

# CATEGORY 1

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STALL; J.A.      Florida Power & Light Co.  
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SUBJECT: Provides results of SG in-situ pressure testing.

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July 8, 1996

L-96-170  
10 CFR 50.4

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

RE: St. Lucie Unit 1  
Docket No. 50-335  
Steam Generator Tube In-situ  
Pressure Test Results

By letter, L-96-129, dated May 14, 1996, Florida Power and Light Company committed to provide the NRC with the results of the St. Lucie Unit 1 steam generator in-situ pressure tests within 10 days of completing the testing. The in-situ pressure testing was completed on July 2, 1996. A summary of the results is attached.

Please contact us if there are any questions about this submittal.

Very truly yours,

A handwritten signature in dark ink, appearing to read "JAS", is written over a horizontal line.

J. A. Stall  
Vice President  
St. Lucie Plant

JAS/GRM

Attachment

cc: Stewart D. Ebnetter, Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, St. Lucie Plant

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PDR ADOCK 05000335  
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IN-SITU PRESSURE TESTING OF ST. LUCIE UNIT 1  
STEAM GENERATOR TUBE DEFECTS  
July 1996

In-situ pressure testing of steam generator (SG) tube defects was performed at St. Lucie Unit 1 using the ABB-CE in-situ pressure testing system and plant approved procedures. Seventeen in-situ tests were conducted using a full tube hydrostatic or defect-specific hydrostatic test method. The full tube method was performed on 3 tubes in SG 1A to test free span axial indications which were not suitable for testing with the defect-specific method.

The defect-specific method was used for 14 defects at various elevations in SGs 1A and 1B. Defect-specific testing included circumferential indications at tube expansion transitions, and axial and volumetric indications at eggcrate supports, drilled supports and the sludge pile region. The attached table provides detailed information and results for each test.

Candidate tube defects for in-situ pressure testing were screened for several criteria. The selection process included review of SG eddy current data for maximum through-wall depth, maximum voltage and growth. Percent degraded area (PDA) was also calculated for candidate circumferential and axial defects to assure that the defects tested are bounding. Finally, lead eddy current test (ECT) data analyst personnel recommendations were included.

In-situ test pressures were increased by 13% for all defects to compensate for test conditions at room temperature. Pressures were increased an additional 8.5% (21.5% total) for circumferential defects to compensate for potential locked support plate conditions. Additional adjustments were made for pressure gauge calibration correction (50 psig) and for test system pressure drop in the event that substantial leakage was encountered. If leakage was encountered at main steam line break (MSLB) or lower pressures, leak rate data were recorded at normal operating and MSLB differential pressures. Tube defects were then tested at 3 times normal operating differential pressures to assess structural condition.

The in-situ pressure test results demonstrate that adequate structural margins existed for St. Lucie Unit 1 SG tubes. There were no catastrophic tube failures (burst) and none of the defects tested leaked at normal operating differential pressure. Three defects leaked at or below MSLB differential pressure, and 2 leaked at 3 times normal operating differential pressure. The results of this testing will be applied to conditional probability of burst analyses and integrated leakage assessments as part of the run time analysis for St. Lucie Unit 1. The following table summarizes the ECT data and the test results for each tube tested.

ST. LUCIE UNIT 1 S/G "A" IN-SITU PRESSURE TEST LIST												IN-SITU TEST LEAKAGE DATA				
Jun-96																
Select Priority	STM. GEN REGION	TUBE INFORMATION				MRPC DATA				BOBBIN DATA		Comments	GPM @ NOPD	GPM @ MSLB	GPM @ NOPD POST MSLB	PRESSURE 3XNOPD
		ROW	LINE	LOCATION	LENGTH	VOLTS	MAX %	PDA	AX/CIRC	VOLTS	MAX %					
1	Expansion	13	113	TSC+0.1	1.80	9.60	78	36.8	Circ	na	NDD	Max. Volts/Lead Analyst Choice	0	0	n/a	5300
1	Free Span	89	107	8H+12.0	2.50	2.00	100	80	Axial	na	NDD	Full Tube/Max. Depth/Length	0	0	n/a	5000
1	Free Span	"	"	8H+10.8	7.00	1.80	99	88	Axial	na	NDD	Full Tube/Max. Depth/Length	0	0	n/a	5000
2	Free Span	33	109	6H+17-19	5.1	1.61	84	61	Axial	0.20	29	Full Tube / 2nd Choice	0	0	n/a	5000
3	Free Span	42	128	6H+10.6	4.8	3.50	100	94.3	ASI	na	NDD	Full Tube / Max Choice	0	0	n/a	4950

ST. LUCIE UNIT 1 S/G "B" IN-SITU PRESSURE TEST LIST												IN-SITU TEST LEAKAGE DATA				
Jun-96																
Select Priority	STM. GEN REGION	TUBE INFORMATION				MRPC DATA				BOBBIN DATA		Comments	GPM @ NOPD	GPM @ MSLB	GPM @ NOPD POST MSLB	PRESSURE 3XNOPD
		ROW	LINE	LOCATION	LENGTH	VOLTS	MAX %	PDA	AX/CIRC	VOLTS	MAX %					
1	Expansion	40	98	TSH+0.1	2.00	2.13	77	55	Circ	na	NDD	Max. PDA	0	0	n/a	5300
2	Expansion	90	38	TSH+0.1	1.40	1.97	86	37	Circ	na	NDD	Max. PDA (SG B)	0	0	n/a	5325
1	Sludge Pile	29	47	TSH+5.3	0.40	7.80	97	76	Axial	5.00	81	Max Depth	0	0.26	0.12	(1) 5000
2	Sludge Pile	78	84	TSH+0.8	0.64	3.37	49	48	Axial	7.60	56	Max Volts	0	0	n/a	(5) 5000
3	Sludge Pile	88	44	TSH+1.5	0.54	1.35	62	50	Axial	3.00	28	Leave in Serv. Candidate	0	0	n/a	5000
4	Sludge Pile	33	115	TSH+5.7	0.53	0.92	44	na	Volumetric	1.50	69	Max. Depth - VOL	0	0	n/a	4950
1	Eggcrate	83	97	1H	0.96	10.80	86	76	Axial	5.60	81	Growth/Lead Analyst Choice	0	(4) 0.25	(4) 0.4	(3) 5100
2	Eggcrate	99	119	1H	0.73	10.00	90	75	Axial	6.60	80	Max. Depth	0	0	n/a	(2) 5000
3	Eggcrate	15	55	1H	0.90	12.30	90	67	Axial	5.60	94/64	Max. Volts	0	0.02	0.01	(3) 5000
1	Drilled Sup.	105	103	9H	0.72	7.20	51	28	Axial	2.60	79	Max. Depth	0	0	n/a	5000
2	Drilled Sup.	114	106	9H	na	3.80	37	na	Volumetric	7.00	20	Max. Volts	0	0	n/a	5000
3	Drilled Sup.	109	81	9H	0.46	1.80	69	53	Axial	1.30	52	2nd Max. Depth	0	0	n/a	5000
4	Drilled Sup.	104	70	9H	na	2.20	81	na	Volumetric	11.60	DNT	Max. Depth VOL w/Dent	0	0	n/a	4950

- (1) Max pressure achieved. Bladder failed at 4300 psi.
- (2) With burst bladder over flaw. <0.25 gpm @ 4800 psi w/o bladder.
- (3) With burst bladder over flaw.
- (4) Initial leakage of .25 gpm at 2400 psig. Post MSLB leak rate (.4 gpm) is higher as a result of attempting to reach 2875 psig after initial leakage was recorded.
- (5) 0.06 gpm leakage at 5000 psi

Target Test Pressures (+100, -0 psi)				
FLAW TYPE	NOPD	MSLB	POST MSLB	3XNOPD
AXIAL FLAWS	1672	2875	1672	4915
CIRC. FLAWS	1794	3088	1794	5281

Pressures increased 13% for temperature.

Pressures increased 21.5% for circ. flaws for temperature & locked supports.

Add 400 lbs. for axial flaws & 300 lbs. for circ. flaws if flow due to leakage.