



FLORIDA POWER & LIGHT

ST. LUCIE UNIT 1

STEAM GENERATOR PROGRAM

**PRESENTED TO THE
NUCLEAR REGULATORY COMMISSION**

APRIL 22, 1996

9605170228 960501
PDR ADOCK 05000335
Q PDR



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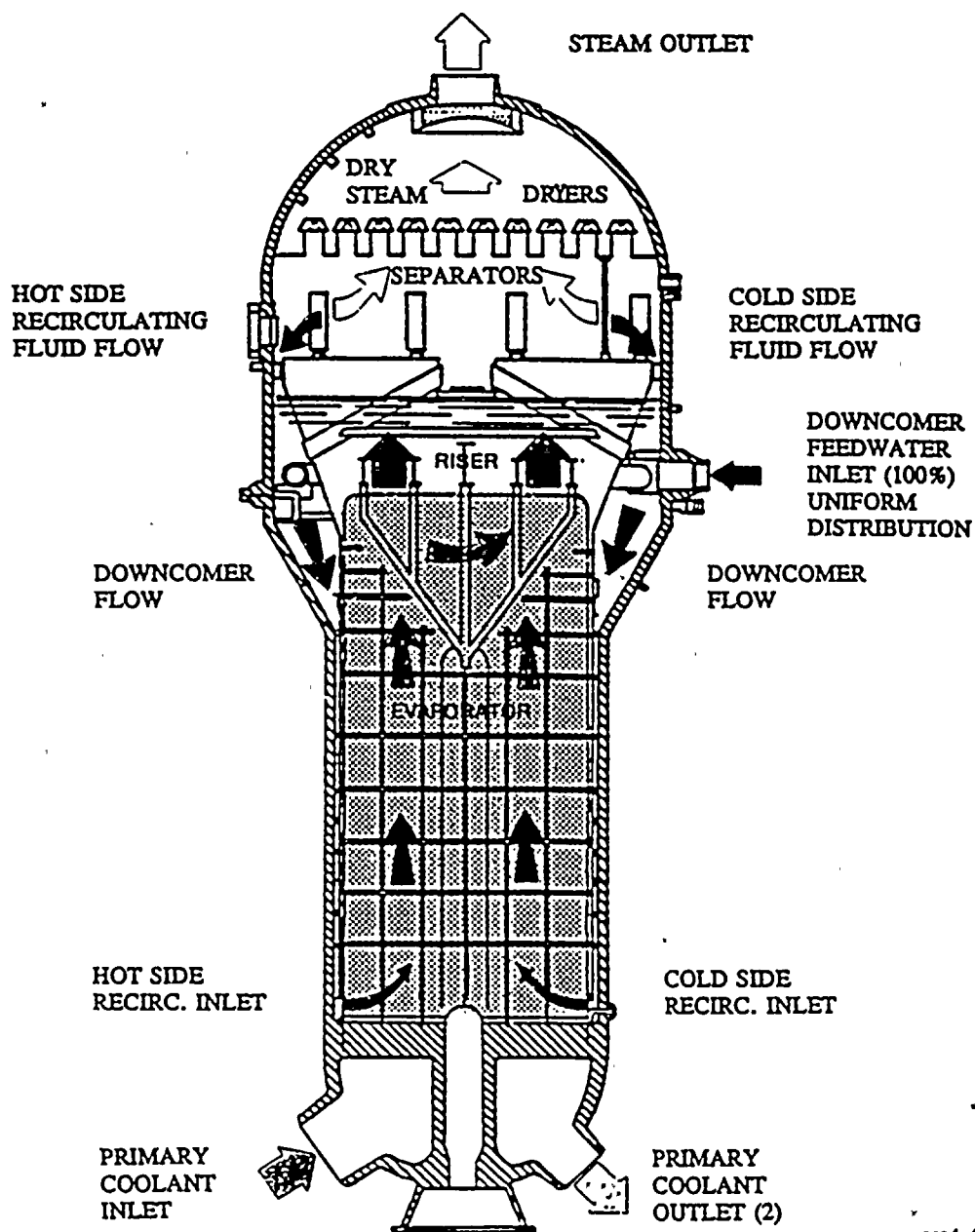
OPENING & INTRODUCTIONS

- I. PURPOSE OF MEETING
- II. STATUS OF S/G CONDITION
- III. ECT TECHNIQUE QUALIFICATION
- IV. 5/96 REFUELING OUTAGE PLANS
- V. SUMMARY

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II. STATUS OF S/G CONDITION

S/G DESIGN FEATURES



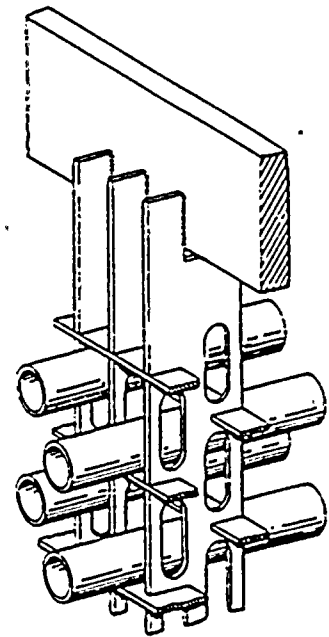
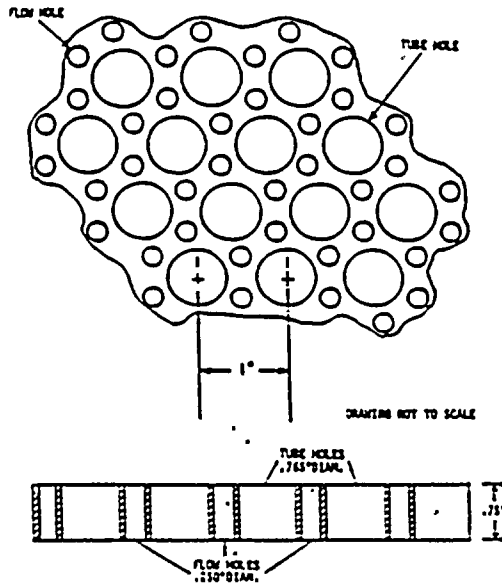
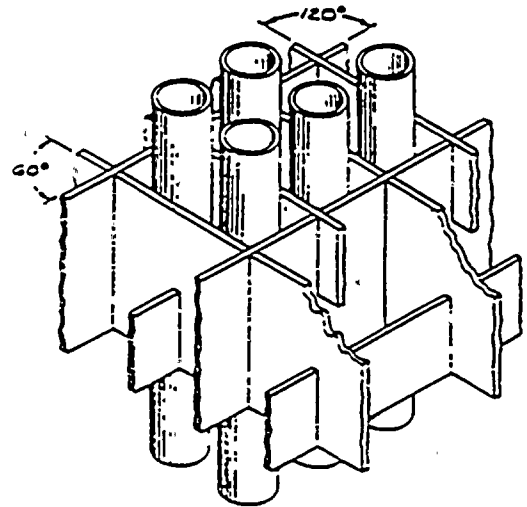
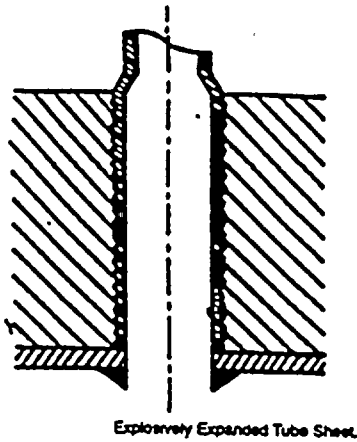
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Schematic of St. Lucie Unit 1 Steam Generator

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II. STATUS OF S/G CONDITION

S/G DESIGN FEATURES

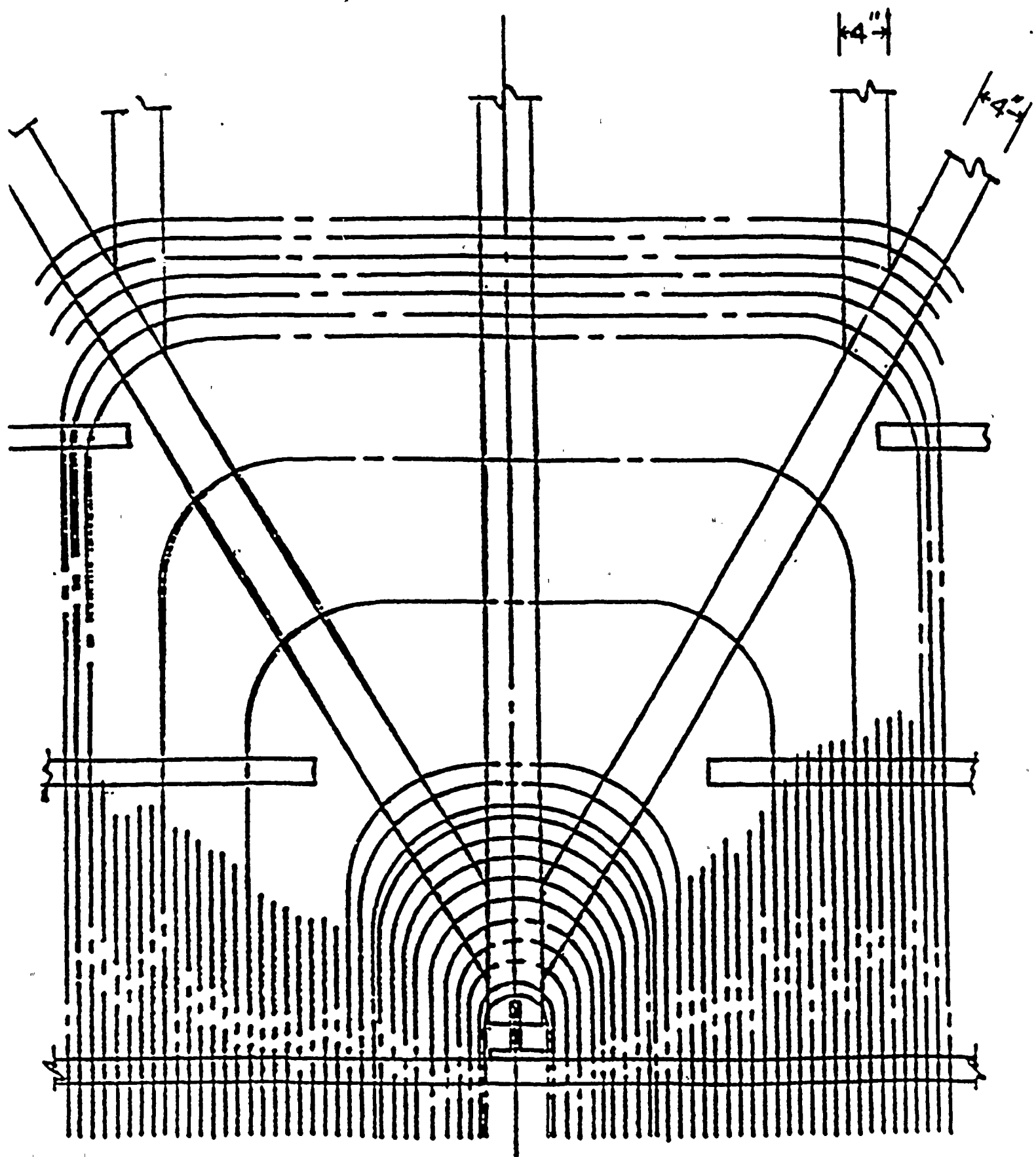


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II. STATUS OF S/G CONDITION

INSPECTION & TUBE PLUGGING HISTORY

EXAM DATE	BOBBIN EXAM	MRPC EXAM	TUBES PLUGGED	RESULTS & COMMENTS
MFG	100%	--	23	Preservice Shop Plugs
1977	10%	--	--	
1978	10%	--	--	
1979	10%	--	21	Drilled Support Rim Cut
1981	A - 28% B - 38%	--	103	U-Bend Cracking Rows 8-11
1984	100%	--	507	Preventive Plugging Rows 8-11 Random Indic. - Sludge Pile & Supports
1985	100%	(8X1)	66	Random Indic. - Sludge Pile & Supports Pulled 3 Tubes
1986	(Midcycle)	--	23	Post Outage ECT Review & Plugging
1987	100%	<50 Bobbin Indications	76	Random Indic. - Sludge Pile & Supports
1988	100%	<50 Bobbin Indications	239	Random Indic. - Sludge Pile & Supports
1990	100%	97 Bobbin Indications	180	Random Indic. - Sludge Pile & Supports
1991	100%	100% HL Expan.Trans. 3% CL Expan. Trans. 650 Bobbin Indications	449	98 Circ. Indications - HL Expan. Trans.
1993	100%	100% HL Expan.Trans. 3% CL Expan.Trans. 250 Bobbin Indications	130	Random Indic. - Sludge Pile & Supports 12 Circ. Indications - HL Expan. Trans.
1994	100%	100% HL Expan.Trans. 3% CL Expan.Trans. 100 Bobbin Indications	94	Random Indic. - Sludge Pile & Supports 14 Circ. Indications - HL Expan. Trans.
TOTAL TUBES - Each = 8519 TOTAL PLUGS - S/G A = 1138 (13.3%) S/G B = 774 (9.1%)			PLUG MARGIN - 2129 Tubes (25%) each S/G +/- 7% Asymmetry	



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II. STATUS OF S/G CONDITION

1985 TUBE PULL RESULTS

Correlation of ECT and Metallography Results

ST. LUCIE UNIT 1 - S/G "A" PULLED TUBE CORRELATION BOBBIN COIL EDDY CURRENT vs METALLOGRAPHY						
LINE	ROW	ELEV.	ECT % 1985	MET. DEPTH	ECT % 1996	DEFECT APPEARANCE
120	12	Sludge Pile	41%	30%	26%	IG/TG SCC parallel axial cracks. 0.4" longest over 1" axial length across 360° of tube circumference. Most over 90°.
120	12	#3 EC-Hot	82%	72%	70%	IGA/TG SCC parallel axial cracks in land area 0.6" longest over 2" axial across 0.1" of tube circumference.
79	91	Sludge Pile	UDS	16%	NDD	IGA Patch .5" axial x .5" circ.
79	91	Sludge Pile	57%	42%	44%	IGA Patch .8" axial x .5" circ.
59	95	#2 EC-Hot	29%	13%	3%	IGA Patch .4" axial x .3" circ.
59	95	#1 EC-Hot	DSS	52%	46%	IGA Patch .7" axial x .3" circ.

EC Eggcrate
 UDS Undefined signal
 DSS Distorted Signal
 NDD No Detectable Defect

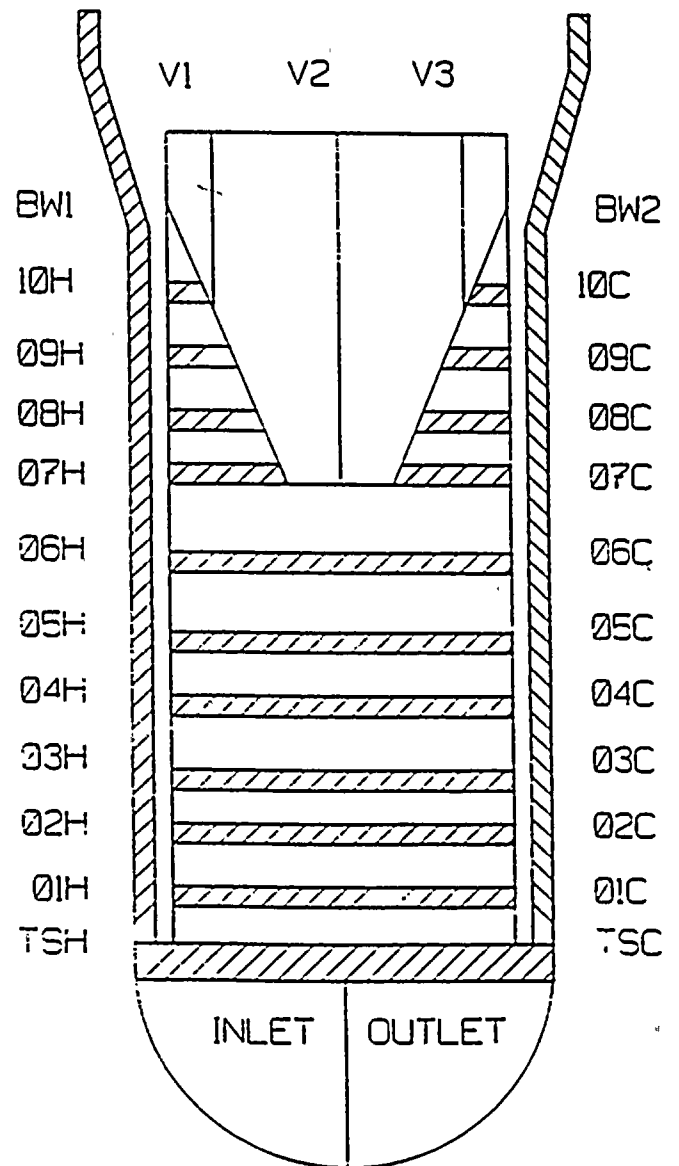
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II. STATUS OF S/G CONDITION

LOCATION OF DEGRADATION

REPORTABLE INDICATIONS IN SERVICE

<u>S/G REGION</u>	<u>S/G A</u>	<u>S/G B</u>
U-BEND	190	166
DRILLED SUPPORTS # 9 & 10	294	101
EGGCRATE SUPPORTS # 1 TO 8	1948	1242
SLUDGE PILE	1131	642
<u>TOTALS</u>	<u>3563</u>	<u>2151</u>



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II. STATUS OF S/G CONDITION

LEAKAGE HISTORY

April 1981

Leak Rate - 0.01- 0.05 Gallons/Day (gpd)

Leak Location - Steam Blanketed U-Bend

Cause - IGA/IGSCC

January 1990

Leak Rate - 2 - 5 Gallons/Day (gpd)

Leak Location - ~ 13" Above Tubesheet

Cause - Slag Nugget Between Periphery

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II. STATUS OF S/G CONDITION

LEAKAGE HISTORY

TECHNICAL SPECIFICATION REQUIREMENTS

3 Samples / 7 Days - 5 ml Gross Activity

Monthly Sample - 4000 ml Dose Equivalent Iodine

ADDITIONAL MONITORING

On-Line

Blowdown Monitors

Air Ejector Monitors

Grab Samples

400 Liter Sample on Resin

Monthly if < LLD

Weekly if > LLD

Secondary Side Tritium

Current RCS Leakage 3-5 Gallons/Day (gpd)

EPRI Leak Rate Guidelines

Night Order in Control Room

Incorporate into Operations Procedures
Prior to Startup from 4/96 Outage

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III. ECT TECHNIQUE QUALIFICATION - IGA/SCC

FPL BOBBIN COIL TECHNIQUE EXCEEDS EPRI
S/G EXAM. GUIDELINE, "APPENDIX H" REQUIREMENTS

<u>Requirement</u>	<u>Appendix H Req.</u>	<u>FPL Technique</u>
DETECTION	80% POD @ 90% CL For Flaws \geq 60%	80% POD @ 90% CL For Flaws \geq 35%
DEPTH SIZING	RMSE \leq 25%	RMSE = 17.9%

*** EPRI PEER REVIEW APPROVED MARCH 27, 1996 ***

QUALIFICATION SAMPLE SET

FLAWS AT EGGCRATE SUPPORTS

FLAWS AT SLUDGE PILE REGION

ALL AVAILABLE CE S/G PULLED TUBE DATA

11 FLAWS FROM CE S/Gs (6 from PSL-1)

7 IGA/SCC LAB SAMPLES FROM EPRI

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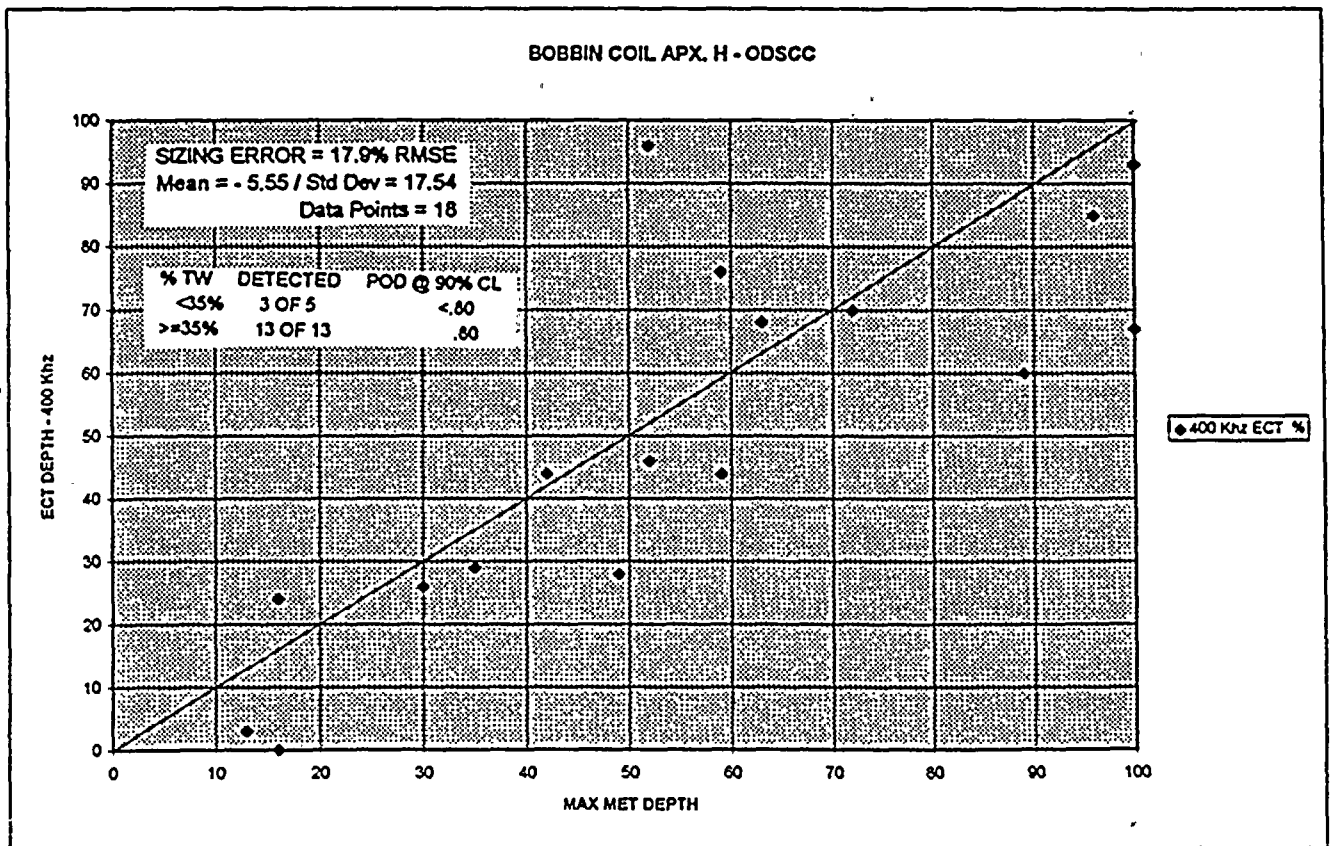
III. ECT TECHNIQUE QUALIFICATION - IGA/SCC

FPL BOBBIN COIL QUALIFICATION SAMPLE SET

ECT vs METALLOGRAPHY RESULTS

DETECTION 80% POD @ 90% CL
 For Flaws $\geq 35\%$

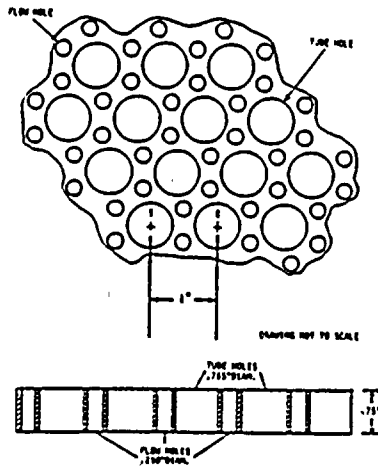
DEPTH SIZING RMSE = 17.9%



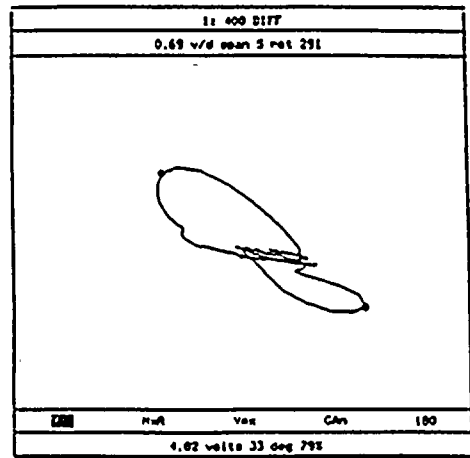
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III. ECT TECHNIQUE QUALIFICATION

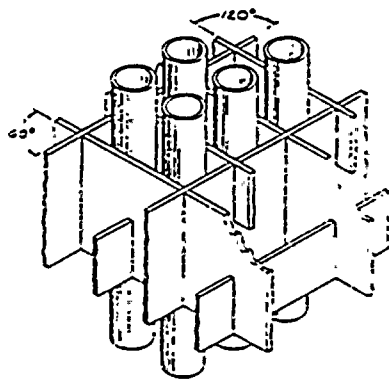
DRILLED SUPPORT ECT SIGNAL LARGER &
INTERFERES MORE WITH FLAW DETECTION & SIZING



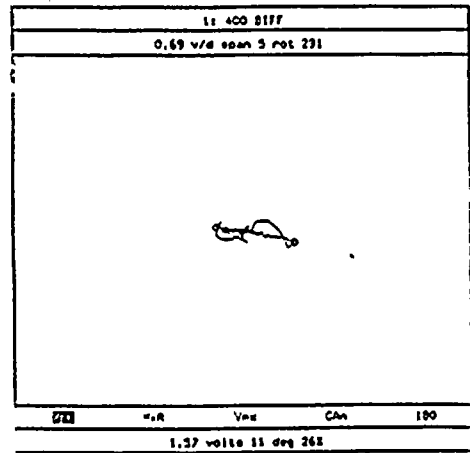
DRILLED SUPPORT DESIGN



ECT SIGNAL



EGGCRAPE SUPPORT DESIGN



ECT SIGNAL



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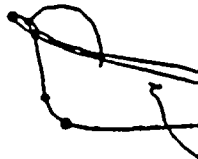
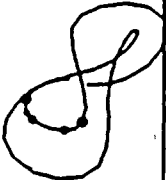


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III. ECT TECHNIQUE QUALIFICATION

FLAW AT DRILLED SUPPORT PLATE
 (FLAW IDENTIFIED BY VECTOR POINTS)

1: 400 DIFF	3: 100 DIFF	P1:1-3 DIFF	4: 100 ABSL
0.8VD S 6 R279	2.5VD S 22 R134	0.8VD S 7 R277	6.8VD S 61 R277
			
Vpp █ Vax GAn 180	Vpp █ Vax GAn 180	Vpp █ Vax GAn 180	Vpp █ Vax GAn 180
2.29v 81d 68%	3.69v 20d 50%	2.00v 67d 68%	10.09v 113d
OIM - 0.33			

FLAW AT EGGCRATE SUPPORT
 (FLAW IDENTIFIED BY VECTOR POINTS)

1: 400 DIFF	3: 100 DIFF	P1:1-3 DIFF	4: 100 ABSL
1.0VD S 8 R278	1.3VD S 11 R134	1.0VD S 8 R278	2.7v S 23 R262
			
Vpp █ Vax GAn 180	Vpp █ Vax GAn 180	Vpp █ Vax GAn 180	Vpp █ Vax GAn 180
2.91v 116d 38%	3.99v 106d	2.91v 90d 47%	3.9v 203d
OIM - 0.70			

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III. ECT TECHNIQUE QUALIFICATION - IGA/SCC

EPRI BOBBIN COIL QUALIFICATION FOR IGA/SCC

ALL DRILLED SUPPORT PLATE PULLED TUBE FLAWS

<u>Requirement</u>	<u>Appendix H Req.</u>	<u>EPRI Technique</u>
DETECTION	80% POD @ 90% CL For Flaws \geq 60%	80% POD @ 90% CL For Flaws \geq 40%
DEPTH SIZING	RMSE \leq 25%	<u>RMSE = 29%</u>

EPRI EFFORT NOT REPRESENTATIVE FOR CE S/Gs

ST. LUCIE UNIT 1 HAS 2 PARTIAL DIAMETER DRILLED SUPPORTS



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IV. 1996 S/G INSPECTION PLANS

DRILLED SUPPORT PLATES

ENHANCED APPROACH FOR EOC 13 INSPECTION

EPRI S/G Examination Guidelines, Supplement I - "Guidelines for Disposition of Bobbin Coil Indications Attributed to ODSCC at Non-Dented and Drilled Tube Support Plates"

SUPPLEMENT I APPROACH

BOBBIN SIZING IF INDICATION IS CONCLUSIVE

MRPC IF INDICATION IS INCONCLUSIVE

REPAIR FOR CRACK LIKE INDICATION

MONITOR IF NOT CRACK LIKE

FPL APPROACH - MRPC ALL BOBBIN INDICATIONS

PLUG CRACK-LIKE INDICATIONS

TRACK IF NOT DETECTED BY MRPC

EVALUATE IF NOT CRACK-LIKE BY MRPC

ASSESS DEPTH BY BOBBIN & MRPC

REVIEW HISTORY FOR GROWTH

PLUG IF 40%> OR EVIDENCE OF GROWTH

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IV. 1996 S/G INSPECTION PLANS

BOBBIN COIL INSPECTIONS

100% OF ACTIVE TUBES FULL LENGTH

MRPC COIL INSPECTIONS

100% OF ACTIVE HL EXPANSION TRANSITIONS

20% OF ACTIVE CL EXPANSION TRANSITIONS

20% OF HL DENTED SUPPORT INTERSECTIONS

SELECTED BOBBIN INDICATIONS (DIAGNOSTIC)

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IV. 1996 S/G INSPECTION PLANS

IN-SITU PRESSURE TEST

SEVERAL SIGNIFICANT FLAWS

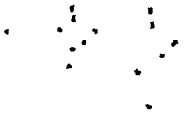
AXIAL & CIRCUMFERENTIAL

INSTALLED PLUG INSPECTIONS

LOCATION & CONDITION

WESTINGHOUSE ALLOY 600 PLUGS

FRAMATOME "PAP" ALL HOT LEG PLUGS



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V. SUMMARY

CONSERVATIVE PROGRAM HISTORY

PROACTIVE RESPONSE TO LEAKAGE

PREVENTIVE PLUGGING

PROACTIVE INSPECTIONS

NO MID-CYCLE OUTAGES SINCE 1986

BOBBIN TECHNIQUE EXCEEDS APPENDIX H

CONSERVATIVE APPROACH ON DRILLED PLATES

REPLACEMENT SCHEDULED FOR SPRING 1998

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V. SUMMARY

REPLACEMENT S/G FEATURES

SAME FORM, FIT & FUNCTION

50.59 SAFETY EVALUATION

ALLOY 690 TUBING

ALL LATTICE BAR SUPPORTS - 410 SS

FLAT BAR VERTICAL SUPPORTS

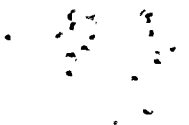
**BLOWDOWN HEADER INTEGRAL
WITH TUBESHEET**

**MEETING BETWEEN NRC STAFF AND
FLORIDA POWER & LIGHT COMPANY**

ST. LUCIE, UNIT 1

APRIL 22, 1996

<u>Name</u>	<u>Office</u>
W. Bohlke	FPL
G. Boyers	FPL
K. Craig	FPL
E. Weinkam	FPL
M. Schoppman	FPL
L. Wiens	NRC
R. Croteau	NRR/PDII-2
P. Rush	NRR/EMCB
J. Norris	NRR/PDII-1
B. Sheron	NRR/DE
F. Hebdon	NRR/PDII-3
J. Strosnider	NRR/DE/EMCB
E. Sullivan	NRR/DE/EMCB
G. Hornseth	NRR/DE/EMCB
K. Karwoski	NRR/DE/EMCB
J. Tsao	NRR/DE/EMCB



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