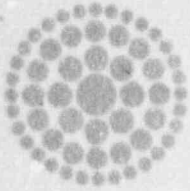


50-302



**Florida  
Power**  
CORPORATION  
Crystal River Unit 3  
Docket No. 50-302

July 10, 1992  
3F0792-02

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

Subject: Eddy Current Testing, Technical Specification Report

Reference: FPC to NRC, 3F0392-02, dated March 30, 1992

Dear Sir:

Florida Power Corporation (FPC) completed the Eddy Current (EC) inspection of Crystal River Unit 3's Once-Through Steam Generators (OTSGs) on June 29, 1992. Attached please find the 15-day report submitted in accordance with Technical Specification (TS) 4.4.5. The report contains sections on: Background summarizing FPC's changes to the inspection plan previously provided to the NRC in the referenced letter; Selection of Samples and Results describing sample size, its selection method and a description of the results; Tables A and B providing the number and location of plugged tubes in each OTSG; Table C listing plugged tubes resulting from a supplemental sample inspection performed in the B OTSG; and a Conclusion.

Sincerely,

P. M. Beard, Jr.  
Senior Vice president  
Nuclear Operations

PMB/LVC

Attachment

xc: Regional Administrator, Region II  
NRR Project Manager  
Senior Resident Inspector

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A Florida Progress Company

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BACKGROUND:

The reference letter provided FPC's inspection plan for the EC testing performed during Refuel 8. FPC enhanced that inspection plan to provide further assurance of long term integrity of the CR-3 steam generators. The enhanced inspection proceeded as follows:

- A) Inspected as planned all tubes in the "A" SG which had not been previously inspected (43%) and approximately half of the tubes in the "B" SG (31%) which had not been inspected. The remaining 31% of the tubes in the "B" SG was to be inspected in 9R (1994).

However, FPC expanded the inspection to test the remaining tubes (4535 tubes) in the "B" SG. Presently, all tubes in both steam generators have been inspected at least once since the baseline pre-service inspection in 1976.

- B) All tubes containing 1% - 39% wall loss; tubes three rows on either side of the untubed lane; tubes adjacent to plugged, but non-stabilized tubes; and tubes containing previous indications below the threshold of a clear signal were re-inspected.
- C) Tubes with indications below the threshold of a clear signal were inspected by a motorized rotating pancake coil (MRPC) probe, as has been the practice for the past two EC inspections.
- D) FPC pulled 7 tubes from the "B" steam generator. Chemical and metallurgic analyses will be performed on these tubes in an effort to gather data that will assist in better characterizing freespan indications that are below the threshold of a clear signal. Three of the tubes had degradation of greater than 40% and would have been plugged (see Table B). Four tubes would not have required plugging if they have been left in service. The tubes that were removed from service for metallurgical examination were:

Row/Tube No.

41/44

52/51

90/28 \*\*

97/91 \*\*

106/32

109/32

133/33 \*\*

\*\* Tubes would have been plugged.

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For the repair of the seven pulled tubes, pursuant to 10 CFR 50.55 (a)(g)(iv), FPC used an automatic welding process for steam generator welded plugs developed by Babcock and Wilcox Nuclear Services (BWNS). This method was developed following the guidance of the 1989 Edition of ASME Section III. ASME Section XI, 1989 Edition was used for qualification of procedures and personnel.

**SELECTION OF SAMPLES AND RESULTS:**

The selection of the inspection samples was conducted in accordance with Technical Specification (TS) Table 4.4.2. The samples size was determined by dividing the total number of tubes to be inspected in each steam generator into seven samples to define the number of tubes constituting "S" and then determine the size of the TS samples 1s, 2s and 4s. These samples were randomly selected and their inspection results tracked to allow recognition of entry into the three possible TS categories.

The total number of tubes inspected in the A steam generator was 7,961 tubes. The first sample consisted of 1,122 tubes, two degraded tubes were found in this sample of which one tube was defective and therefore plugged. The second sample had 2,243 tubes, two degraded tubes were found, both tubes were plugged. The third sample had 4,596 tubes with nine degraded tubes of which five were plugged. The total number of plugged tubes in the A steam generator was 22, eight pluggers were from the three TS samples, seven pluggers were from special interest areas and seven additional tubes were administratively (indications less than 40 percent through-wall penetration) plugged due to location and type of observed tube degradation.

The first sample for the B steam generator consisted of 891 tubes, four degraded tubes were found of which three were plugged. The second sample 1,802 tubes with seventeen degraded tubes of which sixteen were plugged. The third sample had 3,752 tubes with thirty-seven degraded tubes, twenty-three of these tubes were plugged. The total number of tubes plugged in the B steam generator was 46, forty-two tubes were from the three TS samples and four additional tubes were administratively (indications less than 40 percent through-wall penetration) plugged due to location and type of observed tube degradation.

All samples were in the C-2 category requiring no additional inspection after the third sample. However, due to the efficiency of the inspection and availability of time and resources, FPC expanded the inspection by testing a supplemental sample which included the remaining tubes of the B generator that had never been inservice inspected before. The supplemental inspection included 4,535 tubes; twenty-nine tubes were found degraded; sixteen tubes were plugged.

Tables A and B provide a list of all tubes plugged in each steam generator and their location. These tables include tubes found to be defective during the three sample inspections and therefore plugged, and tubes that were administratively plugged. Table C consists of all plugged tubes from the supplemental inspection of the B steam generator.

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**CONCLUSION:**

FPC has completed a comprehensive inspection of both steam generators. The inspection encompassed our TS requirements and the supplemental expanded inspection. The results of these inspections showed no significant rate of degradation or failure mechanisms. Further understanding of the data obtained is expected once the results of tests to be performed on the seven pulled tubes is available.

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TABLE A  
"A" OTSG

NO.	ROW	TUBE	IND.	%TW	VOLTS	LOCATION
1.	7	28	WAR WAR	64 86	0.83 0.80	9TH TSP + 0.00" 8TH TSP + 0.00"
2.	18	39	MBM	*	0.28	10TH TSP + 28.60"
3.	26	91	WAR	19	0.24	7TH TSP + 0.59"
4.	27	92	WAR WAR	50 42	2.67 2.10	7TH TSP + 0.00" 8TH TSP + 0.00"
5.	60	114	ODI	50	1.50	14TH TSP + 0.91"
6.	66	129	WAR	52	0.94	10TH TSP + 0.00"
7.	72	67	ODI	64	1.50	UTSF + 0.39"
8.	72	128	ODI	46	1.21	8TH TSP - 0.60"
9.	73	63	SAI	*	0.27	UTSF - 0.68"
10.	74	30	CCL	*	0.46	UTSF + 0.11"
11.	74	58	CCL	*	1.53	UTSF + 0.12"
12.	75	52	MBM	*	0.21	14TH TSP + 2.53"
13.	75	125	ODI	47	1.20	10TH TSP - 0.69"
14.	77	5	WAR	*	1.67	15TH TSP + 0.40"

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TABLE A

"A" OTSG

NO.	ROW	TUBE	IND.	%TW	VOLTS	LOCATION
15.	77	26	SAI	*	1.72	14TH TSP - 0.92"
16.	77	43	SAI	*	0.90	UTSF + 0.18"
17.	79	28	CCL	*	2.90	UTSF - 0.14"
18.	79	30	CCL	*	2.14	UTSF - 0.11"
19.	79	34	CCL	*	1.75	UTSF - 0.10"
20.	90	17	ODI	63	1.41	12TH TSP + 0.68"
21.	97	98	MBM	*	0.67	13TH TSP + 4.62"
22.	149	25	WAR	37	0.57	10TH TSP - 0.62"

\* Tubes were plugged because of crack-like indications and location of defect. If a WAR or MBM was in an area of concern, (i.e., high steam cross flow) then it was plugged.

WAR - Wear  
TSP - Tube Support Plate  
MBM - Manufacturer Burnish Marks  
ODI - Outside Diameter Indication  
SAI - Single Axial Indication  
CCL - Circumferential Crack-Like  
UTSF - Upper Tube Secondary Face

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TABLE B

"B" OTSG

NO.	ROW	TUBE	IND.	%TW	VOLTS	LOCATION
1.	112	39	ODI	50	0.86	LTSF + 6.33"
2.	131	56	ODI	47	1.26	13TH TSP - 0.33"
3.	143	55	ODI	55	1.22	7TH TSP + 0.00"
4.	6	14	ODI	43	1.08	9TH TSP + 0.96"
5.	41	41	ODI	42	1.12	LTSF + 14.07"
6.	44	49	ODI ODI	64 61	0.54 0.53	LTSF + 12.82" LTSF + 9.45"
7.	51	81	ODI	40	1.05	LTSF + 7.25"
8.	52	33	ODI	56	1.77	9TH TSP - 0.56"
9.	53	30	ODI	40	1.00	LTSF + 7.29"
10.	67	111	ODI	43	1.01	4TH TSP+ 0.61"
11.	80	42	ODI	46	0.88	9TH TSP+ 5.37"
12.	95	43	ODI	56	1.24	LTSF + 7.04"
13.	95	92	ODI	67	0.79	LTSF + 10.31"
14.	97	91	ODI ODI	62 76	0.74 0.90	LTSF + 14.28"++ LTSF + 8.28"

++ Tube pulled for metallurgical examination.

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TABLE B

"B" OTSG

NO.	ROW	TUBE	IND.	%TW	VOLTS	LOCATION
15.	103	43	ODI	63	1.16	LTSF - 0.96"
16.	105	55	ODI	64	0.61	2ND TSP - 0.22"
17.	125	8	WAR WAR WAR	67 31 47	2.59 1.62 2.23	9TH TSP - 0.11" 8TH TSP - 0.03" 7TH TSP - 0.00"
18.	143	43	ODI	54	2.38	7TH TSP - 0.75"
19.	144	29	ODI	55	1.28	7TH TSP - 0.77"
20.	4	41	ODI	49	1.08	12TH TSP - 0.082"
21.	9	55	ODI	53	1.30	9TH TSP - 0.90"
22.	25	9	ODI ODI ODI	73 90 87	1.22 1.37 1.27	15TH TSP + 29.86" 4TH TSP + 21.58" LTPF + 7.19"
23.	35	46	ODI	52	1.30	7TH TSP - 0.88"
24.	51	39	ODI	66	1.96	LTSF + 7.98"
25.	52	15	ODI	53	1.59	3RD TSP - 0.77"
26.	59	32	ODI	70	1.05	LTSF + 15.07"
27.	81	95	ODI	64	0.53	LTSF + 9.36"
28.	90	28	ODI	46	1.75	LTSF + 7.88"++
29.	93	37	ODI	53	1.18	LTSF + 12.18"

++ Tube pulled for metallurgical examination.



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TABLE B  
"B" OTSG

NO.	ROW	TUBE	IND	%TW	VOLTS	LOCATION
30.	94	93	ODI	70	0.73	LTSF + 12.38"
31.	96	46	ODI	49	1.61	7TH TSP - 0.83"
32.	99	91	ODI	53	1.12	LTSF + 7.46"
33.	105	33	ODI	46	1.20	LTSF + 7.52"
34.	105	119	ODI	48	2.24	7TH TSP - 0.84"
35.	107	35	ODI	61	1.13	LTSF + 11.45"
36.	121	44	ODI	54	1.29	7TH TSP - 0.77"
37.	130	44	ODI	54	1.16	7TH TSP - 0.82"
38.	138	75	ODI	48	1.47	7TH TSP - 0.73"
39.	140	62	ODI	62	1.28	7TH TSP - 0.92"
40.	145	27	WAR	51	1.37	8TH TSP + 0.00"
41.	146	34	ODI	67	1.33	7TH TSP - 0.89"
42.	133	33	WAR	*	2.72	7TH TSP - 0.82"++
43.	74	16	SAI	*	0.81	UTSF + 0.13"

++ Tube pulled for metallurgical examination.

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TABLE B

"B" OTS

NO.	ROW	TUBE	IND.	%TW	VOLTS	LOCATION
44.	74	22	MAI	*	0.37	UTSF - 0.89"
45.	78	13	SAI	*	0.87	UTSF - 15.96"
46.	78	13	CCL	*	0.47	UTSF + 0.18"

\* Tubes were plugged because of crack-like indications and location of defect. If a WAR or MBM was in an area of concern, (i.e., high steam cross flow) then it was plugged.

WAR - Wear  
TSP - Tube Support Plate  
ODI - Outside Diameter Indication  
LTSF - Lower Tube Secondary Face  
LTPF - Lower Tube Primary Face  
SAI - Single Axial Indication  
MAI - Multiple Axial Indication  
CCL - Circumferential Crack-Like  
UTSF - Upper Tube Secondary Face

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TABLE C

SUPPLEMENTAL INSPECTION  
"B" OTSG

NO.	ROW	TUBE	IND.	%TW	VOLTS	LOCATION
1.	29	75	ODI	57	3.28	LTSF + 3.04"
2.	44	45	ODI	47	0.90	LTSF + 10.02"
3.	45	50	ODI	50	0.89	LTSF + 9.11"
4.	50	38	ODI	48	1.10	LTSF + 6.66"
5.	53	40	ODI	67	0.97	LTSF + 8.03"
6.	54	41	ODI	75	0.69	LTSF + 10.69"
7.	62	125	ODI	59	0.97	UTSF + 7.19"
8.	69	71	ODI	59	3.03	7TH TSP - 0.76"
9.	84	35	ODI	54	1.05	LTSF + 16.26"
10.	86	31	ODI	56	0.94	LTSF + 10.66"
11.	92	29	ODI	70	0.73	LTSF + 25.50"
12.	102	37	ODI ODI	43 56	0.96 1.38	LTSF + 15.26" LTSF + 13.44"
13.	102	78	ODI	51	1.09	3RD TSP - 0.83"
14.	132	47	ODI	54	2.33	7TH TSP - 0.80"
15.	143	29	ODI	48	1.42	7TH TSP - 0.70"
16.	143	45	ODI	63	2.25	7TH TSP - 0.80"

TSP - Tube Support Plate  
 ODI - Outside Diameter Indication  
 IDI - Inside Diameter Indication  
 LTSF - Lower Tube Secondary Face  
 UTSF - Upper Tube Secondary Face