe to be passed through the tube during this outage and previous outages). If the restrictions are service induced, discuss the mechanism and the extent to which a tube can be affected.

FPL Response:

The subject tube (R1C86) was restricted to the passage of a .650 inch +Point™ rotating probe during the March 2003 (EOC19) inspection. The planned inspection extent for the R1 U-bends was from the 6th support on the hot leg (06H) to the 6th support on the cold leg (06C), a distance of approximately 13.2 inches. Repeated attempts were made to inspect R1C86 from both the hot leg and the cold leg. The hot leg inspection covered a distance of approximately 8.3 inches above 06H and the cold leg inspection covered a distance of approximately 4.3 inches above 06C. As a result of not achieving full coverage in the U-bend region with a qualified probe this tube was preventively removed from service. The area in the U-bend where data was evaluated was defect free. Although FPL examined a 20% random sample of the Row 1 and Row 2 U-bend regions with +Point™ rotating probes in March of 2000 and a 50% sample in October of 2001, R1C86 was not in either of these samples. The March 2003 RFO was the first time the U-bend region of R1C86 had been scheduled for examination with a +Point™ rotating probe. The examination results of the March 2000 and October 2001, and the examination results of the March 2003 inspections indicated no evidence of tube wall degradation in the U-bend regions of Row 1 and Row 2. Based on the favorable results of these inspections, and the fact that the U-bend region where data was evaluated in March 2003 was defect free, there is reasonable assurance that no tube wall degradation exists in the U-bend region of R1C86. As stated previously, the March 2003 refueling outage was the first time the U-bend region of R1C86 had been scheduled for examination with a +Point™ rotating probe. However, R1C86 was inspected, full length, with a .680 inch bobbin probe in March 1997, September 1998, and March 2000.

The restriction is believed to be due to tube ovalization as a result of the bending process during manufacturing and not service induced. The +Point™ rotating probe did pass through the U-bend; however, the ovalization of the tube prevented the probe from rotating through this region and achieving the minimum required

coverage. The past examinations with the bobbin probe were able to obtain good data in this area because it does not rotate and the ovalization did not affect its testing capability

b. It was noticed that on page 7 of the ISI report dated July 30, 2003, it was indicated that one tube was plugged during the 2001 refueling outage for Unit 3 due to a restriction in the U-bend to a +Point™ examination. Was this restriction of the same nature as the one referenced above? Discuss any analysis performed to determine what is causing these restrictions in the U-bend.

FPL Response:

The October 2001 refueling outage was the first time the U-bend region of R1C3 had been scheduled for examination with a +Point™ rotating probe. As with R1C86, the restriction is believed to be due to tube ovalization as a result of the bending process during manufacturing and not service induced. The entire U-bend region was traversed with the .650 inch +Point™ rotating probe; however, the data indicated incomplete coverage due to lack of coil rotation throughout the entire U-bend region. As a result of not achieving full coverage in the U-bend region with a qualified probe, R1C3 was preventively removed from service. With the exception of complete coverage in R1C3, FPL has inspected 100% of Row 1 and Row 2 U-bend regions with the "+Point™ rotating probe during the past two inspections (EOC18 &19) and the results indicate that there is no evidence of tube wall degradation. Therefore, based on the favorable results of these inspections, and the fact that the evaluated U-bend region of R1C3 in October 2001 was defect free, there is reasonable assurance that no tube wall degradation exists in the U-bend region of R1C3. R1C3 was inspected, full length, with a .700 inch bobbin probe in September 1998. Additionally, R1C3 was inspected, full length, with a .680 inch bobbin probe in March 1997, September 1995, March 1994, September 1992, and March 1990. No further analysis was required for this condition. The restriction is not service induced, is very limited and no U-bend degradation has been identified for the Turkey Point steam generators.

c. The inspection scope for the 2001 Unit 3 refueling outage consisted of +Point™ examinations of 50 percent of the Row 1 and 2 U-bends while the inspection scope of the 2003 Unit 3 outage also consisted of +Point™ examinations of 50 percent of the Row 1 and 2 U-bends. Clarify whether the 50 percent inspected during the 2003 outage included any of the tubes inspected during the 50 percent U-bend sample in 2001.

FPL Response:

The inspection scope for the October 2001 (EOC18) refueling outage consisted of a 50% +Point™ examination of the U-bend regions in Row 1 and Row 2 inservice tubes. The inspection scope for the March 2003 (EOC19) refueling outage consisted of +Point™ examinations of the remaining Row 1 and Row 2 U-bend regions (those not inspected in October 2001).

2) In Attachment 1 of the Unit 4 ISI summary report, it was indicated that one tube (R45C45) was preventatively plugged due to a volumetric type signal caused during a loose part retrieval activity. Discuss whether there was a dent/ding at this location, the size (length, depth, percent degraded area) and nature of the flaw, and any additional testing performed to assess the integrity of the tube (e.g., ultrasonic testing, in-situ pressure testing).

FPL Response:

There was no evidence of a dent/ding associated with the indication in SG 4A (R45C45). The tube wall damage reported in R45C45 at TSC +12.15 inches was attributed to foreign object retrieval efforts and was documented in Condition Report (CR) 03-3446. The damage occurred just prior to the tube being examined by eddy current. The tube was damaged by the retrieval tool. In order to remove an object on the hot leg side of the generator a long handled tool was inserted through the bundle from the cold leg. This tool handle came in contact with tube R45C45 and left the mark detected by eddy current. The indication was initially detected and reported by the bobbin coil examination and consequently examined with +Point™ to facilitate profile sizing. The profile sizing results indicated an axial length of 0.8 inches, circumferential width of 0.24 inches and a maximum depth of approximately 27%. This indication fell below the condition monitoring (CM) structural limit curve. Profile data of the indication confirmed that the calculated burst pressure exceeded 3xNODP. Leakage potential for MSLB conditions is negligible. Therefore, the volumetric indication met the NEI 97-06 structural performance criterion for burst and leak integrity. No additional testing was necessary. Since the degradation was induced during the secondary side work in the same outage, this tube was not degraded while in service.

3) For Units 3 and 4, discuss any actions taken to identify and remove loose parts from the SGs. If any loose parts were not removed, discuss whether FPL assessed the impact the loose part could have on tube integrity during the interval between inspections. For example, was the possible loose part that resulted in tube wear identified and removed? If not, was the plugged tube stabilized and was the effect the part could have on neighboring tubes assessed?

FPL Response:

The FPL loose parts program incorporates the recommendations of the steam generator vendors and industry guidelines into a secondary side integrity plan. This plan includes foreign object search and retrieval implementation at each refueling outage. The primary side ECT inspections also focus on the identification of actual or potential loose parts. Industry operating experience is continually monitored, and any lessons learned are rolled into the program.

FPL makes every effort to remove any parts identified during the inspections. Any parts that cannot be removed are evaluated for potential tube integrity impact via the corrective action process and Engineering evaluation. The evaluations determine the wear rates associated with the loose parts and the appropriate corrective action. The corrective actions may include plugging, stabilizing, or identification of maximum period to next eddy current inspection, depending on the results.

4) Describe what actions, if any, were taken to verify that the SG tubes in Units 3 and 4 were manufactured (i.e., processing, heat treatment, etc.) as specified so as to exhibit optimal resistance to degradation (refer to NRC Information Notice 2002-21, Supplement 1, dated April 1, 2003). If tubes with non-optimal tube processing have been identified, discuss the implications of these findings with respect to tube integrity.

FPL Response:

All active tubes in Units 3 and 4 were screened with a technique developed by Westinghouse that was used to identify the improperly processed tubes at Seabrook. None of the tubes in Units 3 or 4 exhibit the characteristic "Seabrook Offset" signature that would indicate they were improperly processed. A small number of tubes were identified for monitoring in future inspections as they had relatively low voltage offsets. A low voltage offset does not mean the tube was improperly processed, or that the tube has a higher susceptibility to cracking. Lead analysis personnel reviewed the data for these tubes and confirmed that no degradation or precursors were present. These tubes will be monitored in future scheduled inspections. In addition, new Industry information was recently published with additional recommendations regarding Seabrook screening methods. FPL is in the process of updating the screening results to ensure it conforms to the latest Industry guidance. The results of this update will be factored into future inspections.

5) Discuss if any new dings/dents were identified during the last SG inspection for Units 3 and 4. If new dents/dings were identified, please discuss whether these dents/dings could be traced back to the baseline inspection. In addition, discuss whether the dents/dings are located in specific regions of the tube bundle (e.g., at upper supports in the periphery, etc.).

FPL Response:

Dings are defined as a condition where the tubing inside diameter is less than nominal and can be tracked back to the baseline data. We presently use the 1993 raw data as the point of reference. This is the first year for which digital data is available. All currently identified dings were tracked back to baseline and are noted as such in the 1993 data base. Dings are attributed to damage caused during the final stages of the manufacturing process.

Dents are defined as a condition where the tubing inside diameter is less than nominal and can not be tracked back to 1993 data. Dents typically occur after the steam generators have been put into service and are caused by foreign objects and maintenance activities on the secondary side of the generator. They are normally very small indications with a unique signature unlike corrosion or wear.

During the Turkey Point Unit 3 March 2003 (EOC19) inspection three new dents were identified, two in SG B and one in SG C. There were no new dents reported in SG A. None of these dents were present in prior inspections. Screening criteria for requiring an additional examination with the +Point™ probe during the March 2003 outage was any new dent greater than 5 volts in the hot leg straight sections and greater than 3

volts in the hot leg U-bend region as recorded with the bobbin probe. None of the new dents met these criteria. Of the two new dents reported in SG B, one was located in the freespan of a periphery tube between the 5th and 6th supports on the cold leg. The second dent in SG B was located approximately 3.2 inches above the secondary face of the cold leg tubesheet. The new dent reported in SG C was located approximately 1.4 inches above the secondary face of the hot leg tubesheet. This dent was less than 5 volts; however, it was examined with a +Point™ probe as part of the hot leg top of tubesheet program and there was no evidence of tube wall degradation.

During the Turkey Point Unit 4 October 2003 (EOC20) inspection, eleven new dents were identified, three in SG A, five in SG B and three in SG C. None of these dents were present in prior inspections. The bobbin screening criteria was the same for this examination activity as it was for the Unit 3 March 2003 outage. None of the new dents reported met these criteria. Of the three new dents reported in SG A, one was located approximately 3.3 inches above the secondary face of the cold leg tubesheet and the remaining two dents were located within 2.0 inches above the secondary face of the hot leg tubesheet. Of the five new dents reported in SG B, one was located in the freespan region between the 3rd (03H) and 4th (04H) tube supports on the hot leg, one was located approximately 4.7 inches above the secondary face of the cold leg tubesheet, and the remaining three dents were located within 3.0 inches above the secondary face of the hot leg tubesheet. Of the three new dents reported in SG C, one was located in the freespan region of the U-bend and the remaining two dents, one of which is located in a periphery tube, were located approximately 1.3 inches above the secondary face of the hot leg tubesheet. All new dents within 3.0 inches of the top of the secondary face of the hot leg tubesheet were examined as part of the hot leg top of tubesheet program with a +Point™ probe and no tube wall degradation was reported.

During the Turkey Point Unit 3 March 2003 and the Turkey Point Unit 4 October 2003 Outages, numerous newly reported dings were recorded from the tubesheet hot leg side to AV2 + 17.50 inches and all were traceable to past data. Several of these dings were tested with a +Point™ probe in conjunction with other specialty examinations and there was no evidence of tube wall degradation.

6) On page 7 of the ISI report dated July 30, 2003, you indicated that during the 2001 refueling outage for Unit 3, 12 tubes were plugged because of mechanical type wear at the tube support plates, yet no indications of wear at tube support plates were reported during the 2003 outage. Discuss whether the trends observed for wear at the tube supports of Unit 3 are consistent with that at other plants.

FPL Response:

The subject indications were evaluated by Westinghouse. Based on eddy current and operational data, all the volumetric indications were determined to be caused by wear. Six indications were interpreted to be wear due to interaction between the quatrefoil and the tube at either the land edge or corner. The wear seen at the broached support locations in Turkey Point Unit 3 is consistent with that identified and verified in pulled tube samples from the Crystal River Unit 3 OTSG steam generators, which have trefoil support plates. The potential for developing new degradation at these support locations was determined to be low by the Westinghouse evaluation.

The remaining indications were determined to be wear possibly caused by small particles of foreign material that became wedged between the tube and broached support contact points near the top of the support. The material signatures could only be seen with the rotating coil probe and the locations are not reachable for visual inspection or retrieval efforts. The wear rates were determined to be low and the wear degradation is very limited in extent such that tube sever is not a credible scenario.

7) It was indicated in the ISI report for Unit 4, dated January 3, 2004, that out of the four tubes plugged, two were plugged because of pit-shaped single volumetric wear indications at the flow baffle plate. Yet in Attachment 1 of the same report, it was indicated that two tubes in SG 4A were reported as pit-like indications at the flow baffle and were called single volumetric indications. Clarify if the volumetric indications were caused by wear. If it is not wear, please identify what is causing these volumetric indications. If it is wear, address the following questions:

   a. Discuss if the wear is aligned with the lands of the tube support plate.

   b. Given that the degradation is occurring at the flow baffle plate, please discuss if wear is a common degradation mechanism in this area.

FPL Response:

Although the descriptions provided in the body of the report and in the attachment were different, the intent was to describe the two indications as small single volumetric (SVI) pit-like indications indicative of possible wear and not the result of corrosion induced damage. These indications were both located at the lower edge of the baffle plate and may have been initiated by a deposition of foreign material that is no longer present. No foreign material signature was evident in the rotating probe data reviewed for these locations. Since the baffle support structure has no distinct land contacts, but completely surrounds the tubes similar to drilled supports, the configuration of the baffle structure does not lend itself to allow orienting or aligning the indications relative to a specific contact location.

The indications were determined to be wear based on the eddy current responses and were removed from service as a conservative and preventative measure.

This type of degradation is not prevalent in the industry, but it has been seen previously, primarily in Westinghouse steam generators having pre-heater sections. This is documented in APTECH report, AES 01104538-1Q-1, Controlled Document I-1, April 2002 "Industry Experience and Estimated Nondestructive Examination Performance Data for Irregular Wear at Broached Support Plates."