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SUBJECT: Responds to RAI re GL 95-03, "Circumferential Cracking of SG Tubes."

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OCT 11 1995

L-95-260

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
Response to Request for Additional
Information - Generic Letter 95-03,
Circumferential Cracking
of Steam Generator Tubes

Generic Letter (GL) 95-03, "Circumferential Cracking of Steam Generator Tubes," was issued by the NRC on April 18, 1995, to notify licensees of recent steam generator tube inspection findings at Maine Yankee Atomic Power Station and the safety significance of these findings. By letter L-95-175, dated June 22, 1995, Florida Power and Light Company (FPL) provided its response to GL 95-03.

On August 30, 1995, and September 20, 1995, the NRC issued requests for additional information regarding GL 95-03. In accordance with the NRC requests, attached please find FPL's response relative to Turkey Point Units 3 and 4.

Should there be any questions concerning this response, please contact us.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Plant

OIH

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC
T. P. Johnson, Senior Resident Inspector, USNRC, Turkey Point
Nuclear Plant

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RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION
GENERIC LETTER 95-03
CIRCUMFERENTIAL CRACKING OF STEAM GENERATOR TUBES

NRC QUESTION

In your response, you indicated that sample expansion will be based on the Electric Power Research Institute PWR Steam Generator Examination Guidelines. Please clarify the expansion criteria for all locations susceptible to circumferential cracking.

FPL RESPONSE

By FPL letter L-95-175 dated June 22, 1995 FPL stated that, at the next inspection for each unit, current plans include (1) full length bobbin coil inspection of all active tubes (i.e., 100%) and (2) Motorized Rotating Pancake Coil (MRPC) inspection for a minimum 20% sample of hot leg dented tube support intersections and overexpanded tube transitions in one or more Steam Generators (SGs), with larger dents and overexpansions receiving priority. Since expansion is not possible for bobbin coil inspections, the following will address expansion for planned MRPC inspections.

No circumferential cracking has been reported in any of the identified susceptible areas for Model 44F SGs with Thermally Treated (TT) Alloy 600 tubing, which includes Turkey Point Units 3 and 4. Therefore, MRPC inspections for circumferential cracking at Turkey Point Units 3 and 4 focus on manufacturing anomalies. These include minor denting at tube support intersections and slight overexpansion of the tube transition in a limited number of tubes at the top of the tubesheet. These anomalous conditions produce residual stress in the affected locations which would make them more susceptible to cracking than non-dented or non-overexpanded areas. There are no anomalous manufacturing or operational conditions related to small radius U-bends at Turkey Point Unit 3 and 4, or in other Model 44F SGs, which would require additional inspections for this area.

EXPANSION CRITERIA - For MRPC inspections, if one or more cracks are detected in the initial sample for dented tube support intersections or overexpanded tube transitions, all remaining dented tube support intersections or overexpanded tube transitions, as applicable, will be inspected in the SG leg, and an appropriate sample of dented tube support intersections or overexpanded tube transitions, as applicable, will be inspected in the opposite leg of this SG, and a minimum 20% initial sample of affected tube sections will be inspected in the affected leg(s) of at least one additional SG. If MRPC sampling requires expansion for dented tube support intersections or overexpanded tube transitions, an appropriate sample of non-dented tube support intersections or non-overexpanded tube transitions, as applicable, will be inspected in the affected SG to verify that cracking is bounded by the inspections, and expanded to affected tube sections if additional cracking is detected.

NRC QUESTION

The following areas have been identified as being susceptible to circumferential cracking:

- a. Expansion transition circumferential cracking
- b. Small radius U-bend circumferential cracking
- c. Dented location (including dented TSP) circumferential cracking
- d. Sleeve joint circumferential cracking

In your response, area b was not specifically addressed although your response indicated that no circumferential cracks have been detected in similar model steam generators. Please provide the requested information for area b (and any other areas susceptible to circumferential cracking) per Generic Letter (GL) 95-03. The staff realizes that some of these areas may not have been addressed since they may not be applicable to your plant; however, this should be clearly stated with the basis for the statement (e.g., no sleeves are installed; therefore, the plant is not susceptible to sleeve joint circumferential cracking).

FPL RESPONSE

The FPL response in L-95-175, dated June 22, 1995, adequately addresses areas a, c, and d above. Additional information relative to GL 95-03 is provided below for area b, small radius U-bend circumferential cracking.

GL 95-03 REQUESTED ACTION 1 - Our review of recent industry operating experience shows that circumferential cracking in small radius U-bends is limited to a small number of occurrences in 51 Series or Model D Westinghouse SGs with mill annealed Alloy 600 tubing. This industry experience further indicates that tube integrity analysis supports a low likelihood of tube severance for circumferential cracks in small radius U-bends. No circumferential cracking has been reported in any SG tube area for Model 44F SGs with TT Alloy 600 tubing, which includes Turkey Point Units 3 and 4.

GL 95-03 REQUESTED ACTION 2 - Our safety assessment justifying continued operation until the next steam generator tube inspections are performed includes consideration for all areas susceptible to circumferential cracking. As stated in our response in L-95-175 dated June 22, 1995, no circumferential cracking has been reported in the Turkey Point Unit 3 or 4 SGs, or any other Model 44F SGs with TT Alloy 600 tubing. This includes area b for small radius U-bends. All active small radius U-bends have been inspected in each of the past three inservice inspections using bobbin coil techniques. There are no manufacturing or operational conditions related to small radius U-bends at Turkey Point Units 3 and 4, or in other Model 44F SGs, which would require additional inspections for this area.

GL 95-03 REQUESTED ACTION 3 - FPL completed the Turkey Point Unit 3 SG inspection during the September 1995 refueling outage as discussed in FPL letter L-95-175. Plans for the next SG inspection for Turkey Point Unit 4 currently include inspection of all active small radius U-bends using bobbin coil techniques, with MRPC techniques to further characterize

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indications as required. There are no manufacturing or operational conditions related to small radius U-bends at Turkey Point Units 3 and 4, or in other Model 44F SGs, which require additional inspections for this area. As discussed below, FPL is currently re-evaluating the scheduling of the next Turkey Point Unit 4 SG inspection.

GL 95-03 REQUESTED INFORMATION ITEM 1 - Our safety assessment justifying continued operation (based on Requested Actions 1 & 2 above) provided in L-95-175 dated June 22, 1995, addresses all areas susceptible to circumferential cracking. Additionally, no circumferential cracking has been reported in small radius U-bends for Model 44F SGs with TT Alloy 600 tubing, which includes Turkey Point Units 3 and 4. Further, there are no manufacturing or operational conditions related to small radius U-bends at Turkey Point Units 3 and 4, or in other Model 44F SGs, which would support additional inspections for this area.

GL 95-03 REQUESTED INFORMATION ITEM 2 - FPL completed the Turkey Point Unit 3 SG inspection during the September 1995 refueling outage as discussed in FPL letter L-95-175. The SG inspection conducted included full length examinations of 100% of active tubes in each SG. In this inspection, 100% of overexpanded tube transition and a minimum 20% sample of dented tube support intersections were inspected with MRPC techniques in one SG. No circumferential cracks were found.

Our summary of the inspection plans developed in accordance with Requested Action 3 and the schedule for the next planned inspection for Turkey Point Unit 4 remains unchanged from our response in L-95-175, dated June 22, 1995. FPL plans for the next Turkey Point Unit 4 SG inspection currently include inspection of all active small radius U-bends using bobbin coil techniques, with MRPC techniques to further characterize indications as required.

FPL has conducted extensive SG inspections during the past refuelings at Turkey Point Units 3 and 4. Since 1990, FPL has conducted full length examinations of 100% of active tubes in each SG at each inspection. A summary of the last three SG inspection results for Turkey Point Units 3 and 4 was provided in our response in L-95-175, dated June 22, 1995. Based upon the small percentage of SG tubes plugged on all SGs on Units 3 and 4, we are confident that we are properly managing the SG degradation mechanisms, and the rate of progression of those mechanisms. Furthermore, the results of past SG inspections qualify Unit 4 for a 40 month inspection interval in accordance with plant technical specifications. FPL is evaluating the results of past SG inspections for schedular extension and will advise the NRC of any change in the scope or schedule of future inspections as discussed in FPL letter L-95-175.

NRC QUESTION

In your response, it was indicated that dented tube support plate intersections have been inspected and will be inspected in the future with larger dents receiving priority. Discuss the criteria used for determining which dents will be examined. If a dent voltage threshold is used for such a determination, provide the calibration procedure used (i.e., 4.0 volts on 4-20% through-wall ASME holes at 550/130 mix).

FPL RESPONSE

The criteria used for determining which dents will be examined utilizes a dent voltage threshold. The calibration procedure sets voltage equal to 5 volts on 4-20% ASME flat bottom holes using a 400/100 Kiloherzt Mix. All denting and overexpansions observed in the Turkey Point Units 3 and 4 SG tubing are manufacturing or installation related and not due to operation.

NRC QUESTION

During the Maine Yankee outage in July/August 1994, several weaknesses were identified in their eddy current program as detailed in NRC Information Notice 94-88, "Inservice Inspection Deficiencies Result in Severely Degraded Steam Generator Tubes." In Information Notice 94-88, the staff observed that several circumferential indications could be traced back to earlier inspections when the data was reanalyzed using terrain plots. These terrain plots had not been generated as part of the original field analysis for these tubes. For the rotating pancake coil (RPC) examinations performed at your plant at locations susceptible to circumferential cracking during the previous inspection (i.e., previous inspection per your GL 95-03 response), discuss the extent to which terrain plots were used to analyze the eddy current data. If terrain plots were not routinely used at locations susceptible to circumferential cracking, discuss whether or not the RPC eddy current data has been reanalyzed using terrain mapping of the data. If terrain plots were not routinely used during the outage and your data has not been reanalyzed with terrain mapping of the data, discuss your basis for not reanalyzing your previous RPC data in light of the findings at Maine Yankee.

Discuss whether terrain plots will be used to analyze the RPC eddy current data at locations susceptible to circumferential cracking during your next steam generator tube inspection (i.e., the next inspection per your GL 95-03 response).

FPL RESPONSE

Terrain plots were routinely used for analysis of MRPC data at locations susceptible to circumferential cracking during the two previous inspections [End of Cycle (EOC) 13 and 14] at Turkey Point Unit 4, and were routinely used during the previous inspection (EOC 13) at Turkey Point Unit 3 (i.e., previous inspection per our GL 95-03 response).

Turkey Point Unit 3 has recently completed a SG inspection in September of 1995 (EOC 14) which included routine use of terrain plots for analysis of MRPC data at locations susceptible to circumferential cracking. In this inspection, 100% of overexpanded tube transition and a minimum 20% sample of dented tube support intersections were inspected with MRPC techniques in one SG. No circumferential cracks were found.

FPL planning for future SG inspections at Turkey Point Units 3 and 4 currently includes the routine use of terrain plots for analysis of MRPC data at locations susceptible to circumferential cracking.



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