

STEAM GENERATOR
INSERVICE INSPECTION RESULTS

STEAM GENERATORS

#2 #3 #4

May 1984

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5/23/85
Date

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INTRODUCTION

Pursuant to Technical Specification 6.9.6, this special report is submitted as required by Technical Specification 4.4.10.5.b.

A steam generator tube inservice inspection was performed in accordance with the surveillance requirements of Technical Specification 3.4.10 during April/May of 1984. Based on a rotating selection schedule, steam generator #4 was inspected to satisfy the Technical Specifications. In addition, a cold leg baseline inspection was performed in steam generators #2, 3, and 4. The existence of cold leg defects was discovered in steam generator #1 during the 1982 refueling outage and at that time Yankee committed to perform a cold leg baseline inspection in the remaining steam generators. The results of this inspection program satisfy that commitment, reference (b).

The Yankee Plant has four vertical U-tube steam generators. Each steam generator contains 1620 tubes. The tubes are type 304 stainless steel, 3/4 inch O.D. and 0.072 inch average wall thickness.

REFERENCES

- A. YAEC letter to USNRC, dated May 25, 1984 (FYR 84-60).
- B. USNRC Inspection 50-29 / 82-12, December 23, 1982.

RESULTS

The initial results of this inservice inspection, along with our justification for the program performed is documented in reference (a).

Table I of this report updates the overall results presented in reference (a). A detailed description of the testing done in each steam generator in as follows:

Steam Generator #4

A tube inspection in accordance with Technical Specification 4.4.10.4.a.8. was performed. The degraded/defective tubes from this inspection result in category C-2 as documented in reference (a). In that this first sample included ~ 100% of the tubes, a second sample selection was not required. A total of 1536 tubes were inspected, with 43 tubes previously plugged and 41 tubes not inspected due to the presence of template plugs or inaccessibility.

In addition to the Technical Specification required hot leg inspection program, the new cold leg baseline inspection program was also applied to steam generator #4.

The location and percent of wall thickness penetration for each indication of an imperfection is contained in Attachment I. Identification of tubes plugged is contained in Attachment II.

Steam Generator #2

As part of the cold leg baseline program, steam generator #2 was inspected. A total of 1592 tubes were inspected, with 9 tubes previously plugged and 19 tubes not inspected due to the presence of template plugs or inaccessibility. While the cold leg baseline program was successful, it was discovered that it was not possible to obtain eddy current results on the hot leg side tubes from the tube sheet to the second tube support plate. This is apparently due to the buildup of magnetite on the interior of the tubes in sufficient quantity to cause interference with the eddy current signal. A solution to this problem is being pursued.

The location and percent of wall thickness penetration for each indication of an imperfection is contained in Attachment I. Identification of tubes plugged is contained in Attachment II.

Steam Generator #3

As part of the cold leg baseline program, steam generator #3 was inspected. A total of 1551 tubes were inspected, with 21 tubes previously plugged and 48 tubes not inspected due to the presence of template plugs or inaccessibility.

The location and percent of wall thickness penetration for each indication of an imperfection is contained in Attachment I. Identification of tubes plugged is contained in Attachment II.

Table I

<u>Steam Generator</u>	<u>Degraded Tubes < 40%</u>	<u>Defective Tubes ≥ 40%</u>		<u>Defective Tubes to date</u>	
		<u>Cold Leg</u>	<u>Hot Leg</u>	<u>Cold Leg</u>	<u>Hot Leg</u>
#2 (1984)	11	35	*	35	9
#3 (1984)	6	56	4	56	25
#4 (1984)	11	12	7	12	50
#1 (1982)		5	4	5	47

* Hot leg inspection in steam generator #2 was not completed due to magnitite interference.

NOTE: In addition to the defective tubes, five degraded tubes plus four tubes with restrictions that prevented inspection were also plugged.

- ### TYPES OF ABBREVIATIONS USED

- OTHER COMMENTS

PLANT			UNIT#	S/G	LEG	REEL	TO	REEL	DATE
YANKEE ROWE			1	2	COLDLEG	1			4/27/84
SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION		INDEX
02	000	000	03.25	040	099	1	STD		01774-28
			03.35	081	080	1	STD		01831-28
			03.08	102	067	1	STD		01888-28
			02.73	126	048	1	STD		01945-28
			02.89	152	023	1	STD		02002-28
			03.20	037	099	5	STD		02059-28
			03.16	078	080	5	STD		02116-28
			02.88	098	060	5	STD		02173-28
			02.47	120	040	5	STD		02230-28
			02.40	142	020	5	STD		02287-28
02	E	7				1	DTS CL		02344-28
02	H	7				1	DTS CL		02436-63
02	O	5				1	DENT #5 TSP CL		
02	U	8				1	DENT #5 TSP HL		02690-63
02	J	15	01.25	144	032	1	TTS CL +0001.0		02762-08
02	F	17				1	DTS CL		02834-63
02	I	21	02.01	109	062	1	TTS CL +0002.4		02906-08
02	Y	22	03.85	151	024	1	#4 AVB +0000.0		02975-60
02	Y	23	02.32	148	027	1	#4 AVB +0000.0		03045-09
02	J	24	01.03	123	051	1	TTS CL +0001.5		03066-11
02	J	23	00.80	125	049	1	TTS CL +0000.9		03083-05
02	J	23	01.16	124	050	1	TTS CL +0004.2		03102-13
02	J	24	03.26	103	066	1	TTS CL +0005.4		03164-48
02	J	25	02.51	121	053	1	TTS CL +0003.8		03261-48
02	J	26	11.63	056	092	1	TTS CL +0003.0		03334-24
02	J	26	00.92	114	058	1	TTS CL +0003.3		03383-24
02	B	43	01.15	131	044	1	TTS CL +0001.5		03426-18
02	D	45	02.65	102	067	1	TTS CL +0000.9		03460-15
02	D	46	01.95	140	036	1	TTS CL +0003.3		03503-27
02	C	52	09.73	030	075	1	#1TSP CL+0029.9		ID 03591-60
02	E	59				1	DTS CL		03685-33
02	J	27				1	DTS CL		03773-54
02	G	27	03.08	114	058	1	TTS CL +0005.1		03882-54
02	H	28	00.71	129	046	1	TTS CL +0001.2		03951-14
02	J	29	12.84	061	090	1	TTS CL +0002.7		03977-11
02	F	28				1	RESTRICTED DENT #3TSP HL		04041-52
02	F	29				1	RESTRICTED DENT #3TSP HL		04146-52
02	K	29	15.06	051	095	1	TTS CL +0001.6		04225-26
02	J	29	10.87	061	090	1	TTS CL +0002.1		04278-26
02	H	29	00.72	132	043	1	TTS CL +0002.7		04331-26
02	N	18	01.52	129	046	1	TTS CL +0003.3		04382-24
02	DD	30	02.92	166	<20	1	#4 AVB +0000.0		04467-60
02	H	31	01.25	137	038	1	TTS CL +0003.3		04543-15
02	G	31	01.40	146	029	1	TTS CL +0002.1		04574-15
02	J	33	17.18	045	097	1	TTS CL +0003.0		04629-39
02	G	32	01.41	148	027	1	TTS CL +0004.8		04729-60
02	H	32	01.55	107	063	1	TTS CL +0005.1		04850-60
02	I	34	00.98	131	044	1	TTS CL +0002.1		04926-15
PAGE 01 OF 02			LIST OF DATA STORED ON DISK						

PLANT			UNIT#	S/G	LEG	REEL	TO	REEL	DATE
YANKEE ROWE			1	2	COLDLEG	1			4/27/84
SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION		INDEX
02	K	35	12.65	052	094	1	TTS	CL +0004.2	04998-56
02	H	35	00.83	141	035	1	TTS	CL +0004.8	05111-56
02	F	36	01.83	140	036	1	TTS	CL +0002.7	05193-25
02	J	36	10.79	079	081	1	TTS	CL +0004.2	05276-57
02	K	36	01.66	122	052	1	TTS	CL +0004.2	05391-57
02	I	37	01.07	113	059	1	TTS	CL +0004.2	05506-57
02	H	37	02.02	094	072	1	TTS	CL +0003.9	05736-57
02	G	37	03.06	137	038	1	TTS	CL +0004.5	05851-57
02	F	37	09.53	076	082	1	TTS	CL +0003.3	05947-38
02	F	38	00.80	127	048	1	TTS	CL +0003.9	06024-38
02	G	38	01.40	127	048	1	TTS	CL +0003.3	06083-20
02	F	41	00.68	122	052	1	TTS	CL +0001.8	06114-10
02	G	42	04.86	123	051	1	TTS	CL +0003.0	06143-18
02	F	43	01.97	131	044	1	TTS	CL +0001.8	06180-18
02	N	13				1	RESTRICTED DENT #3TSP HL		06259-60
02	E	62				1	DTS CL		06380-60
02	H	63				1	DENT #2 TSP CL		06504-63
02	DD	44				1	DENT #2 TSP CL		06631-63
02	G	39	02.18	143	033	1	TTS	CL +0005.1	06755-60
PAGE 02 OF 02			LIST OF DATA STORED ON DISK						

PLANT				UNIT#	S/G	LEG	REEL	TO	REEL	DATE
YANKEE ROWE				1	3	COLDLEG	1		17	5/1/84
ID	ROW	COL	VOLTS	DEG	%	CH#	LOCATION			EXTENT
03	F	3				1	DTS HL			
03	J	3				1	DTS HL			
03	L	4				1	DTS HL			
03	O	5				1	PV 3" A#1 TSP HL			
03	L	7				1	PV 30" ATS HL			
03	O	11				1	DENT #1 TSP HL			
03	S	11				1	DENT 19" ATS HL			
03	W	16				1	DENT #1 TSP HL			
03	G	24	03.11	122	052	1	TTS CL +0004.9			
03	I	24	01.74	126	048	1	TTS CL +0003.6			
03	K	24	01.51	080	080	1	TTS CL +0002.4			
03	J	25	00.89	107	063	1	TTS CL +0003.3			
03	G	25	02.80	097	070	1	TTS CL +0004.5			
03	F	25	01.17	156	<20	1	TTS CL +0003.9			
03	I	28	00.63	121	053	1	TTS CL +0003.9			
03	H	28	05.05	076	082	1	TTS CL +0004.5			
03			03.09	099	069	1	TTS CL +0004.4			
03	G	28	00.92	111	060	1	TTS CL +0002.1			
03	N	30	01.65	134	041	1	TTS HL +0000.6			
03	J	30	00.60	105	065	1	TTS CL +0000.9			
03	H	31	04.22	095	071	1	TTS CL +0004.2			
03	I	31	06.41	085	077	1	TTS CL +0003.9			
03	K	31	02.41	112	059	1	TTS CL +0003.0			
03	K	32	01.94	112	059	1	TTS CL +0002.4			
03	J	32	05.71	094	072	1	TTS CL +0001.8			
03	I	32	20.64	045	097	1	TTS CL +0002.4			
03	H	32	01.44	132	043	1	TTS CL +0001.2			
03	H	33	03.08	091	074	1	TTS CL +0002.4			
03	K	33	10.17	055	093	1	TTS CL +0002.1			
03	K	34	07.13	077	082	1	TTS CL +0002.1			
03	K	36	01.31	119	054	1	TTS CL +0002.1			
03	H	36	03.02	128	047	1	TTS CL +0001.5			
03	F	37	01.08	150	025	1	TTS HL			
03			05.05	113	059	1	TTS CL +0002.1			
03	G	37	01.06	139	037	1	TTS CL +0003.0			
03	I	37	00.79	148	027	1	TTS CL +0002.1			
03	J	37	01.33	118	055	1	TTS CL +0002.1			
03	G	40	17.35	052	094	1	TTS CL +0002.1			
03	F	40	18.43	052	094	1	TTS CL +0002.1			
03	F	41	04.79	074	083	1	TTS CL +0002.4			
03	H	42	03.26	119	054	1	TTS HL +0001.5			
03	G	42	03.88	110	061	1	TTS CL +0001.8			
03	F	42				1	PV 16" A #1 TSP HL			
03			01.19	126	048	1	TTS CL +0000.9			
03	V	29				1	DENT #1 TSP HL			
03	X	29				1	DENT #1 TSP HL			
03	BB	30				1	PV 20" A #1 TSP HL			
03	R	30				1	PV BTWN TTS & #1 TSP HL			
PAGE 01 OF 02				EVALUATOR Wayne A. Gray				LEVEL IIA		

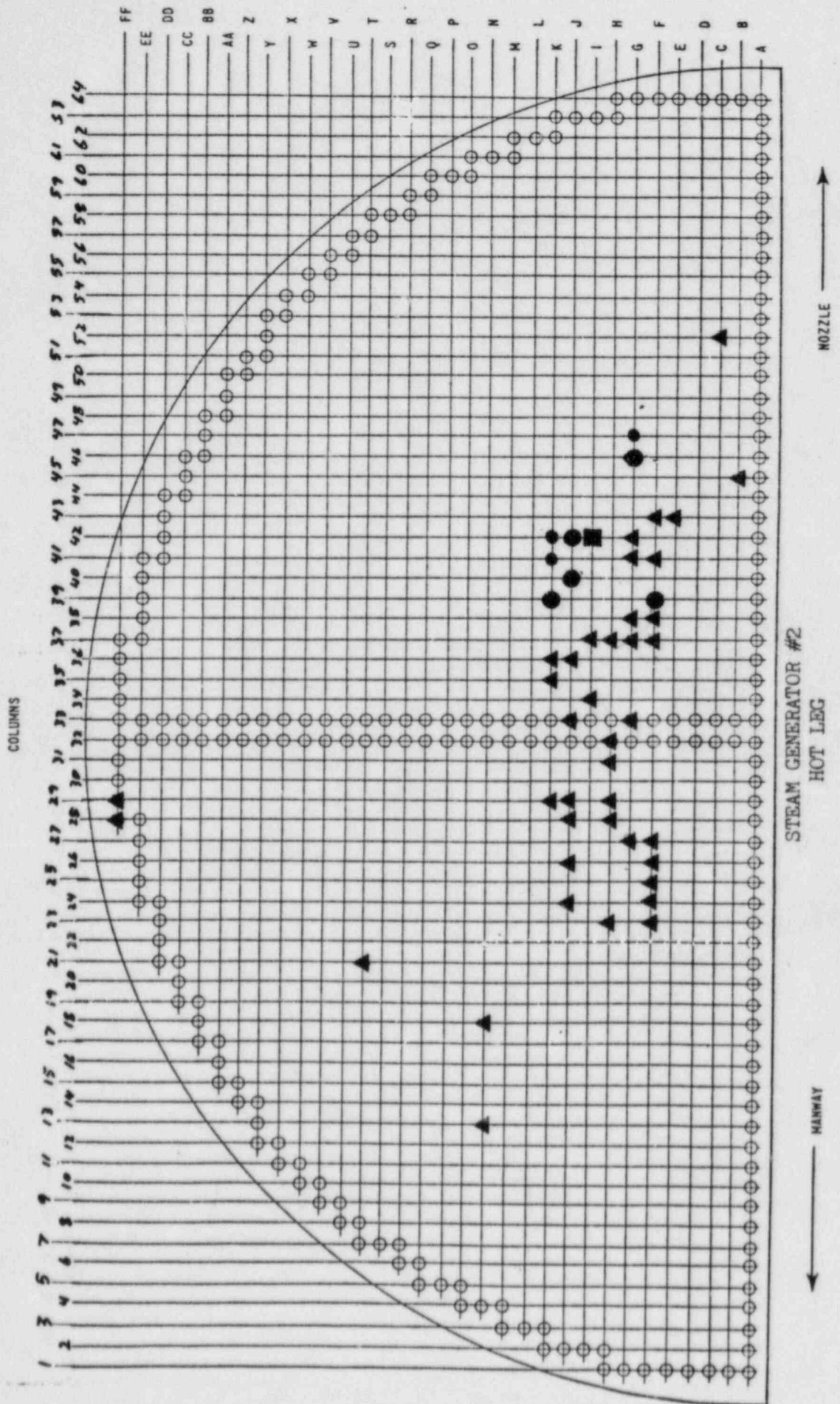
PLANT				UNIT#	S/G	LEG	REEL	TO	REEL	DATE	
YANKEE ROWE				1	3	COLDLEG	1		17	5/1/84	
ID	ROW	COL	VOLTS	DEG	%	CH#	LOCATION				EXTENT
03	E	21	01.35	118	055	1	TTS CL +0002.7				
03	D	21	00.77	138	038	1	TTS CL +0002.7				
03	B	47	01.56	134	041	1	TTS CL +0002.1				
03	D	22	02.84	129	046	1	TTS CL +0003.0				
03	D	23	02.51	110	061	1	TTS CL +0002.1				
03	G	18	02.23	127	048	1	TTS HL +0004.2				
03	X	20				1	DENT #1 TSP HL				
03	H	20	01.06	143	033	1	TTS CL +0001.2				
03	G	20	02.02	112	059	1	TTS CL +0001.2				
03	F	20	01.63	114	058	1	TTS CL +0003.7				
03	F	21	03.69	102	067	1	TTS CL +0003.9				
03	J	21	01.51	094	072	1	TTS CL +0002.4				
03	J	22	01.04	081	080	1	TTS CL +0001.2				
03	G	22	01.32	140	036	1	TTS CL +0002.7				
03	H	23	02.28	135	040	1	TTS CL +0001.2				
03	I	23	04.94	088	076	1	TTS CL +0003.3				
03	J	23	01.13	121	053	1	TTS CL +0001.8				
03	H	26	02.64	099	069	1	TTS CL +0004.2				
			02.21	111	060	1	TTS CL +0002.1				
03	F	27	02.84	106	064	1	TTS CL +0002.1				
			04.05	075	083	1	TTS CL +0001.4				
03	G	27	14.52	045	097	1	TTS CL +0002.1				
03	J	27	02.94	138	038	1	TTS HL +0002.8				
			17.33	045	097	1	TTS CL +0002.4				
03	Y	33	04.90	145	031	1	#4 AVB +0000.0				
02	Y	35	07.45	129	046	1	#4 AVB +0000.0				
			06.80	130	045	1	#1 AVB +0000.0				
02	R	38				1	DENT #1 TSP HL				
02	X	39				1	DENT #1 TSP HL				
02	Q	41				1	DENT #1 TSP HL				
02	W	45				1	DENT #1 TSP HL				
02	Z	48				1	DENT #1 TSP HL				
02	F	39	02.74	135	040	1	TTS CL +0003.6				
02	E	38	05.00	093	072	1	TTS CL +0003.3				
02	F	38	15.96	054	093	1	TTS CL +0003.6				
02	G	38	03.10	155	<20	1	TTS CL +0003.3				
02	G	35	06.28	090	074	1	TTS CL +0003.9				
02	F	35	00.99	118	055	1	TTS CL +0001.2				
02	G	34	03.23	111	060	1	TTS CL +0002.7				
02	G	33	01.85	113	059	1	TTS CL +0002.4				
02	F	29	05.58	095	071	1	TTS CL +0001.5				
02	G	30	01.45	128	047	1	TTS CL +0002.4				
02	G	31	00.94	127	048	1	TTS CL +0000.9				
02	P	19				1	RESTRICTED #2TSP CL				
02	K	35	02.28	117	056	1	TTS CL +0002.4				
02	F	24	06.41	089	075	1	TTS CL +0003.6				
PAGE 02 OF 02				EVALUATOR Wynne A. Choy				LEVEL IIA			

PLANT			UNIT#		S/G	LEG	REEL	TO	REEL	DATE
YANKEE ROWE			1		4	COLDLEG	1		18	4/27/84
SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION			INDEX
04	000	000	03.38	041	100	1	STD			00019-18
			03.38	082	080	1	STD			00056-18
			03.16	106	060	1	STD			00093-18
			02.78	130	040	1	STD			00130-18
			02.90	152	020	1	STD			00167-18
			03.39	040	100	5	STD			00204-18
			05.08	074	080	5	STD			00250-27
			04.41	091	060	5	STD			00305-27
			03.28	109	040	5	STD			00360-27
			02.41	131	020	5	STD			00415-27
04	G	59				1	PV 5" A #5TSP HL			00506-63
04	P	43				1	PV BTWN #1 TSP HL			00633-63
04	E	41				1	DENT TTS CL			01268-63
04	E	40				1	DENT TTS CL			01395-63
04	D	22	01.86	130	45	1	3.3" ATS CL			01522-63
04	C	12	08.50	12	30	1	ID 32.5" A #1TSP CL			01649-63
04	K	4				1	PV BTWN #1 & #2TSP HL			01776-63
04	M	5				1	PV BTWN TS & #2TSP HL			01903-63
04	P	5				1	PV 16" A #1TSP HL			02030-63
						1	PV 10" A #2TSP HL			02157-63
04	Q	5				1	PV 32" A #1TSP HL			02284-63
						1	PV 12" A #3TSP HL			02411-63
04	K	6				1	PV BTWN TTS & #1TSP HL			02538-63
04	K	7				1	PV BTWN TTS & #1TSP HL			02665-63
04	S	7				1	COPPER DEPOSIT #4 AVB			02792-63
04	T	7				1	DENT #4TSP CL			02919-63
						1	DENT #3TSP CL			03046-63
04	U	8				1	DENT #4TSP CL			03173-63
						1	DENTS 3"-5" A #4TSP CL			03300-63
04	P	8				1	PV 8" A #1TSP HL			03427-63
04	L	8				1	PV 2" ATS HL			03554-63
04	F	9				1	PV 4" ATS HL			03681-63
						1	PV 20" ATS HL			03808-63
04	X	41				1	PV 10" ATS HL			03935-63
04	X	39				1	PV 8" ATS HL			04062-63
04	T	10				1	PV 40" ATS HL			04189-63
04	G	11				1	PV 10" ATS HL			04316-63
04	W	11				1	PV BTWN #1 & #2TSP HL			04443-63
04	U	12				1	DENTS 28"-29" ATS HL			04570-63
04	Q	13				1	DTS HL			04697-63
04	P	13				1	DTS HL			04824-63
04	V	13				1	PV 10" A#2TSP HL			04951-63
04	Z	14				1	PV 2" ATS HL			05076-63
						1	DENT #4TSP HL			05205-63
04	X	14				1	DENT 6" A #1TSP HL			05332-63
04	EE	039	02.34	153	022	1	# 4 AVB +0000.0			05456-60
04	FF	36				1	PV 1" A #3TSP HL			05579-62
04	S	34				1	DTS CL			05705-63
PAGE 01 OF 02			LIST OF DATA STORED ON DISK							

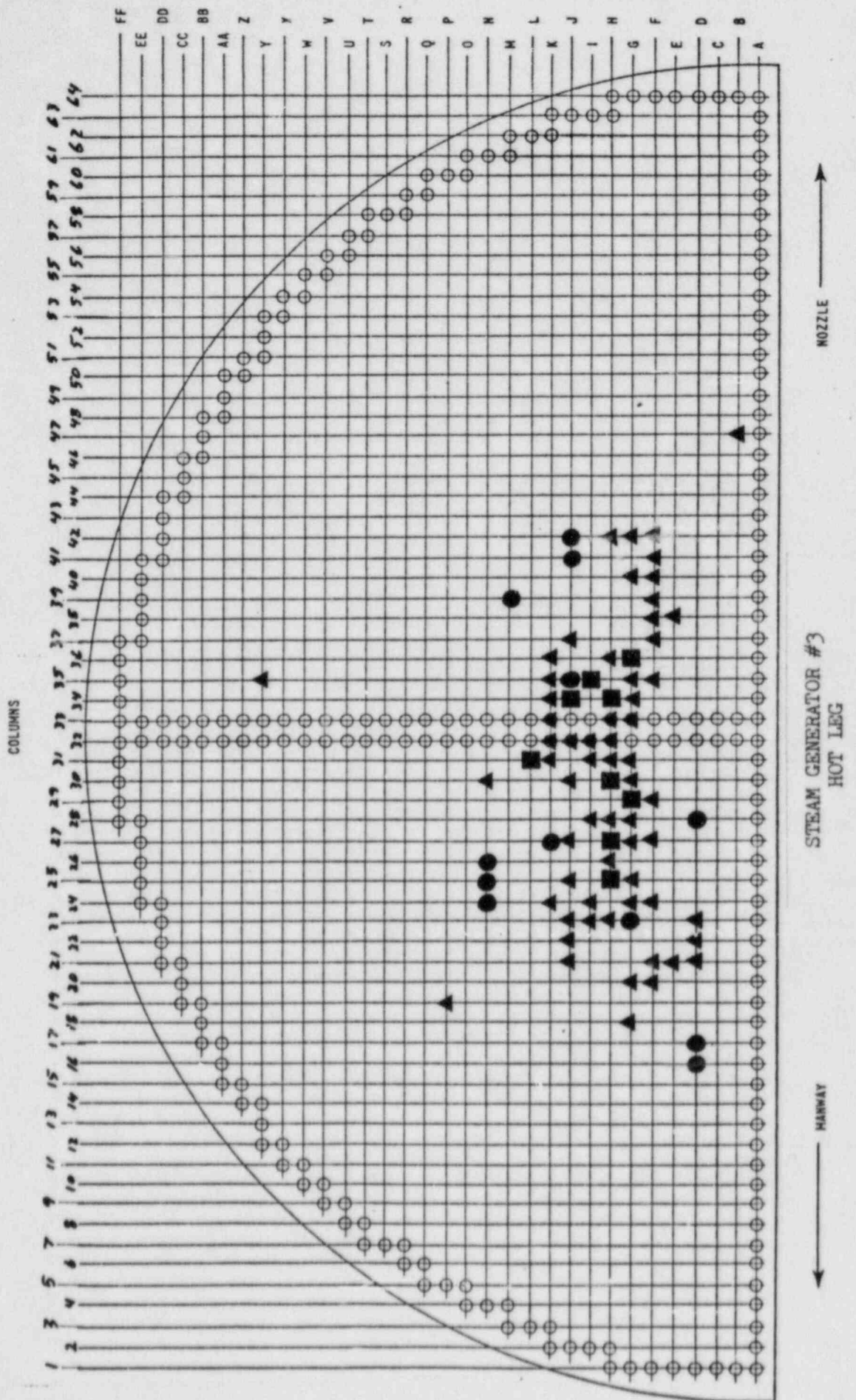
PLANT				UNIT#	S/G	LEG	REEL	TO	REEL	DATE
YANKEE ROWE				1	4	COLDLEG	1		18	4/27/84
SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION			INDEX
04	W	34				1	PV #3TSP HL			05832-63
04	FF	33				1	DENT #2TSP HL			05956-60
04	U	33				1	PV BTWN #1 & #4TSP HL			06077-60
04	FF	32				1	DENT #2 TSP HL			06198-60
04	V	31				1	PV #2TSP HL			06301-42
04	S	31				1	PV 8"-10" ATS CL			06386-42
04	G	39	02.70	148	027	1	TTS CL +0001.2			06447-18
04	G	38	00.63	129	046	1	TTS HL +0001.8			06485-19
			05.63	094	072	1	TTS CL +0002.4			06535-30
			06.04	127	048	1	TTS CL +0001.1			06572-06
04	K	38	01.28	148	027	1	TTS HL +0003.0			06639-60
04	P	36	03.33	098	069	1	TTS HL +0002.7			06725-25
04	L	36	01.32	160	<20	1	TTS HL +0005.9			06776-25
04	H	36	02.11	143	033	1	TTS CL +0001.8			06818-16
			05.51	121	053	1	TTS CL +0003.2			06851-16
04	K	35	00.95	112	059	1	TTS HL +0003.9			06878-10
04	T	35	01.56	142	034	1	TTS CL +0001.2			06915-26
04	T	35	01.04	157	<20	1	TTS HL +0002.1			06960-18
04	J	34	01.38	122	052	1	TTS CL +0002.4			06997-18
04	L	33				1	DTS HL			07075-59
04	K	33	01.03	131	044	1	TTS CL +0003.6			07194-59
04	J	32	01.20	144	032	1	TTS CL +0001.8			07281-27
04	P	31				1	PV 4" ATS HL			07336-27
04	K	30	01.21	138	038	1	TTS CL +0002.4			07424-60
04	N	30	01.96	159	<20	1	TTS HL +0002.7			07545-60
04	O	29	02.72	103	066	1	TTS HL +0003.6			07648-42
04	O	29	00.86	147	028	1	TTS HL +0005.7			07743-13
04	K	29	00.95	142	034	1	TTS HL +0006.0			07781-24
			01.51	143	033	1	TTS CL +0001.5			
04	H	29	02.63	108	062	1	TTS CL +0006.3			07830-24
04	J	28	01.53	118	055	1	TTS CL +0004.8			07915-60
04	O	28	01.37	097	070	1	TTS HL +0003.0			08005-29
04	I	27	05.28	012	030	1	#1 TSP H+0046.4			08095-60
04	O	27	00.61	127	049	1	TTS HL +0002.7			08216-60
04	K	27	01.47	138	38	1	TTS CL +0051.2			08337-60
04	J	28	01.24	129	048	1	TTS CL +0001.1			08458-60
04	H	26	18.03	045	097	1	TTS CL +0002.7			08579-60
04	J	26	07.69	108	058	5	TTS CL +0002.1			08669-29
04	H	19	05.02	089	075	1	TTS CL +0002.1			08714-15
04	G	20	17.48	045	097	1	TTS CL +0004.8			08790-60
04	I	20	01.70	124	050	1	TTS CL +0004.5			08911-60
04	H	21	01.31	121	053	1	TTS HL +0004.8			08998-26
04	H	22	01.08	114	058	1	TTS HL +0004.5			09042-17

PAGE 02 OF 02
LIST OF DATA STORED ON DISK

▲ = 1984 plug
■, ● = pre-1984 plug

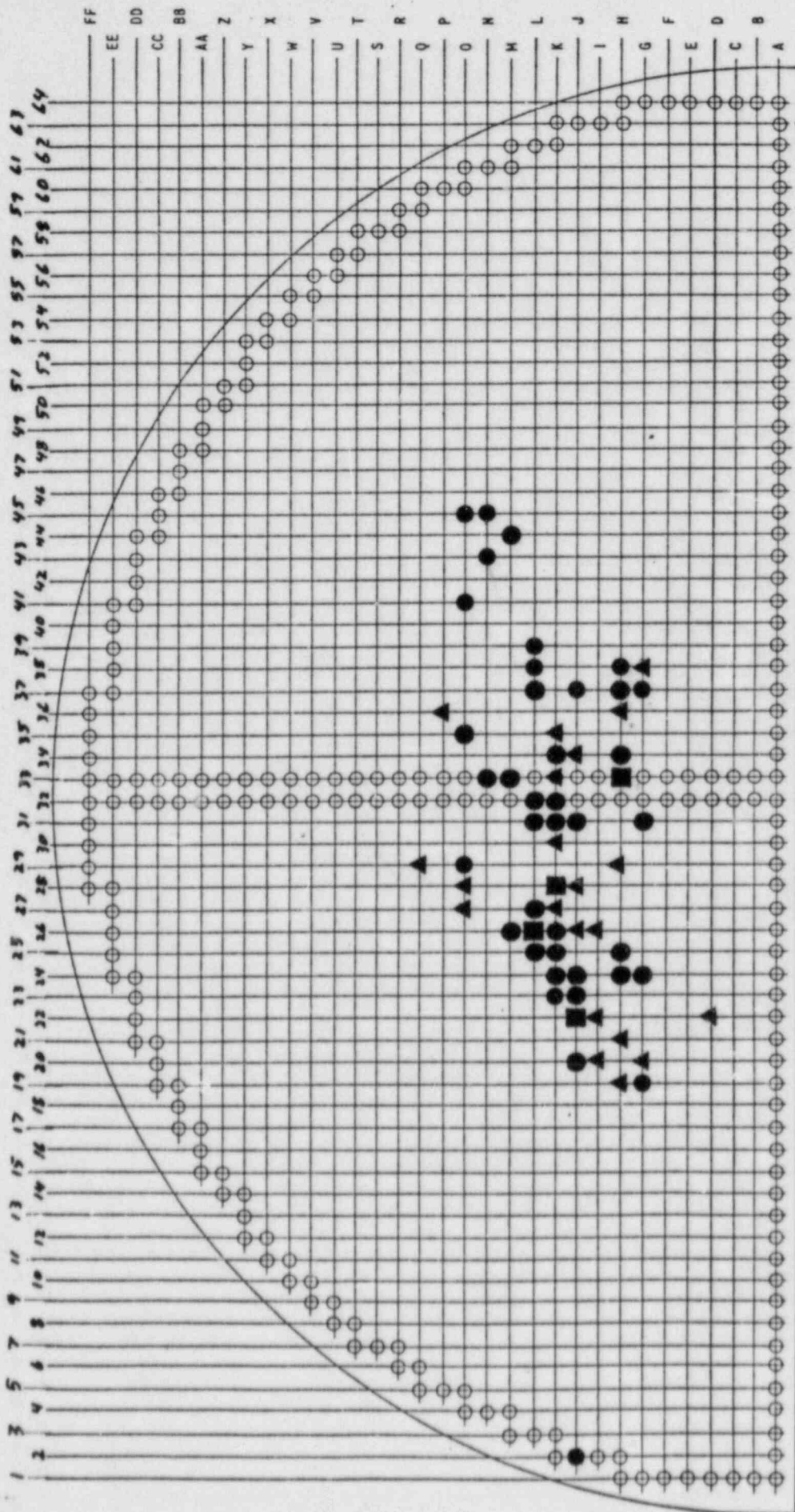


▲ = 1984 plug
■, ● = pre-1984 plug



▲ = 1984 plug
■, ● = pre-1984 plug

COLUMNS



STEAM GENERATOR #4
HOT LEG

MANWAY

NOZZLE