



November 9, 2005

L-2005-234
10 CFR 50.55a
10 CFR 50.36

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

Re: St. Lucie Unit 1
Docket No. 50-335
Revised Steam Generator Tube Inservice Inspection
Special Report for Refueling Outage SL1-19 & RAI Response

Attached is complete replacement of the Steam Generator Tube Inservice Inspection Special Report required by sections 4.4.5.5.b and 6.9.2 of the St. Lucie Unit 1 Technical Specifications for the spring 2004 refueling outage (SL1-19) submitted by FPL letter L-2005-077 dated April 8, 2005. A portion of the report was inadvertently omitted in the original submittal.

Attachment 1 provides a revised report and Attachment 2 provides a response to the NRC request for additional information (RAI) dated July 12, 2005. A revised response date was discussed with the NRC project manager.

Should there be any questions, please contact us.

Very truly yours,

William Jefferson, Jr.
Vice President
St. Lucie Plant

WJ/GRM

Attachment

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Replacement St. Lucie Unit 1
Spring 2004 Refueling Outage SL1-19
Steam Generator Tube Inservice Inspection
Special Report

This report addresses Plant Technical Specification Section 4.4.5.5 b. The attached information provides the summarized results for the inservice examination of steam generator tubing, which is to be submitted to the Commission within 12 months of the examination completion date.

1. Inservice eddy current examination and tube plugging of the St. Lucie Unit 1 steam generators was completed between April 4, 2004 and April 10, 2004. The examination scope as noted below is represented under "Total Tubes Inspected" on the attached FORM NIS-BB, Owners' Data Report for Eddy Current Examination Results.

Examination Scope

- **Bobbin Coil Probe**
 - Approximately 57% of the inservice tubes in S/G 1A and approximately 54% of the inservice tubes in S/G 1B were examined from tube end to tube end. Row 3 examinations (because of the tight bend radii) included the hot leg and cold leg straight sections with complementary u-bend examinations performed using the Plus Point Probe.
 - **Plus Point Rotating Probe**
 - Approximately 50% of the hot leg Expansion Transitions from 3 inches above to 2 inches below the secondary face of the tubesheet.
 - 50% of the row 3 U-bends as a minimum were examined. (Row 3 has the tightest bend radius due to the crossover design)
 - Special interest (diagnostic) locations as required by the bobbin coil results.
2. The location and percent of wall thickness penetration is also summarized on the attached FORM NIS-BB under "Location of Indications. To date, no corrosion type indications have been reported at St. Lucie Unit 1.
 3. Three (3) tubes were preventively plugged in S/G 1A due to mechanical wear that was less than the Technical Specification plugging limit of 40% wall thickness penetration. This is summarized in the upper portion of the attached FORM NIS-BB.
 4. A total of 21 mechanical wear indications (17 in S/G 1A and 4 in S/G 1B) detected at u-bend support structures that measured less than 20% wall thickness penetration will remain in service for cycle 19.
 5. The source documents (tubes preventively plugged, 20% to 39%, and 1% to 19%) used for preparation of FORM NIS-BB are attached for reference.

FORM NIS-BB OWNERS' DATA REPORT FOR EDDY CURRENT EXAMINATION RESULTS As required by the provisions of the ASME CODE RULES								
EDDY CURRENT EXAMINATION RESULTS								
PLANT: St. Lucie Unit 1			Outage: SL1-19					
EXAMINATION DATE: April 4, 2004 through April 10, 2004								

STEAM GENERATOR	TOTAL TUBES INSPECTED	TOTAL TUBES 20%-39%	TOTAL TUBES ≥40%, PIT & VOL	TUBES PREVENTIVELY PLUGGED (PTP)	TUBES PLUGGED THIS OUTAGE	TOTAL PLUGGED TUBES IN S/G
769802A (Bobbin)	4834	3	0	3	3	14
769801B (Bobbin)	4640	0	0	0	0	0
769802A (RPC) (1)	4288 (2)	0	0	0	0	See Bobbin
769801B (RPC) (1)	4291 (2)	0	0	0	0	See Bobbin

LOCATION OF INDICATIONS (1% - 100%, PIT & VOL)								
STEAM GENERATOR	U Bend CBH (3) To CBC (3)	Lattice Grids (TSP's) 01 to 07		Top of Tubesheet to #1 Support C/L	Top of Tubesheet to #1 Support H/L	Total Indications		
		H/L	C/L			1% - 19%	20%-39%	≥40%, PIT or VOL
769802A (Bobbin)	3	0	0	0	0	17	3 (4)	0
769801B (Bobbin)	0	0	0	0	0	4	0	0
769802A (RPC) (1)	0	0	n/a	n/a	n/a	n/a	n/a	0
769801B (RPC) (1)	0	n/a	n/a	n/a	n/a	n/a	n/a	0

Remarks:
 (1) RPC = Rotating Pancake Coil Technique.
 (2) Includes tubes in the low row U-bend & dent programs.
 (3) CBH = Connector Bar Hot Leg; CBC = Connector Bar Cold Leg
 (4) Tubes with indications measuring greater than or equal to 20% through wall were preventively plugged (PTP).

The following listings are source documents used for the preparation of "Form NIS-BB".

S/G A Tubes with Bobbin 20-39% TWD Indications

QUERY: QueryM1

ROW	LINE	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	CAL #	LEG	PROBE	
68	77	0.36	109	P	3	TWD	22 F06	-1.40	TEH	TEC	38	COLD	610UL
100	79	0.80	122	P	3	TWD	32 F06	+0.91	TEH	TEC	38	COLD	610UL
103	78	0.32	109	P	3	TWD	21 CBC	+1.80	TEH	TEC	38	COLD	610UL

Total Tubes : 3
Total Records: 3

S G A Tubes Preventatively Plugged

QUERY: QueryM1

ROW	LINE	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	CAL #	LEG	PROBE
68	77						PTP	TEH	TEC	38	COLD	610UL
100	79						PTP	TEH	TEC	38	COLD	610UL
103	78						PTP	TEH	TEC	38	COLD	610UL

Total Tubes : 3
Total Records: 3

S/G B Tubes with Bobbin 20-100% TWD Indications

No damage was reported in S/G B that exceeded 20% wall thickness penetration.

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S/G A:

Tubes with Bobbin 1-19% TWD Indications

QUERY: QueryM1

ROW	LINE	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	CAL #	LEG	PROBE
---	----	-----	---	---	---	---	-----	---	---	-----	-----	-----
77	92	0.20	127	P 3	TWD 14	F09	-2.28	TEH	TEC	20	COLD	610UL
79	92	0.15	130	P 3	TWD 11	F09	-1.99	TEH	TEC	20	COLD	610UL
84	99	0.13	114	P 3	TWD 11	F06	+1.30	TEH	TEC	38	COLD	610UL
88	93	0.14	124	P 3	TWD 11	F04	-0.61	TEH	TEC	20	COLD	610UL
91	78	0.25	112	P 3	TWD 16	CBC	+1.91	TEH	TEC	20	COLD	610UL
92	77	0.13	127	P 3	TWD 11	CBC	+0.37	TEH	TEC	38	COLD	610UL
95	92	0.19	107	P 3	TWD 13	F09	-1.93	TEH	TEC	20	COLD	610UL
97	92	0.13	123	P 3	TWD 11	F09	-2.02	TEH	TEC	38	COLD	610UL
97	144	0.11	155	P 3	TWD 10	01C	-1.53	TEH	TEC	62	COLD	610UL
		0.24	124	P 3	TWD 17	02C	-1.56	TEH	TEC	62	COLD	610UL
99	78	0.27	155	P 3	TWD 18	CBC	+1.74	TEH	TEC	38	COLD	610UL
102	111	0.14	111	P 3	TWD 11	F06	-1.07	TEH	TEC	22	COLD	610UL
103	92	0.12	115	P 3	TWD 9	F09	-1.92	TEH	TEC	20	COLD	610UL
114	75	0.25	109	P 3	TWD 17	F06	-0.99	TEH	TEC	38	COLD	610UL
115	78	0.12	137	P 3	TWD 9	F10	+2.24	TEH	TEC	20	COLD	610UL
115	82	0.19	130	P 3	TWD 15	F05	+0.89	TEH	TEC	61	COLD	610UL
128	51	0.14	74	P 3	TWD 11	F10	+0.54	TEH	TEC	41	COLD	610UL

Total Tubes : 16

Total Indications: 17

S/G B:

Tubes with Bobbin 1-19% TWD Indications

QUERY: QueryM1

ROW	LINE	VOLTS	DEG	CHN	IND	%TW	LOCATION	EXT	EXT	CAL #	LEG	PROBE
---	----	-----	---	---	---	---	-----	---	---	-----	-----	-----
81	102	0.14	125	P 3	TWD 12	F04	-1.80	TEH	TEC	21	COLD	610UL
97	144	0.08	158	P 3	TWD 8	05H	+1.46	TEH	TEC	52	COLD	610UL
110	91	0.10	77	P 3	TWD 9	F06	-1.38	TEH	TEC	36	COLD	610UL
114	51	0.08	156	P 3	TWD 6	F05	-1.42	TEH	TEC	36	COLD	610UL

Total Tubes : 4

Total RIndications: 4

**REQUEST FOR ADDITIONAL INFORMATION
SL1-19 STEAM GENERATOR TUBE INSERVICE INSPECTION SPECIAL REPORT
ST. LUCIE NUCLEAR PLANT, UNIT 1
DOCKET NUMBER 50-335**

NRC Request 1:

St. Lucie Unit 1 Technical Specification (TS) 4.4.5.5.b requires the licensee to provide the location and percent of wall thickness penetration for each indication of an imperfection. This technical specification also requires identification of tubes plugged. Please provide the location of the three tubes that were plugged in steam generator A (i.e., row, column, and axial location of the flaw). In addition provide the location and percent of wall thickness penetration for each indication of an imperfection in both steam generators.

FPL Response 1:

The required information is provided in the enclosed listings, which include indications 1-19% through-wall for both steam generators, and indications 20% or greater through-wall for steam generator 1A (S/G 1B does not contain any indications 20% or greater). A listing for tubes preventatively plugged in steam generator 1A is also provided.

NRC Request 2:

Your report identifies the population of tubes that are experiencing wear at U-bend support structure locations. There are different types of wear mechanisms, which behave differently and may present challenges to tube integrity. To help the NRC staff in understanding the identified indications of wear, please discuss the extent to which these wear indications are considered "typical fan bar wear," "atypical U-bend wear," or "localized U-bend wear." Typical fan bar wear refers to wear caused by the thermal hydraulic conditions and tube-to-support clearances, which can vary because of manufacturing tolerances. Atypical U-bend wear refers to pit-like indications found at flat-bar supports and theorized to be the result of asperities on the flat bars introduced during fabrication. Localized U-bend wear refers to wear "localized" to specific columns of tubes and possibly the adjacent column as a result of arch-bar distortion instead of a more random manufacturing tolerance issue (which causes typical fan bar wear).

Please discuss how the nature of the wear detected during this outage compares to the wear indications detected in 1999 (i.e., what was the cause of wear indications in 1999).

FPL Response 2:

Most indications are localized U-bend wear occurring at flat-bar supports in line 77-79 and line 92-93 in steam generator 1A, which account for 13 of 14 tubes plugged to date. One additional tube (S/G 1A, R27 L100) was plugged in 1999 for an atypical pit-like wear indication at a flat-bar support in the U-bend that is likely due to a manufacturing anomaly. In the most recent inspection at SL1-19, 16 new wear indications were reported. Five of

these were localized wear in the U-bend as discussed above, three of which were plugged (see listing "S/G A Tubes Preventatively Plugged"). Eleven of these are typical wear occurring randomly at flat-bar supports in the U-bend and straight tube regions. Wear indications remaining inservice at the present time include localized U-bend wear and typical (i.e., random) wear indications.

NRC Request 3:

In several Babcock and Wilcox replacement steam generators currently in service, tube-to-tube contact or tubes in close proximity have been observed. For St. Lucie Unit 1, please discuss how many tubes are currently considered to be in close proximity and whether any tube wear has been observed at the locations of close proximity. In addition, please discuss whether the number of tubes in close proximity has increased, decreased, or remained the same since the steam generators were installed. If the number of tubes in close proximity is increasing with time, please discuss the cause (the staff understands that the tube proximity issue is a result of manufacture and that it was expected that the condition may correct itself with time).

FPL Response 3:

The approximate number of tubes in close proximity reported during the three inservice inspections conducted to date (SL1-16, SL1-17 and SL1-19) are shown below. The number remains relatively constant over time and none of the tubes contained any wear degradation based on bobbin and rotating probe inspections completed.

Steam Generator Tubes In Close Proximity – St. Lucie Unit 1			
	SL1-16	SL1-17	SL1-19
S/G 1A	54	54	56
S/G 1B	45	52	48

NRC Request 4:

There is limited steam generator design information in the St. Lucie Updated Final Safety Analysis Report. In order for the staff to better understand the design of your steam generators and the location of the indications described in your reports, please provide the following design information for St. Lucie Unit 1: (a) the manufacturer's model number for the replacement steam generators, (b) tube manufacturer, (c) outer diameter and nominal wall thickness of tubes, (d) number of tubes in each steam generator, (e) tube pitch and pattern (e.g., 0.95 inches triangular), (f) tubesheet thickness (with and without clad), (g) a sketch depicting the tube support structure naming (h) anti-vibration bar (fan bar) design, (i) tube support material (e.g., 410 Stainless Steel), (j) a sketch of a tubesheet map which depicts the rows and columns of the tubes in the steam generators, (k) smallest U-bend radius in the steam generator and the radii of the row 1 tubes, (l) stress relief after bending of tubes (e.g., stress relief of the entire tube length for the tubes in rows 1 through 27).

FPL Response 4:

Babcock & Wilcox International does not use model numbers, but instead uses a descriptive title and serial number in the manufacture of their steam generators as shown in the table below. Additional figures are enclosed as identified in the table.

St. Lucie Unit 1 Steam Generator Design Information	
(a) the manufacturer's model number	St. Lucie Nuclear Power Plant Unit 1 Replacement Steam Generator S/G A S/N 769802A, S/G B S/N 769801B
(b) tube manufacturer	Sumitomo Special Metals
(c) tube outer diameter & nominal wall thickness	0.75 inches x 0.045 inches
(d) number of tubes in each steam generator	8523
(e) tube pitch and pattern (e.g., 0.95 inches triangular)	1.0 inch triangular
(f) tubesheet thickness (with/without clad)	21.875 inches / 21.50 inches
(g) a sketch depicting the tube support structure naming	See Figure 1
(h) anti-vibration bar (fan bar) design,	See Figure 2
(i) tube support material (e.g., 410 Stainless Steel)	410 Stainless Steel
(j) a sketch of a tubesheet map which depicts the rows and columns of the tubes in the steam generators	See Figure 3
(k) smallest U-bend radius in the steam generator and the radii of the row 1 tubes	Row 3 has the smallest radius of 3.905 inches, Row 1 radius measures 4.272 inches
(l) stress relief after bending of tubes (e.g., stress relief of the entire tube length for the tubes in rows 1 through 27)	The u-bend regions of tubes in Row 1-20 are stress relieved after bending

NRC Request 5:

Steam generator inspections may not be required each refueling outage to meet TS requirements. To ensure NRC staff records are accurate, please confirm that no tube inspections were performed during the fall 2002 refueling outage (SL1-18).

FPL Response 5:

No tube inspections were performed during the fall 2002 refueling outage (SL1-18).

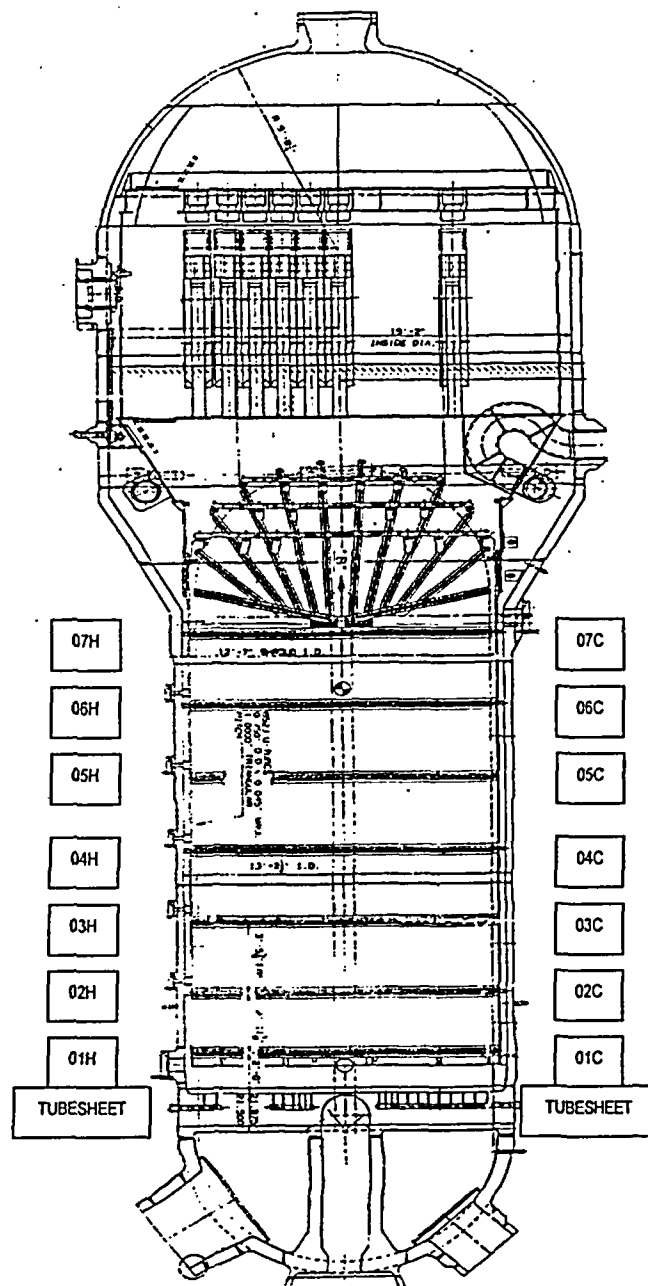


FIGURE 1
PSL-1 Replacement Steam Generator Support Identification

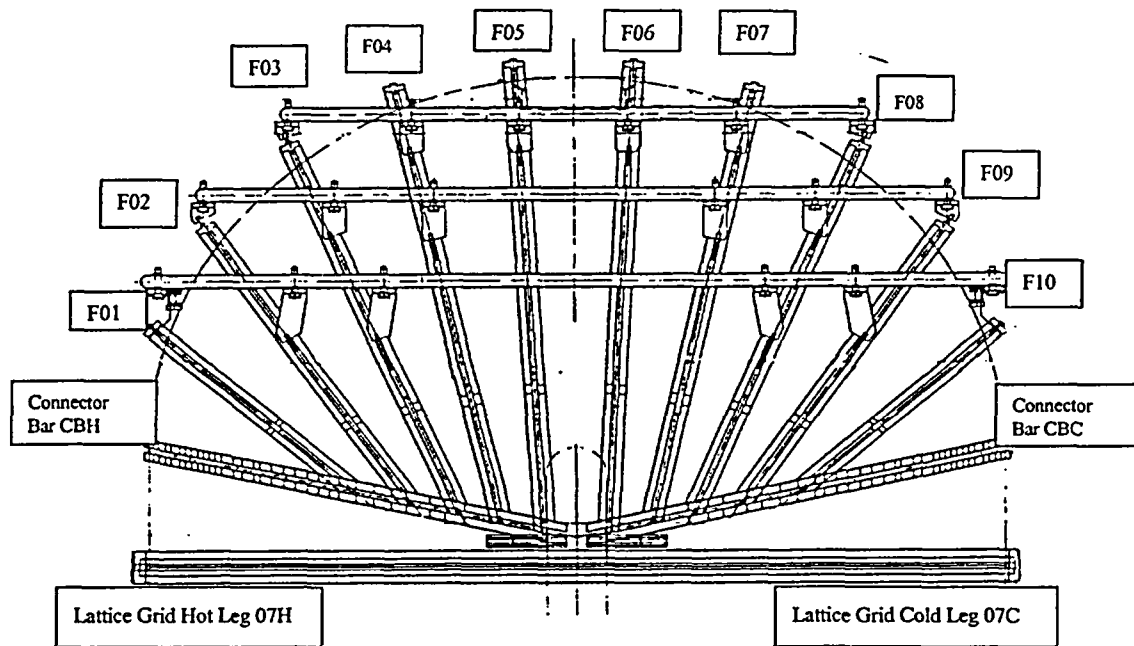


FIGURE 2
PSL-1 Replacement Steam Generator U-Bend Structure Identification

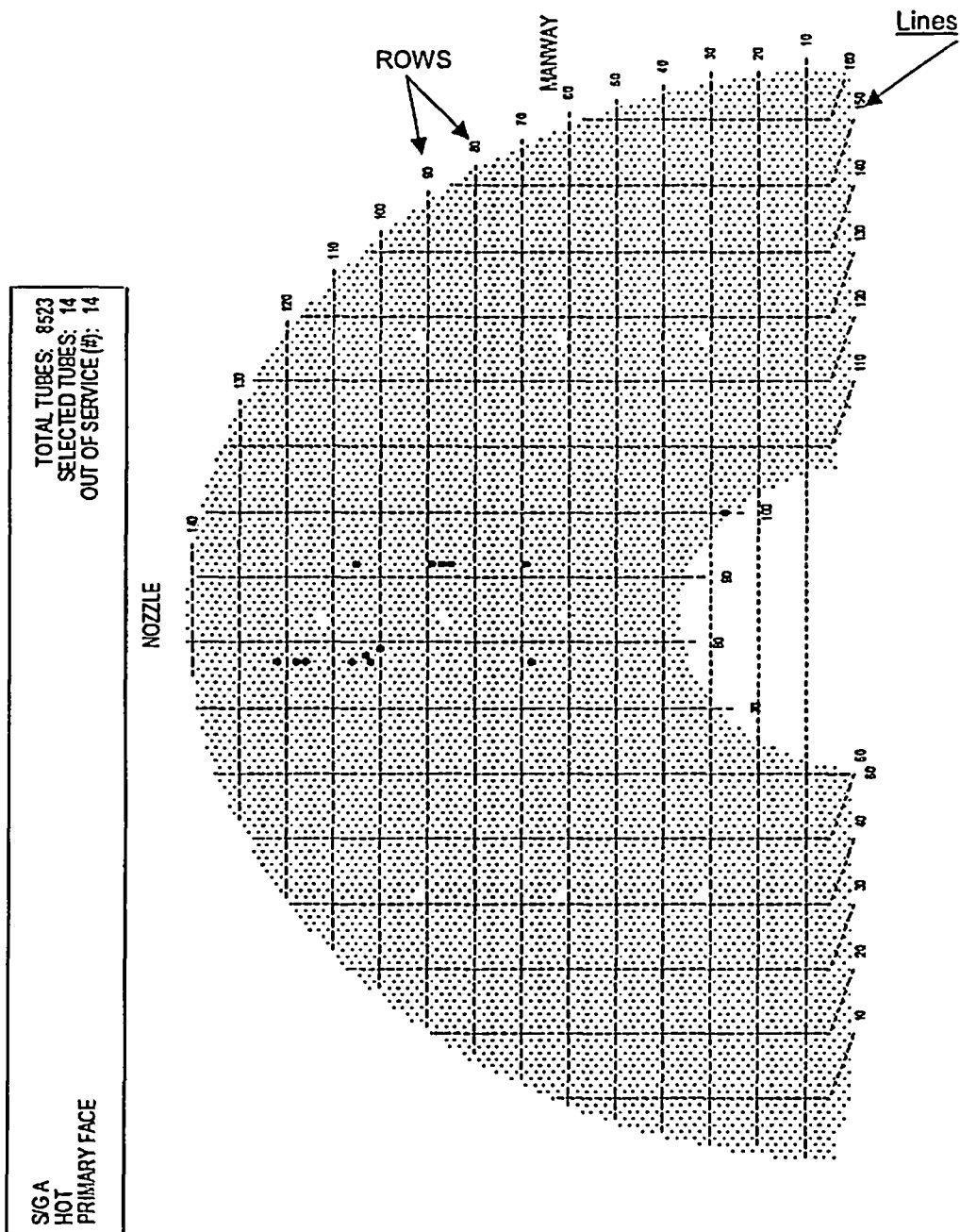


FIGURE 3
PSL-1 Replacement Steam Generator Tube Sheet Layout