ROCHESTER GAS AND ELECTRIC CORPORATION
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RESEARCH AND SCIENCES DEPARTMENT
MATERIALS ENGINEERING AND INSPECTION SERVICES SECTION

SUMMARY EXAMINATION REPORT

FOR THE

1987 STEAM GENERATOR EDDY CURRENT INSPECTION

AT

R.E. GINNA NUCLEAR POWER STATION

MARCH 5, 1987

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TABLE OF CONTENTS

1.0 INTRODUCTION

The following report is a summary of the results of the multifrequency eddy current examination performed during the February 1987 Annual Refueling and Maintenance Outage at the R.E. Ginna Nuclear Power Station. The examination was performed on both the "A" and "B" recirculating steam generators which are Westinghouse Series-44 design, containing 3260 Inconel Grade 600 tubes having an outside diameter of 0.875" and a nominal wall thickness of 0.050".

The examination was performed by Rochester Gas & Electric (RG&E) personnel that have been trained and qualified in the eddy current examination method to at least a Level I certification. The initial data analysis review was performed by a team of ZETEC Inc. personnel. An independent data analysis review was performed by RG&E and B&W personnel subsequent to the Zetec analysis. The data analysis was performed, by both teams, utilizing the Zetec DDA-4 Digital Data Analysis System. In addition, Zetec's Automated Data Screening System was utilized as a third review of the data. Final resolutions of all data analysis was performed by RG&E Level III personnel.

The purpose of the eddy current examination was to assess any corrosion or mechanical damage that may have occurred during the operation cycle since March 1986. Particular attention was given to detecting intergranular attack (IGA) and intergranular stress corrosion cracking (IGSCC) in the tubesheet crevice region; pitting and wastage between the tubesheet and first tube support plate; denting at all tube support plate intersections; and wear fretting at the antivibration bar to tube intersections in the U-bend region.

2.0 DATA ACQUISITION PROGRAM

The eddy current examination of the "A" and "B" steam generators was performed utilizing the Zetec MIZ-18 Digital Data Acquisition System. The frequencies selected were 400, 200, 100 and 25kHz, all of which were run in the differential and absolute modes. The examination was performed primarily with a standard 0.740" or 0.720" O.D. bobbin coil, with smaller diameter probes used to traverse the smaller radius U-bends.

Prior to examination of the steam generators, an inspection program was established for the inlet sides of both the "A" and "B" steam generators. The philosophy in generating this program is to provide 100% examination coverage of each steam generator tube from the tube sheet up to the first tube support plate, along with 3% of these tubes being selected and examined for their full length. In addition, all previous tubes with indications greater than 20% through wall depth were examined as a minimum to the location of their degradation. Table 1 is a breakdown, by steam generator, of all tubes examined and to the extent inspected.

STEAM GENERATOR "A"

1987 EDDY CURRENT EXAMINATION RESULTS

PRIOR TO CORRECTIVE ACTION

EXTENT INSPECTED	NUMBER OF TUBES	PERCENTAGE
FULL LENGTH	124	3.8%
PART LENGTH FROM INLET		
HTS	1	< 1%
#1 TSP H	2907	91.1%
#2 TSP H	77	2.3%
#3 TSP H	5	< 1%
#4 TSP H	0	
#5 TSP H	0	
#6 TSP H	3	< 1%
U-BEND	0	
#6 TSP C	1	< 1%
#5 TSP C	0	
#4 TSP C	0	
#3 TSP C	0	
#2 TSP C	0	
#1 TSP C	0	
CTS	0	
SLEEVED TUBES	12	.3%
TUBES PERMANENTLY PLUGGED	126	3.8%

TABLE 1

STEAM GENERATOR "B"

1987 EDDY CURRENT EXAMINATION RESULTS

PRIOR TO CORRECTIVE ACTION

EXTENT INSPECTED	NUMBER OF TUBES	PERCENTAGE
FULL LENGTH	103	3.2%
PART LENGTH FROM INLET		
HTS	0	
#1 TSP H	2724	83.8%
#2 TSP H	20	< 1%
#3 TSP H	5	< 1%
#4 TSP H	0	
#5 TSP H	0	
#6 TSP H	3	< 1%
U-BEND	0	
#6 TSP C	0	
#5 TSP C	0	
#4 TSP C	0	
#3 TSP C	1	< 1%
#2 TSP C	1	< 1%
#1 TSP C	1	< 1%
CTS	1	< 1%
SLEEVED TUBES	201	6.2%
TUBES PERMANENTLY PLUGGED	201	6.2%

TABLE 1 (CON'T)

3.0 DATA ANALYSIS RESULTS SUMMARY

The initial and independent review data analysis was performed using the Zetec DDA-4 Digital Data Analysis System. Edition 18.1 Rev. 4.2 of the data analysis software was used to analyze data from the MIZ-18 digital data acquisition system. This system provides on-line data digitization and storage on to a magnetic data cartridge. All digital data (up to 8 channels) is sent directly to the HP-9836 computer from the data cartridge. A message block is available should any comments be desired during data acquisition.

All data cartridges were reviewed by displaying the 400 kHz data on the CRT along with the vertical component of the differential and absolute mix outputs in strip chart form. Other frequencies and their components were selected as needed for final resolution. All recordable indications were logged into the computer and stored on floppy disk. The final report form summarizing all crevice and $\geq$20% through wall dimension (TWD) indications for each steam generator (inlet and outlet) can be found in this section. An explanation of the abbreviations and nomenclature used on these lists has been compiled for ease of interpretation.

Table 2 has been compiled to show a list of the total number of dents at each axial elevation and Table 3 is a breakdown of defects by percent TWD. The dent indications on this table are only those with signal amplitude of 5 volts and greater, which would approximate about a .0025" dent on the diameter of the tube.

LIST OF >20% INDICATION AND CREVICE INDICATION NOMENCLATURE

Top of List Information

SG- Steam Generator and Leg (ie: 1 = A, 2 = B and 1 = Inlet, 2 = Outlet)

ROW - ROW number from the tube identification.

COL - Column number from the tube identification.

VOLTS - P-_ amplitude of the measured indication signal response.

%TWD - Percent through wall from O.D. based on measured signal.

CH# - Channel from which indication was determined.

LOCATION - Location of indication relative to tubesheet or support plate.

Information Under %

<20 - Measurable indication less than 20% through wall.

SQR - Multiple indications interferring with a depth determination (IGA-SCC).

XX - The measure percent through wall of the deepest penetration.

IGSCC - Integranular Stress Corrosion Cracking (SCC)

ADS - Absolute Drift Signal Indicative of IGA.

IGA - Intergranular Attack

WAS - Wastage

Information Under CH#

1 - Indication determined and measured with 400 kHz differential for final interpretation.

M2 - Indication determined with absolute mix, depth cannot be accurately determined, but based upon amplitude is felt to be above 40% IGA.

LIST OF >20% INDICATION AND CREVICE INDICATION NOMENCLATURE (CON'T)

Information Under LOCATION/ELEVATION

HTS SF - Secondary face of inlet tubesheet.

TSP - Tube Support Plate

CTS SF - Secondary face of outlet tubesheet.

AVB - Antivibration Bars

-XX.X - Depth below the secondary face of the tubesheet or support plates where the indication is located.

+XX.X - Height above the secondary face of the tubesheet or support plate where indication is located.

H - Hot Leg

C - Cold Leg

Plant: GINNA
Outage: RGE-87A

Steam Generator: A

QUERY: ALL DEFECTS,>19 % TW,,ALL VOLTS,ALL ELEV (ALL TUBES),ALL-SL

ROW-	COL	OUTAGE	ELEVATION		INDICATION	% TW	VOLTS
24-	10	RGE-87A	HTS SF	- 17.30"	OD SCC	84	0.74
24-	10	RGE-87A	HTS SF	- 18.10"	OD SCC	80	1.73
33-	15	RGE-87A	HTS SF	- 15.00"	OD SCC	74	2.81
21-	19	RGE-87A	HTS SF	- 18.10"	OD SCC	86	1.00
7-	20	RGE-87A	HTS SF	+ 1.80"	OD WASTAGE	20	2.97
8-	21	RGE-87A	HTS SF	+ 2.10"	OD WASTAGE	20	2.84
9-	21	RGE-87A	HTS SF	+ 2.30"	OD WASTAGE	27	3.76
10-	21	RGE-87A	HTS SF	+ 2.30"	OD WASTAGE	25	0.91
11-	21	RGE-87A	HTS SF	+ 1.90"	OD WASTAGE	26	5.31
15-	21	RGE-87A	HTS SF	+ 1.60"	OD WASTAGE	22	4.05
17-	21	RGE-87A	HTS SF	+ 1.00"	OD WASTAGE	27	3.05
10-	22	RGE-87A	HTS SF	+ 2.90"	OD WASTAGE	24	1.41
11-	22	RGE-87A	HTS SF	+ 2.00"	OD WASTAGE	22	2.59
16-	22	RGE-87A	HTS SF	+ 1.40"	OD WASTAGE	22	2.61
18-	22	RGE-87A	HTS SF	+ 1.10"	OD WASTAGE	21	3.12
21-	22	RGE-87A	HTS SF	- 17.80"	OD SCC	92	1.56
10-	23	RGE-87A	HTS SF	+ 1.90"	OD WASTAGE	36	1.51
12-	23	RGE-87A	HTS SF	+ 3.20"	OD WASTAGE	21	3.98
13-	23	RGE-87A	HTS SF	+ 3.10"	OD WASTAGE	33	9.01
14-	23	RGE-87A	HTS SF	+ 3.10"	OD WASTAGE	23	4.59
14-	23	RGE-87A	HTS SF	+ 1.80"	OD WASTAGE	24	1.40
21-	23	RGE-87A	HTS SF	- 17.90"	OD SCC	80	0.81
21-	23	RGE-87A	HTS SF	+ 1.40"	OD WASTAGE	24	3.01
10-	24	RGE-87A	HTS SF	+ 2.00"	OD WASTAGE	22	1.71
11-	24	RGE-87A	HTS SF	+ 2.80"	OD WASTAGE	22	1.97
12-	24	RGE-87A	HTS SF	+ 2.90"	OD WASTAGE	21	4.05
13-	24	RGE-87A	HTS SF	+ 2.90"	OD WASTAGE	26	4.78
13-	24	RGE-87A	HTS SF	+ 2.40"	OD WASTAGE	22	2.97
23-	24	RGE-87A	HTS SF	+ 1.30"	OD WASTAGE	22	2.09
23-	24	RGE-87A	HTS SF	+ 1.30"	OD WASTAGE	24	2.07
12-	25	RGE-87A	HTS SF	+ 2.20"	OD WASTAGE	22	3.28
13-	25	RGE-87A	HTS SF	+ 2.80"	OD WASTAGE	35	4.81
14-	25	RGE-87A	HTS SF	+ 2.60"	OD WASTAGE	25	7.26
17-	25	RGE-87A	HTS SF	+ 2.30"	OD WASTAGE	25	6.05
9-	26	RGE-87A	HTS SF	+ 1.00"	OD WASTAGE	26	3.97
21-	26	RGE-87A	HTS SF	+ 2.40"	OD WASTAGE	23	2.86
23-	26	RGE-87A	HTS SF	+ 1.90"	OD WASTAGE	29	1.74
24-	26	RGE-87A	HTS SF	+ 1.20"	OD WASTAGE	25	2.85
27-	26	RGE-87A	HTS SF	- 17.70"	OD SCC	77	8.85
17-	27	RGE-87A	HTS SF	+ 3.00"	OD WASTAGE	32	4.44
17-	27	RGE-87A	HTS SF	+ 2.10"	OD WASTAGE	28	2.72
18-	27	RGE-87A	HTS SF	+ 2.60"	OD WASTAGE	33	6.29
22-	27	RGE-87A	HTS SF	+ 2.60"	OD WASTAGE	24	6.27
22-	27	RGE-87A	HTS SF	+ 1.80"	OD WASTAGE	25	4.91
23-	27	RGE-87A	HTS SF	+ 2.40"	OD WASTAGE	28	2.55
23-	27	RGE-87A	HTS SF	+ 1.40"	OD WASTAGE	29	1.61
24-	27	RGE-87A	HTS SF	+ 1.30"	OD WASTAGE	27	2.95
25-	27	RGE-87A	HTS SF	+ 0.60"	OD WASTAGE	22	3.26
23-	28	RGE-87A	HTS SF	+ 2.20"	OD WASTAGE	26	2.91
15-	29	RGE-87A	HTS SF	+ 2.90"	OD WASTAGE	21	3.11
24-	29	RGE-87A	HTS SF	+ 1.40"	OD WASTAGE	24	3.31
23-	30	RGE-87A	HTS SF	+ 1.40"	OD WASTAGE	29	4.91
24-	30	RGE-87A	HTS SF	+ 1.50"	OD WASTAGE	34	2.70
25-	30	RGE-87A	HTS SF	+ 1.40"	OD WASTAGE	21	6.87
23-	31	RGE-87A	HTS SF	+ 1.90"	OD WASTAGE	29	6.66
24-	31	RGE-87A	HTS SF	+ 1.30"	OD WASTAGE	24	4.32
20-	32	RGE-87A	HTS SF	+ 2.70"	OD WASTAGE	32	3.95
22-	32	RGE-87A	HTS SF	+ 2.00"	OD WASTAGE	26	8.25
23-	32	RGE-87A	HTS SF	+ 2.30"	OD WASTAGE	28	6.46
24-	32	RGE-87A	HTS SF	+ 1.60"	OD WASTAGE	22	6.42
26-	32	RGE-87A	HTS SF	+ 0.80"	OD WASTAGE	23	4.14
18-	33	RGE-87A	HTS SF	- 13.70"	OD SCC	90	0.55
21-	33	RGE-87A	HTS SF	+ 1.80"	OD WASTAGE	25	3.80
22-	33	RGE-87A	HTS SF	+ 2.00"	OD WASTAGE	24	6.86
23-	33	RGE-87A	HTS SF	+ 2.10"	OD WASTAGE	24	5.46

Plant: GINNA
Outage: RGE-87A

Steam Generator: A

QUERY: ALL DEFECTS,>19 % TW,,ALL VOLTS,ALL ELEV (ALL TUBES),ALL-SL

ROW-	COL	OUTAGE	ELEVATION	INDICATION	% TW	VOLTS
24-	33	RGE-87A	HTS SF + 1.60"	OD WASTAGE	25	4.77
19-	34	RGE-87A	HTS SF + 2.10"	OD WASTAGE	33	2.82
23-	34	RGE-87A	HTS SF + 2.20"	OD WASTAGE	31	2.94
25-	34	RGE-87A	HTS SF + 1.50"	OD WASTAGE	22	6.04
15-	35	RGE-87A	HTS SF - 13.20"	OD SCC	90	0.43
19-	35	RGE-87A	HTS SF + 2.60"	OD WASTAGE	24	3.61
26-	35	RGE-87A	HTS SF + 1.40"	OD WASTAGE	21	3.65
39-	35	RGE-87A	AVB4	OD (general)	30	0.40
39-	35	RGE-87A	AVB3	OD (general)	21	1.21
26-	36	RGE-87A	HTS SF + 1.50"	OD WASTAGE	27	3.99
21-	37	RGE-87A	HTS SF + 1.60"	OD WASTAGE	21	5.44
21-	37	RGE-87A	CTS SF - 2.10"	OD WASTAGE	22	2.85
25-	37	RGE-87A	HTS SF + 1.40"	OD WASTAGE	26	6.11
26-	37	RGE-87A	HTS SF + 1.20"	OD WASTAGE	24	3.10
24-	38	RGE-87A	HTS SF + 1.40"	OD WASTAGE	25	3.61
25-	38	RGE-87A	HTS SF + 2.50"	OD WASTAGE	23	3.17
27-	38	RGE-87A	HTS SF + 1.50"	OD WASTAGE	28	2.64
26-	39	RGE-87A	HTS SF + 2.70"	OD WASTAGE	21	6.34
27-	40	RGE-87A	HTS SF + 2.70"	OD WASTAGE	23	5.56
28-	41	RGE-87A	HTS SF + 2.30"	OD WASTAGE	22	4.27
26-	42	RGE-87A	HTS SF + 1.60"	OD WASTAGE	22	4.37
27-	43	RGE-87A	HTS SF + 1.80"	OD WASTAGE	24	2.47
28-	43	RGE-87A	HTS SF + 2.10"	OD WASTAGE	23	4.95
29-	44	RGE-87A	HTS SF + 1.50"	OD WASTAGE	22	5.56
21-	45	RGE-87A	CTS SF - 15.70"	ID (general)	25	7.44
12-	46	RGE-87A	CTS SF - 17.60"	ID (general)	25	6.73
14-	46	RGE-87A	CTS SF - 18.30"	ID (general)	30	3.40
15-	46	RGE-87A	HTS SF - 3.10"	OD SCC	94	6.39
20-	46	RGE-87A	CTS SF - 15.30"	ID (general)	25	10.10
22-	46	RGE-87A	CTS SF - 15.50"	ID (general)	30	7.56
25-	46	RGE-87A	HTS SF + 1.20"	OD WASTAGE	23	5.10
26-	46	RGE-87A	HTS SF + 1.40"	OD WASTAGE	28	4.63
20-	47	RGE-87A	CTS SF - 17.70"	ID (general)	27	4.87
21-	47	RGE-87A	CTS SF - 14.90"	ID (general)	30	9.70
26-	48	RGE-87A	HTS SF + 1.40"	OD WASTAGE	27	3.14
16-	50	RGE-87A	HTS SF - 11.00"	OD SCC	85	7.81
6-	51	RGE-87A	HTS SF - 17.00"	OD SCC	90	3.54
13-	52	RGE-87A	HTS SF + 1.80"	OD WASTAGE	21	2.61
15-	52	RGE-87A	HTS SF + 3.30"	OD WASTAGE	24	1.12
38-	52	RGE-87A	HTS SF + 10.30"	OD (general)	27	2.83
17-	53	RGE-87A	HTS SF + 3.50"	OD WASTAGE	39	1.73
31-	53	RGE-87A	HTS SF - 18.60"	OD SCC	73	2.86
17-	54	RGE-87A	HTS SF - 9.70"	OD SCC	84	0.55
30-	54	RGE-87A	HTS SF - 14.30"	OD IGA	76	0.71
30-	56	RGE-87A	HTS SF + 0.60"	OD WASTAGE	24	2.78
23-	58	RGE-87A	HTS SF + 1.90"	OD WASTAGE	22	1.73
24-	58	RGE-87A	HTS SF + 1.50"	OD WASTAGE	22	1.82
15-	59	RGE-87A	HTS SF + 2.60"	OD WASTAGE	22	4.04
24-	59	RGE-87A	HTS SF + 1.60"	OD WASTAGE	22	2.19
13-	61	RGE-87A	HTS SF + 1.40"	OD WASTAGE	38	1.40
19-	61	RGE-87A	HTS SF + 1.30"	OD WASTAGE	22	3.08
21-	61	RGE-87A	HTS SF + 1.30"	OD WASTAGE	21	2.61
19-	63	RGE-87A	HTS SF + 1.60"	OD WASTAGE	21	4.23
16-	64	RGE-87A	HTS SF + 1.40"	OD WASTAGE	21	3.21
19-	64	RGE-87A	HTS SF + 1.60"	OD WASTAGE	24	5.95
15-	65	RGE-87A	HTS SF + 1.40"	OD WASTAGE	27	3.67
17-	65	RGE-87A	HTS SF + 1.40"	OD WASTAGE	22	2.68
8-	66	RGE-87A	HTS SF - 18.40"	OD SCC	72	0.89
12-	66	RGE-87A	HTS SF + 1.40"	OD WASTAGE	22	2.60
15-	66	RGE-87A	HTS SF + 1.40"	OD WASTAGE	22	5.02
18-	66	RGE-87A	HTS SF + 1.60"	OD WASTAGE	22	3.26
9-	67	RGE-87A	HTS SF + 0.90"	OD WASTAGE	22	4.69
9-	69	RGE-87A	HTS SF + 1.10"	OD WASTAGE	28	1.99
5-	71	RGE-87A	HTS SF - 17.10"	OD IGA	27	2.27
9-	73	RGE-87A	HTS SF + 1.50"	OD WASTAGE	20	3.80

Plant: 'GINNA
Outage: RGE-87A

Steam Generator: A

QUERY: ALL DEFECTS,>19 % TW,,ALL VOLTS,ALL ELEV (ALL TUBES),ALL-SL

ROW-	COL	OUTAGE	ELEVATION	INDICATION	% TW	VOLTS
12-	73	RGE-87A	HTS SF + 1.20"	OD WASTAGE	25	6.04
8-	74	RGE-87A	HTS SF + 1.10"	OD WASTAGE	22	3.17

Plant: GINNA
Outage: RGE-87B

Steam Generator: B

QUERY: ALL DEFECTS,>19 % TW,,ALL VOLTS,ALL ELEV (ALL TUBES),ALL-SL

ROW-	COL	OUTAGE	ELEVATION	INDICATION	% TW	VOLTS
9-	3	RGE-87B	HTS SF - 18.30"	OD SCC	55	0.99
9-	4	RGE-87B	HTS SF - 18.30"	OD SCC	47	1.49
18-	5	RGE-87B	C1	OD (general)	28	1.32
18-	6	RGE-87B	C1	OD (general)	34	1.09
18-	6	RGE-87B	C2	OD (general)	32	1.37
11-	7	RGE-87B	HTS SF - 18.30"	OD SCC	52	1.85
18-	7	RGE-87B	HTS SF - 18.20"	OD SCC	83	1.58
11-	8	RGE-87B	HTS SF - 17.30"	OD SCC	97	1.72
24-	8	RGE-87B	C1	OD (general)	27	1.32
11-	15	RGE-87B	HTS SF - 17.10"	OD SCC	67	2.99
21-	15	RGE-87B	HTS SF - 17.30"	OD SCC	47	4.27
9-	20	RGE-87B	HTS SF + 1.40"	OD WASTAGE	22	5.96
12-	20	RGE-87B	HTS SF + 1.00"	OD WASTAGE	23	1.95
11-	22	RGE-87B	HTS SF + 1.10"	OD WASTAGE	22	5.42
28-	24	RGE-87B	HTS SF - 18.60"	OD SCC	75	1.95
9-	25	RGE-87B	HTS SF + 1.20"	OD WASTAGE	22	1.33
17-	25	RGE-87B	HTS SF + 1.20"	OD WASTAGE	26	5.09
20-	25	RGE-87B	HTS SF + 1.20"	OD WASTAGE	23	5.33
24-	25	RGE-87B	HTS SF + 1.30"	OD WASTAGE	36	7.06
28-	25	RGE-87B	HTS SF - 18.20"	OD SCC	81	0.61
31-	25	RGE-87B	HTS SF - 17.70"	OD SCC	65	0.72
38-	25	RGE-87B	HTS SF - 17.90"	OD SCC	76	1.46
19-	26	RGE-87B	HTS SF + 1.20"	OD WASTAGE	28	6.73
20-	26	RGE-87B	HTS SF + 1.40"	OD WASTAGE	22	4.06
24-	26	RGE-87B	HTS SF + 1.50"	OD WASTAGE	28	7.00
28-	26	RGE-87B	HTS SF - 15.50"	OD SCC	90	1.02
29-	26	RGE-87B	HTS SF - 12.20"	OD SCC	57	0.37
13-	27	RGE-87B	HTS SF + 1.20"	OD WASTAGE	22	2.99
29-	28	RGE-87B	HTS SF - 14.60"	OD SCC	67	0.69
42-	31	RGE-87B	CTS SF + 15.30"	OD (general)	31	2.03
21-	32	RGE-87B	HTS SF - 8.40"	OD SCC	85	1.46
36-	32	RGE-87B	HTS SF - 18.50"	OD SCC	92	0.58
21-	33	RGE-87B	HTS SF - 7.60"	OD SCC	88	0.75
24-	34	RGE-87B	HTS SF - 5.70"	OD SCC	80	2.55
31-	34	RGE-87B	HTS SF - 18.50"	OD SCC	39	1.29
40-	39	RGE-87B	HTS SF - 18.20"	OD SCC	79	2.33
24-	40	RGE-87B	HTS SF + 1.50"	OD WASTAGE	22	3.55
39-	40	RGE-87B	HTS SF - 18.20"	OD SCC	81	1.63
23-	41	RGE-87B	HTS SF + 1.50"	OD WASTAGE	23	3.21
24-	41	RGE-87B	HTS SF + 1.20"	OD WASTAGE	31	3.62
6-	42	RGE-87B	HTS SF + 0.70"	OD WASTAGE	24	3.16
9-	42	RGE-87B	HTS SF - 15.30"	OD SCC	97	0.38
20-	42	RGE-87B	HTS SF - 12.80"	OD SCC	77	0.45
26-	42	RGE-87B	HTS SF - 5.70"	OD SCC	50	0.51
32-	42	RGE-87B	HTS SF - 18.50"	OD SCC	96	2.03
3-	44	RGE-87B	HTS SF - 14.90"	OD SCC	84	2.57
34-	44	RGE-87B	HTS SF - 19.10"	OD SCC	77	0.90
36-	44	RGE-87B	HTS SF - 17.70"	OD SCC	78	2.59
39-	45	RGE-87B	HTS SF - 17.20"	OD SCC	94	4.56
6-	46	RGE-87B	HTS SF - 16.90"	OD SCC	92	0.58
31-	46	RGE-87B	HTS SF - 16.20"	OD SCC	77	0.40
11-	47	RGE-87B	HTS SF - 17.70"	OD SCC	88	0.90
1-	48	RGE-87B	HTS SF - 14.40"	OD SCC	85	1.74
16-	48	RGE-87B	HTS SF - 13.30"	OD SCC	86	1.04
19-	48	RGE-87B	HTS SF - 9.50"	OD SCC	85	2.74
29-	49	RGE-87B	HTS SF - 3.80"	OD SCC	35	2.22
11-	50	RGE-87B	HTS SF - 18.10"	OD SCC	71	2.45
25-	50	RGE-87B	HTS SF + 3.30"	OD WASTAGE	25	3.04
24-	51	RGE-87B	HTS SF + 3.60"	OD WASTAGE	22	0.60
27-	52	RGE-87B	HTS SF + 3.10"	OD WASTAGE	29	0.94
29-	52	RGE-87B	HTS SF + 2.80"	OD WASTAGE	22	1.04
11-	54	RGE-87B	HTS SF - 16.90"	OD SCC	94	0.61
36-	55	RGE-87B	HTS SF - 16.90"	OD SCC	96	1.25
30-	56	RGE-87B	HTS SF + 2.30"	OD WASTAGE	24	1.42
42-	57	RGE-87B	HTS SF - 18.10"	OD SCC	50	1.95

Plant: GINNA
Outage: RGE-87B

Steam Generator: B

QUERY: ALL DEFECTS,>19 % TW,,ALL VOLTS,ALL ELEV (ALL TUBES),ALL-SL

ROW-	COL	OUTAGE	ELEVATION	INDICATION	% TW	VOLTS
1-	58	RGE-87B	HTS SF - 17.60"	OD SCC	62	1.40
35-	58	RGE-87B	HTS SF - 17.50"	OD SCC	75	1.00
36-	58	RGE-87B	HTS SF - 18.40"	OD SCC	85	0.83
8-	59	RGE-87B	HTS SF - 16.30"	OD SCC	97	0.60
33-	60	RGE-87B	HTS SF - 18.70"	OD SCC	90	1.19
29-	61	RGE-87B	HTS SF + 0.50"	OD WASTAGE	23	0.87
28-	62	RGE-87B	HTS SF + 1.60"	OD WASTAGE	22	3.20
38-	62	RGE-87B	HTS SF - 17.90"	OD SCC	96	0.66
22-	63	RGE-87B	HTS SF + 2.00"	OD WASTAGE	22	5.39
28-	63	RGE-87B	HTS SF + 1.70"	OD WASTAGE	25	3.36
28-	64	RGE-87B	HTS SF + 1.50"	OD WASTAGE	22	4.19
28-	64	RGE-87B	HTS SF + 1.70"	OD WASTAGE	23	5.59
36-	64	RGE-87B	HTS SF - 18.30"	OD SCC	91	2.22
33-	65	RGE-87B	HTS SF - 17.50"	OD SCC	70	4.84
36-	65	RGE-87B	HTS SF - 18.30"	OD SCC	91	1.51
33-	67	RGE-87B	HTS SF - 17.40"	OD SCC	59	1.03
11-	69	RGE-87B	HTS SF - 15.90"	OD SCC	73	1.16
26-	72	RGE-87B	HTS SF - 17.40"	OD SCC	94	2.57
2-	75	RGE-87B	HTS SF - 16.20"	OD SCC	66	10.96
27-	75	RGE-87B	HTS SF - 16.80"	OD SCC	89	1.07
32-	75	RGE-87B	HTS SF - 17.40"	OD SCC	87	1.09
27-	77	RGE-87B	HTS SF - 17.70"	OD SCC	92	3.45
28-	77	RGE-87B	HTS SF - 17.50"	OD SCC	86	1.09
8-	78	RGE-87B	HTS SF - 16.10"	OD SCC	83	2.57
22-	78	RGE-87B	HTS SF - 17.20"	OD SCC	83	1.84
3-	79	RGE-87B	HTS SF - 17.60"	OD SCC	99	0.88
4-	79	RGE-87B	HTS SF - 16.40"	OD SCC	84	1.19
27-	80	RGE-87B	HTS SF - 18.10"	OD SCC	97	1.80
8-	82	RGE-87B	HTS SF - 17.80"	OD SCC	81	1.14
4-	84	RGE-87B	HTS SF - 17.40"	OD SCC	83	4.49
17-	84	RGE-87B	HTS SF - 18.30"	OD SCC	47	1.32
14-	85	RGE-87B	HTS SF - 18.20"	OD SCC	47	5.23
9-	86	RGE-87B	HTS SF - 19.00"	OD SCC	75	9.10
11-	86	RGE-87B	HTS SF - 18.80"	OD SCC	92	4.83
13-	86	RGE-87B	HTS SF - 18.20"	OD SCC	73	3.37
9-	89	RGE-87B	HTS SF - 18.90"	OD SCC	92	6.82

DENT TABLE

FEBRUARY 1987 INSPECTION

STEAM GENERATOR "A"

ELEVATION	DENT (VOLTS)				
	<10	10-<20	20-<30	>=30	TOTAL
1. HTS PF	0	0	0	0	0
2. HTS MID	5	2	0	0	7
3. HTS SF	190	88	6	0	284
4. HTS-H1	3	3	0	0	6
5. H1	95	85	40	28	248
6. H1-H2	3	0	0	0	3
7. H2	2	8	5	1	16
8. H2-H3	0	0	0	0	0
9. H3	0	0	0	0	0
10. H3-H4	0	0	0	0	0
11. H4	0	0	0	0	0
12. H4-H5	0	0	0	0	0
13. H5	0	1	0	3	4
14. H5-H6	0	0	0	0	0
15. H6	1	3	3	4	11
16. >H6	0	0	0	0	0
17. AVB1	0	0	0	0	0
18. >AVB1	0	0	0	0	0
19. AVB2	0	0	0	0	0
20. >AVB2	0	0	0	0	0
21. >AVB3	0	0	0	0	0
22. AVB3	0	0	0	0	0
23. >AVB4	0	0	0	0	0
24. AVB4	0	0	0	0	0
25. >C6	0	0	0	0	0
26. C6	4	4	1	0	9
27. C6-C5	0	0	0	0	0
28. C5	0	0	0	0	0
29. C5-C4	0	0	0	0	0
30. C4	1	1	0	0	2
31. C4-C3	0	0	0	0	0
32. C3	0	1	0	0	1
33. C3-C2	0	0	0	0	0
34. C2	1	2	0	1	4
35. C2-C1	0	0	0	0	0
36. C1	1	1	0	0	2
37. C1-CTS	0	0	0	0	0
38. CTS SF	2	0	0	0	2
39. CTS MID	0	0	0	0	0
40. CTS PF	0	0	0	0	0
41. OTHER	0	0	0	0	0
TOTALS:	308	199	55	37	599
PERCENT:	51.4	33.2	9.2	6.2	

TABLE 2

DENT TABLE

FEBRUARY 1987 INSPECTION

STEAM GENERATOR "B"

ELEVATION	DENT (VOLTS)				
	<10	10-<20	20-<30	>=30	TOTAL
1. HTS PF	0	0	0	0	0
2. HTS MID	0	2	0	0	2
3. HTS SF	204	111	12	3	330
4. HTS-H1	4	0	0	0	4
5. H1	4	7	7	12	30
6. H1-H2	0	0	0	0	0
7. H2	0	0	0	0	0
8. H2-H3	0	0	0	0	0
9. H3	0	0	0	0	0
10. H3-H4	0	0	0	0	0
11. H4	0	0	0	0	0
12. H4-H5	0	0	0	0	0
13. H5	0	0	0	0	0
14. H5-H6	0	0	0	0	0
15. H6	5	0	0	0	5
16. >H6	3	0	0	0	3
17. AVB1	0	0	0	0	0
18. >AVB1	0	0	0	0	0
19. AVB2	0	0	0	0	0
20. >AVB2	0	0	0	0	0
21. >AVB3	0	0	0	0	0
22. AVB3	0	0	0	0	0
23. >AVB4	0	0	0	0	0
24. AVB4	0	0	0	0	0
25. >C6	0	0	0	0	0
26. C6	0	0	1	1	2
27. C6-C5	1	0	0	0	1
28. C5	0	0	0	0	0
29. C5-C4	0	0	0	0	0
30. C4	0	0	0	0	0
31. C4-C3	0	0	0	0	0
32. C3	0	1	0	0	1
33. C3-C2	0	0	0	0	0
34. C2	0	0	0	0	0
35. C2-C1	0	0	0	0	0
36. C1	0	0	0	0	0
37. C1-CTS	0	0	0	0	0
38. CTS SF	0	0	0	0	0
39. CTS MID	0	0	0	0	0
40. CTS PF	0	0	0	0	0
41. OTHER	0	0	0	0	0
TOTALS:	221	120	21	16	378
PERCENT:	58.5	31.7	5.6	4.2	

DEFECT TABLE
FEBRUARY 1987 INSPECTION

STEAM GENERATOR A

Defects (Inlet)	
0 - 19% TW	325
20 - 39% TW	98
40 - 49% TW	0
50 - 100% TW	15
SQR	2
ADS	17

Defects (Outlet)	
0 - 19% TW	4
20 - 39% TW	8
40 - 49% TW	0
50 - 100% TW	0

U - Bend

0 - 19% TW	0
20 - 39% TW	2
40 - 49% TW	0
50 - 100% TW	0

STEAM GENERATOR B

Defects (Inlet)	
0 - 19% TW	160
20 - 39% TW	27
40 - 49% TW	4
50 - 100% TW	64
SQR	10
ADS	72

Defects (Outlet)	
0 - 19% TW	3
20 - 39% TW	5
40 - 49% TW	0
50 - 100% TW	0

4.0 OBSERVATIONS

The results of the examination indicates that intergranular attack (IGA) and intergranular stress corrosion cracking (IGSCC) is still active within the tubesheet crevice regions on the inlet side of each steam generator. The IGA/IGSCC is primarily located in the "B" steam generator with 153 total indications detected. In the "A" steam generator 34 indications were detected. Table 4 shows the steam generator IGA history.

GINNA'S STEAM GENERATORS
CREVICE CORROSION INDICATION HISTORY
B-Steam Generator (A-Steam Generator)

	Not Sizeable	0-25%	26-50%	51-75%	76-100%	A-S/G TOTAL	B-S/G TOTAL
March 1979	0	0	0	2	0	(0)	2
December 1979	0	0	6	5	0	(0)	11
April 1980	19	1	2	7	2	(0)	31
November 1980	2	0	0	1	0	(0)	3
April 1981	0	5	4	5	0	(0)	14
February 1982	1	0	1	6	5	(0)	13
October 1982	27	4	5	7(1)	16	(1)	59
April 1983	11(3)	3(1)	15	7	15	(4)	51
March 1984	5	0	0(1)	1	2	(1)	8
March 1985	23	4	6	9(1)	27(1)	(2)	69
February 1986	3(2)	9(2)	1	14(1)	25	(5)	52
February 1987	82(17)	1	8(1)	16(3)	46(13)	(34)	153
TOTALS	173(22)	27(3)	48(2)	80(6)	138(14)	(47)	466

TABLE 4

The cause of the inlet tubesheet crevice corrosion indications is intergranular attack and intergranular stress corrosion cracking of the mil-annealed Inconel 600 tube material. This form of corrosion is the result of the tubesheet crevices forming an alkaline environment. This crevice environment has developed over the years as deposits and active species like sodium and phosphate, have reacted, changing a neutral or inhibited crevice into the aggressive environment that presently exist.

A large volume, typically <20% TWD (Through Wall Dimension) wastage type condition exists just above the tubesheet secondary face. A small percentage of the tubes, generally toward the center of the bundle, have this condition. Several of these tubes did have penetrations >20% TWD. These tubes were affected by the original water chemistry conditions when phosphate was used as a buffering medium and have not seen further degradation since 1975.

Small indications of probable copper deposits were also found in the tubesheet crevice region randomly located throughout each steam generator. Based on studies performed with copper plated on Inconel tubing and the phase relationships of these signal responses at the different inspection frequencies the indications can be attributed to copper deposits and not a defect condition.

Minor denting has been detected at the tubesheet secondary side face for many years in both steam generators, primarily on the inlet side. Denting was also detected at the 1st, 2nd and 6th tube support plates randomly throughout the generator, and in most cases was of greater magnitude in size. No tubes were found which obstructed the passage of a 0.720" O.D. probe. In general, minor distortions of most of the tube support plate signals were seen.

4.0 OBSERVATIONS (CON'T)

The denting phenomenon and minor distortions at the tubesheet and support plates can be attributed to secondary side corrosion product build-up in the annular region between the tube outside surface and the carbon steel support member. Comparisons with previous data does not indicate any change in the extent or magnitude of denting from what has been detected by previous inspections.

Several indications were detected in the cold legs of the "A" & "B" steam generators in and around tube R23-C46. A review of previous years data revealed these indications to be present. They appear as a shallow ID indication <20% which were confirmed visually to be an expansion of diameter within the tubesheet. This was caused by a cam-lock expansion device which was used in earlier years to suspend lead blankets from the tubesheet primary face.

In summary, the "A" Steam Generator had thirty four (34) tubes that were found to have tubesheet crevice indications. The "B" Steam Generator had one hundred fifty three (153) tubesheet crevice indications.

One tube in the "A" Steam Generator had two (2) indications at the third and fourth anti-vibration bar intersections. These indications are greater than 20% but less than the repair limit, and have not changed since the 1986 Inspection. This tube will be re-examined at the next inspection to determine if there is an active fretting wear damage mechanism going on. In light of the fact that only this tube exhibits these indications, AVB fretting wear is not a major concern.

5.0 CORRECTIVE ACTION

Table 5 has been generated to identify the tubes with crevice indications or with indications which exceed the repair criteria. This table also shows the location and axial extent of the indication and what corrective action was taken on these tubes. All tubes requiring repair had hot leg tubesheet crevice indications which were identified by an absolute drift signal of the Mix-2 Channel and/or quantifiable intergranular stress corrosion cracking (IGSCC) indications by the 400 kHz data. Several squirrel type (SQR) indications, multiple IGSCC, were also identified and have been placed on the list of tubes requiring corrective action. A total of 24 sleeves and 10 plugs were installed into the "A" steam generator. The "B" steam generator required a total of 80 sleeves and 73 plugs to be installed. One plug is attributed to a sleeve installed this outage which had to be removed from service due to unacceptable ultrasonic examination results of the upper weld.

As part of the Inspection Program for the "B" steam generator, a 750 PSI Hydrostatic Pressure Test was performed from the secondary side to locate any tubes, sleeves or plugs which were leaking. The results of the visual examination of the "B' hot leg tubesheet during the hydro indicated that 2 tubes, 2 1980 Test Sleeves, 11 Westinghouse Explosive Plugs, and one CE Mechanical plug in the cold leg were identified as leaking. The 2 tubes identified were confirmed by eddy current testing to have high percent through wall indications (>80% TWD) in the midspan of the hot leg tubesheet which are probable intergranular stress corrosion cracks (IGSCC). Five of the explosive plugs were drilled out and replaced with a welded "Top Hat" plug. The remaining six explosive plugs were left in service as their leakage rate was extremely small. The CE Mechanical Plug in the cold leg was removed and replaced with another CE Mechanical Plug.

5.0 CORRECTIVE ACTION (CON'T)

The 2 sleeves identified as leaking were B&W 36" Brazed Sleeves which were installed in 1980 as part of a test program. An eddy current inspection using annular differential magnetic bias probe was performed on these sleeves and the 3 other test sleeves installed in 1980, in addition to the 20% random inspection of all sleeves installed. The results of data analysis for the sleeves of the braze/expansion regions as well as the lower roll transitions revealed no detectable degradation or deviation from the eddy current signature seen in the other sleeves or from the 1986 Inspection Data. An ultrasonic inspection of the braze regions, performed in 1983, showed that the brazed bonding of the sleeve to the parent tube marginally met the acceptance criteria. At that time it was resolved that these sleeves would be considered leak limiting, not hermetically sealed, and be left in service until leakage was detected.

The analysis for the parent tube showed that Tube 21-47 has a deep IGSCC indication (estimated at 94% TWD) and Tube 24-47 has three deep IGSCC indications (deepest estimated at 97% TWD) located in the midspan of the tubesheet region. A review of the 1986 Data for these parent tubes also revealed the existence of these deep flaws. An increase in the volume (based on the amplitude of the signals) was noted when comparing the 1987 to the 1986 data.

Based on the detection of a through wall defect in the parent tube and the braze condition of the sleeve, existence of the primary to secondary boundary leak has been confirmed. These 2 sleeves have been removed from service using a B&W explosive plug.

Plant: GINNA Steam Generator: A

REPORT: TUBES REQUIRING CORRECTIVE ACTION

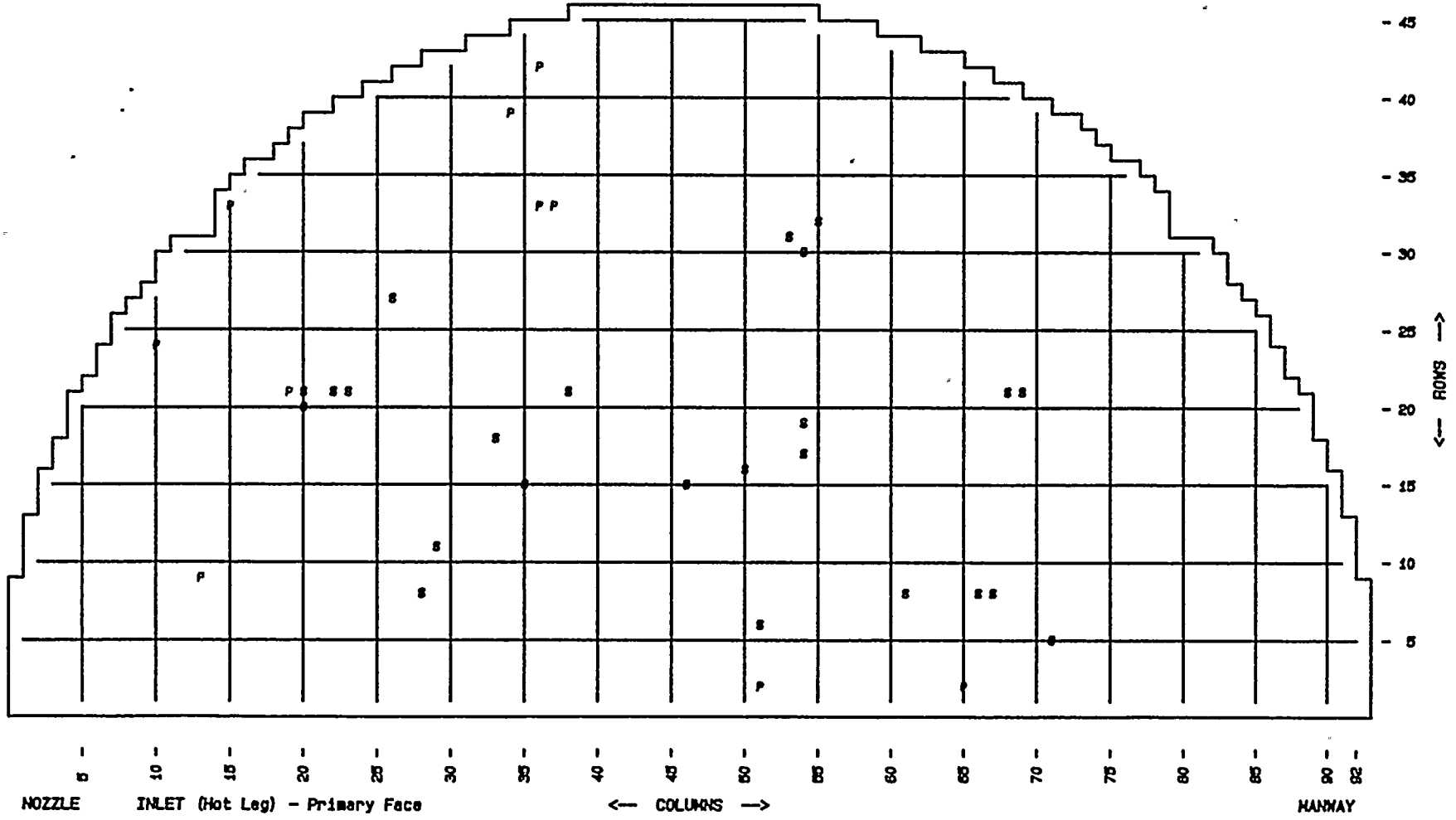
SG	ROW	COL	VOLTS	DEG	IND	CHN	LOCATION	COMMENTS	EXTENT	TAPE	PRB
11	24	10	1.73	66	80	M 1	HTS - 18.1	PLG SCC	#1 TSP H	8	740
11	24	10	0.72	60	84	M 1	HTS - 17.3	SCC	#1 TSP H	8	740
11	9	13	1.08	186	ADS	M 2	HTS - 18.2	PLG IGA	#1 TSP H	8	740
11	33	15	2.81	51	74	M 2	HTS - 15.0	PLG SCC	#1 TSP H	8	740
11	21	19	1.00	58	86	M 1	HTS - 18.1	PLG SCC	#1 TSP H	8	740
11	20	20	1.73	41	ADS	M 2	HTS - 15.1	SLV IGA	#1 TSP H	8	740
11	21	20	3.22	57	ADS	M 2	HTS - 14.3	SLV IGA	#1 TSP H	8	740
11	21	22	1.56	26	92	M 1	HTS - 17.8	SLV SCC	#1 TSP H	1	740
11	21	23	0.81	81	80	1	HTS - 17.9	SLV SCC	#1 TSP H	1	740
11	27	26	8.85	53	77	M 2	HTS - 17.7	SLV SCC	#1 TSP H	1	740
11	8	28	1.70	47	ADS	M 2	HTS - 17.1	SLV IGA	#1 TSP H	9	700
11	11	29	2.46	35	ADS	M 2	HTS - 16.7	SLV IGA	#1 TSP H	2	740
11	18	33	.55	43	90	M 1	HTS - 13.7	SLV SCC	#1 TSP H	2	740
11	39	34	1.25	129	ADS	M 2	HTS - 18.2	PLG IGA	#1 TSP H	2	740
11	15	35	0.43	61	90	1	HTS - 13.2	SLV SCC	#1 TSP H	2	740
11	33	36	3.89	35	ADS	M 2	HTS - 18.0	PLG IGA	#1 TSP H	3	740
11	42	36	0.79	266	ADS	M 2	HTS - 11.1	PLG IGA	#1 TSP H	3	740
11	33	37	3.01	87	SQR	M 2	HTS - 17.9	PLG SCC	#1 TSP H	3	740
11	21	38	3.21	72	ADS	M 2	HTS - 18.2	SLV IGA	#1 TSP H	3	740
11	15	46	6.39	30	94	M 2	HTS - 3.1	SLV SCC	#1 TSP H	4	740
11	16	50	7.81	40	85	M 2	HTS - 11.0	SLV SCC	#1 TSP H	4	740
11	2	51	2.25	51	ADS	M 2	HTS - 18.1	PLG IGA	#1 TSP H	7	740
11	6	51	3.54	33	90	M 2	HTS - 17.0	SLV SCC	#1 TSP H	7	740
11	31	53	2.86	76	73	M 1	HTS - 18.6	SLV SCC	#1 TSP H	4	740
11	17	54	3.55	47	ADS	M 2	HTS - 16.4	SLV IGA	#1 TSP H	4	740
11	17	54	0.55	60	84	M 1	HTS - 9.7	SCC	#1 TSP H	4	740
11	19	54	5.40	7	SQR	M 2	HTS - 14.2	SLV SCC	#1 TSP H	4	740
11	30	54	0.71	49	76	M 2	HTS - 14.3	SLV IGA	#1 TSP H	4	740
11	32	55	1.74	27	ADS	M 2	HTS - 13.0	SLV IGA	#1 TSP H	4	740
11	8	61	1.94	45	ADS	M 2	HTS - 16.4	SLV IGA	#1 TSP H	8	740
11	2	65	1.69	29	ADS	M 2	HTS - 17.0	PLG IGA	#1 TSP H	5	740
11	8	66	.89	31	72	1	HTS - 18.4	SLV SCC	#1 TSP H	5	740
11	8	67	2.98	33	ADS	M 2	HTS - 15.5	SLV IGA	#1 TSP H	5	740
11	21	68	4.93	31	ADS	M 2	HTS - 18.1	SLV IGA	F/L	9	700
11	21	69	4.05	70	ADS	M 2	HTS - 16.8	SLV IGA	#1 TSP H	6	740
11	5	71	2.27	79	27	M 2	HTS - 17.1	SLV IGA	#1 TSP H	6	740

STEAM GENERATOR "A" TUBES RECEIVING CORRECTIVE ACTION - FEBRUARY 1987

PLANT: GINNA GENERATOR: A TOTAL TUBES: 3260

S = CE 27° SLEEVES (24) P = CE PLUGS (10)

TOTAL TUBES ASSIGNED: 34



Plant: GINNA Steam Generator: B

REPORT: TUBES REQUIRING CORRECTIVE ACTION

SG	ROW	COL	VOLTS	DEG	IND	CHN	LOCATION	COMMENTS	EXTENT	TAPE	PRB
21	9	3	0.99	19	55	M 1	HTS - 18.3	PLG SCC	#1 TSP H	10	700
21	9	4	1.49	16	47	M 1	HTS - 18.3	PLG SCC	#1 TSP H	10	700
21	11	7	1.85	21	52	1	HTS - 18.3	PLG SCC	#1 TSP H	1	740
21	18	7	1.58	74	83	1	HTS - 18.2	PLG SCC	#1 TSP H	1	740
21	11	8	1.72	45	97	1	HTS - 17.3	PLG SCC	#1 TSP H	1	740
21	5	13	2.47	178	ADS	M 2	HTS - 16.8	SLV IGA	#1 TSP H	2	740
21	9	13	1.32	128	ADS	M 2	HTS - 17.7	SLV IGA	#1 TSP H	2	740
21	10	13	1.49	134	ADS	M 2	HTS - 16.9	SLV IGA	#1 TSP H	2	740
21	8	14	1.84	146	ADS	M 2	HTS - 17.2	SLV IGA	#1 TSP H	2	740
21	9	14	1.80	62	ADS	M 2	HTS - 16.9	SLV IGA	#1 TSP H	2	740
21	15	14	1.99	138	ADS	M 2	HTS - 17.7	PLG IGA	#1 TSP H	2	740
21	11	15	2.99	52	67	M 2	HTS - 17.1	SLV SCC	#1 TSP H	2	740
21	21	15	4.27	61	47	M 2	HTS - 17.3	PLG SCC	#1 TSP H	2	740
21	2	16	2.82	204	ADS	M 2	HTS - 17.6	PLG IGA	#1 TSP H	2	740
21	11	16	4.48	101	ADS	M 2	HTS - 17.6	SLV IGA	#1 TSP H	2	740
21	21	16	1.61	110	ADS	M 2	HTS - 17.5	PLG IGA	#1 TSP H	2	740
21	24	16	2.50	115	ADS	M 2	HTS - 17.5	PLG IGA	#1 TSP H	2	740
21	25	16	2.57	17	SQR	M 2	HTS - 17.8	PLG SCC	#1 TSP H	2	740
21	13	18	1.21	69	ADS	M 2	HTS - 13.4	SLV IGA	F/L	9	700
21	18	18	4.62	174	ADS	M 2	HTS - 17.7	SLV IGA	#1 TSP H	2	740
21	20	18	1.83	143	ADS	M 2	HTS - 18.5	PLG IGA	F/L	2	740
21	18	20	3.11	67	SQR	M 2	HTS - 17.0	SLV SCC	#1 TSP H	2	740
21	18	21	2.86	113	ADS	M 2	HTS - 17.7	SLV IGA	#1 TSP H	2	740
21	1	22	2.33	29	ADS	M 2	HTS - 16.0	PLG IGA	#1 TSP H	2	740
21	9	22	3.53	25	SQR	M 2	HTS - 16.3	SLV SCC	#1 TSP H	2	740
21	14	22	4.73	19	ADS	M 2	HTS - 16.9	SLV IGA	#1 TSP H	2	740
21	8	24	3.48	28	ADS	M 2	HTS - 16.5	SLV IGA	#1 TSP H	2	740
21	28	24	1.95	65	75	M 1	HTS - 18.6	PLG SCC	#1 TSP H	3	740
21	28	25	0.61	66	81	1	HTS - 18.2	PLG SCC	#1 TSP H	3	740
21	31	25	0.72	77	65	M 1	HTS - 17.7	PLG SCC	#1 TSP H	3	740
21	38	25	1.46	87	76	1	HTS - 17.9	PLG SCC	#1 TSP H	3	740
21	28	26	1.02	43	90	M 1	HTS - 15.5	PLG SCC	#1 TSP H	3	740
21	29	26	0.37	85	57	M 1	HTS - 12.2	PLG SCC	#1 TSP H	3	740
21	29	28	0.69	86	67	M 1	HTS - 14.6	SLV SCC	F/L	9	700
21	21	32	1.46	51	85	M 1	HTS - 8.4	SLV SCC	#1 TSP H	3	740
21	36	32	0.58	58	92	1	HTS - 18.5	PLG SCC	F/L	9	700
21	21	33	0.75	23	88	M 1	HTS - 7.6	SLV SCC	#1 TSP H	3	740
21	24	34	2.55	43	80	M 2	HTS - 5.7	SLV SCC	#1 TSP H	4	740
21	31	34	1.29	136	39	1	HTS - 18.5	SLV SCC	#1 TSP H	4	740
21	9	37	0.51	156	SQR	1	HTS - 16.3	SLV SCC	#1 TSP H	4	740
21	32	37	2.30	53	ADS	M 2	HTS - 16.3	SLV IGA	#1 TSP H	4	740
21	39	38	5.20	20	ADS	M 2	HTS - 16.6	PLG IGA	#1 TSP H	4	740
21	12	39	1.34	50	ADS	M 2	HTS - 15.2	SLV IGA	#1 TSP H	4	740
21	21	39	3.33	166	6	1	HTS - 3.0	SLV SCC	#1 TSP H	4	740
21	40	39	2.33	37	79	M 2	HTS - 18.2	PLG SCC	#1 TSP H	10	700
21	39	40	1.63	57	81	M 1	HTS - 18.2	PLG SCC	#1 TSP H	4	740
21	9	42	0.38	32	97	M 1	HTS - 15.3	SLV SCC	#1 TSP H	9	700
21	20	42	0.45	85	77	1	HTS - 12.8	SLV SCC	#1 TSP H	5	740
21	26	42	0.51	87	50	M 1	HTS - 5.7	SLV SCC	#1 TSP H	5	740
21	32	42	2.03	48	96	1	HTS - 18.5	SLV SCC	#1 TSP H	5	740
21	3	44	2.57	40	84	M 2	HTS - 14.9	PLG SCC	#1 TSP H	5	740
21	34	44	0.90	86	77	1	HTS - 19.1	PLG SCC	#1 TSP H	5	740
21	36	44	2.59	84	78	1	HTS - 17.7	PLG SCC	#1 TSP H	5	740
21	32	45	2.82	39	ADS	M 2	HTS - 17.1	SLV IGA	#1 TSP H	9	700
21	34	45	3.30	30	ADS	M 2	HTS - 17.6	PLG IGA	#1 TSP H	9	700
21	39	45	4.56	38	94	M 2	HTS - 17.2	PLG SCC	#1 TSP H	9	700
21	6	46	.58	24	92	M 1	HTS - 16.9	SLV SCC	#1 TSP H	5	740
21	31	46	0.40	31	77	1	HTS - 16.2	SLV SCC	#1 TSP H	5	740
21	11	47	0.90	46	88	M 1	HTS - 17.7	SLV SCC	#1 TSP H	5	740
21	1	48	1.74	39	85	M 2	HTS - 14.4	PLG SCC	#1 TSP H	5	740
21	16	48	1.04	50	86	M 1	HTS - 13.3	SLV SCC	#1 TSP H	5	740
21	19	48	2.74	17	85	M 2	HTS - 9.5	SLV SCC	#1 TSP H	5	740
21	29	49	2.22	65	35	M 2	HTS - 3.8	SLV SCC	#1 TSP H	5	740
21	11	50	2.45	80	71	M 1	HTS - 18.1	SLV SCC	#1 TSP H	10	700
21	23	51	8.27	2	SQR	M 2	HTS - 15.0	SLV SCC	#1 TSP H	5	740
21	6	52	0.39	10	SQR	M 1	HTS - 18.1	SLV SCC	#1 TSP H	10	700
21	19	52	1.40	260	ADS	M 2	HTS - 9.0	SLV IGA	#1 TSP H	5	740
21	11	54	0.61	45	94	M 1	HTS - 16.9	SLV SCC	#1 TSP H	10	700
21	28	54	2.56	30	ADS	M 2	HTS - 16.4	SLV IGA	#1 TSP H	6	740
21	36	54	5.77	46	ADS	M 2	HTS - 16.7	PLG IGA	#1 TSP H	6	740

TABLE 5 (CON'T)

Plant: GINNA Steam Generator: B

REPORT: TUBES REQUIRING CORRECTIVE ACTION

SG	ROW	COL	VOLTS	DEG	IND	CHN	LOCATION	COMMENTS	EXTENT	TAPE	PRB
21	22	55	1.64	57	ADS	M 2	HTS - 14.6	SLV IGA	#1 TSP H	6	740
21	24	55	3.46	31	ADS	M 2	HTS - 13.4	PLG IGA	#1 TSP H	6	740
21	27	55	1.91	23	ADS	M 2	HTS - 16.2	SLV IGA	#1 TSP H	6	740
21	31	55	3.91	38	ADS	M 2	HTS - 15.3	SLV IGA	#1 TSP H	6	740
21	35	55	2.39	40	SQR	M 2	HTS - 16.5	PLG SCC	#1 TSP H	6	740
21	36	55	1.25	25	96	M 1	HTS - 16.9	PLG SCC	#1 TSP H	6	740
21	35	56	1.99	126	ADS	M 2	HTS - 17.1	PLG IGA	#1 TSP H	6	740
21	27	57	3.13	80	ADS	M 2	HTS - 6.0	SLV IGA	#1 TSP H	6	740
21	42	57	1.95	20	50	1	HTS - 18.1	PLG SCC	#1 TSP H	6	740
21	1	58	1.40	25	62	1	HTS - 17.6	PLG SCC	#1 TSP H	10	700
21	33	58	2.90	35	ADS	M 2	HTS - 17.7	PLG IGA	#1 TSP H	6	740
21	34	58	3.97	44	ADS	M 2	HTS - 17.6	PLG IGA	#1 TSP H	6	740
21	35	58	1.00	47	75	M 2	HTS - 17.5	PLG SCC	#1 TSP H	6	740
21	36	58	0.83	51	85	M 1	HTS - 18.4	PLG SCC	#1 TSP H	6	740
21	8	59	0.60	39	97	M 1	HTS - 16.3	SLV SCC	#1 TSP H	10	700
21	32	59	2.15	22	ADS	M 2	HTS - 17.3	SLV IGA	#1 TSP H	6	740
21	32	60	3.79	56	SQR	M 2	HTS - 17.5	SLV SCC	#1 TSP H	6	740
21	33	60	1.19	44	90	M 1	HTS - 18.7	PLG SCC	#1 TSP H	6	740
21	4	61	4.07	22	ADS	M 2	HTS - 17.0	SLV IGA	#1 TSP H	6	740
21	8	61	1.26	37	ADS	M 2	HTS - 16.1	SLV IGA	#1 TSP H	6	740
21	31	61	2.44	47	ADS	M 2	HTS - 17.2	SLV IGA	#1 TSP H	6	740
21	32	61	3.19	25	SQR	M 2	HTS - 17.2	PLG SCC	#1 TSP H	6	740
21	4	62	3.71	18	ADS	M 2	HTS - 15.2	SLV IGA	#1 TSP H	6	740
21	24	62	3.01	11	ADS	M 2	HTS - 18.1	SLV IGA	#1 TSP H	6	740
21	38	62	.66	41	96	M 1	HTS - 17.9	PLG SCC	#1 TSP H	10	700
21	14	63	4.19	39	ADS	M 2	HTS - 16.1	SLV IGA	#1 TSP H	6	740
21	28	64	1.04	56	SQR	M 1	HTS - 15.8	SLV SCC	#1 TSP H	10	700
21	36	64	2.22	42	91	M 1	HTS - 18.3	PLG SCC	#1 TSP H	6	740
21	4	65	4.21	29	ADS	M 2	HTS - 16.3	SLV IGA	#1 TSP H	7	740
21	17	65	3.36	23	ADS	M 2	HTS - 16.4	SLV IGA	#6 TSP H	7	740
21	27	65	1.89	58	ADS	M 2	HTS - 14.9	SLV IGA	#1 TSP H	7	740
21	32	65	4.02	33	ADS	M 2	HTS - 13.0	PLG IGA	#1 TSP H	7	740
21	33	65	4.84	46	70	M 2	HTS - 17.5	PLG SCC	#1 TSP H	7	740
21	36	65	1.51	42	91	M 1	HTS - 18.3	PLG SCC	#1 TSP H	6	740
21	3	66	2.71	17	ADS	M 2	HTS - 13.7	SLV IGA	#1 TSP H	7	740
21	4	66	4.11	39	ADS	M 2	HTS - 12.3	SLV IGA	#1 TSP H	7	740
21	5	66	3.34	28	ADS	M 2	HTS - 14.3	SLV IGA	#1 TSP H	7	740
21	2	67	4.34	26	ADS	M 2	HTS - 16.1	PLG IGA	#1 TSP H	7	740
21	4	67	4.25	53	ADS	M 2	HTS - 15.9	SLV IGA	#1 TSP H	7	740
21	5	67	3.84	28	ADS	M 2	HTS - 15.9	SLV IGA	#1 TSP H	7	740
21	8	67	5.41	44	ADS	M 2	HTS - 16.7	SLV IGA	#1 TSP H	7	740
21	11	67	4.76	32	ADS	M 2	HTS - 15.0	SLV IGA	#1 TSP H	7	740
21	33	67	1.03	112	59	1	HTS - 17.4	PLG SCC	#2 TSP C	7	740
21	4	68	3.52	31	ADS	M 2	HTS - 15.6	SLV IGA	#1 TSP H	7	740
21	9	68	2.68	33	ADS	M 2	HTS - 16.0	SLV IGA	#1 TSP H	7	740
21	13	68	3.72	32	ADS	M 2	HTS - 16.1	SLV IGA	#1 TSP H	7	740
21	35	68	2.30	31	ADS	M 2	HTS - 16.1	PLG IGA	#1 TSP H	7	740
21	5	69	1.74	53	ADS	M 2	HTS - 16.7	SLV IGA	#1 TSP H	7	740
21	11	69	1.16	92	73	1	HTS - 15.9	SLV SCC	#1 TSP H	7	740
21	24	69	2.04	50	ADS	M 2	HTS - 16.7	SLV IGA	#1 TSP H	7	740
21	32	69	6.07	27	ADS	M 2	HTS - 16.3	PLG IGA	#1 TSP H	7	740
21	1	70	4.39	23	ADS	M 2	HTS - 16.5	PLG IGA	#1 TSP H	7	740
21	8	70	2.89	28	ADS	M 2	HTS - 16.1	SLV IGA	#1 TSP H	7	740
21	24	70	1.69	56	ADS	M 2	HTS - 17.6	SLV IGA	#1 TSP H	7	740
21	14	71	4.87	34	ADS	M 2	HTS - 15.7	SLV IGA	#1 TSP H	7	740
21	19	71	1.76	54	ADS	M 2	HTS - 16.3	SLV IGA	#1 TSP H	7	740
21	27	71	2.85	37	ADS	M 2	HTS - 17.4	PLG IGA	#1 TSP H	7	740
21	9	72	3.98	27	ADS	M 2	HTS - 16.6	SLV IGA	#1 TSP H	7	740
21	24	72	2.67	62	ADS	M 2	HTS - 15.6	PLG IGA	#1 TSP H	7	740
21	26	72	2.57	31	94	M 2	HTS - 17.4	PLG SCC	#1 TSP H	7	740
21	2	75	10.96	48	66	M 2	HTS - 16.2	PLG SCC	#1 TSP H	7	740
21	12	75	1.28	75	ADS	M 2	HTS - 16.8	SLV IGA	#1 TSP H	7	740
21	27	75	1.07	63	89	1	HTS - 16.8	PLG SCC	#1 TSP H	7	740
21	32	75	1.09	35	87	1	HTS - 17.4	PLG SCC	#1 TSP H	7	740
21	9	76	0.83	112	ADS	M 1	HTS - 16.1	SLV IGA	#1 TSP H	7	740
21	27	77	3.45	49	92	M 1	HTS - 17.7	PLG SCC	#1 TSP H	7	740
21	28	77	1.09	70	86	1	HTS - 17.5	PLG SCC	#1 TSP H	7	740
21	8	78	2.57	38	83	M 2	HTS - 16.1	SLV SCC	#1 TSP H	7	740
21	22	78	1.84	74	83	1	HTS - 17.2	PLG SCC	#1 TSP H	7	740
21	2	79	3.36	227	ADS	M 2	HTS - 17.0	PLG IGA	#1 TSP H	8	740

Plant: GINNA

Steam Generator: B

REPORT: TUBES REQUIRING CORRECTIVE ACTION

SG	ROW	COL	VOLTS	DEG	IND	CHN	LOCATION	COMMENTS	EXTENT	TAPE	PRB
21	3	79	0.88	41	99	1	HTS - 17.6	SLV SCC	#1 TSP H	8	740
21	4	79	1.19	62	84	M 1	HTS - 16.4	SLV SCC	#1 TSP H	8	740
21	23	80	1.80	54	ADS	M 2	HTS - 3.4	PLG IGA	#1 TSP H	8	740
21	27	80	1.80	43	97	1	HTS - 18.1	PLG SCC	#1 TSP H	8	740
21	8	82	1.14	80	81	1	HTS - 17.8	PLG SCC	#1 TSP H	8	740
21	4	84	4.49	38	83	M 2	HTS - 17.4	PLG SCC	#1 TSP H	8	740
21	17	84	1.32	19	47	1	HTS - 18.3	PLG SCC	#1 TSP H	8	740
21	14	85	5.23	19	47	1	HTS - 18.2	PLG SCC	#1 TSP H	8	740
21	9	86	9.10	54	75	M 2	HTS - 19.0	PLG SCC	#1 TSP H	9	700
21	11	86	4.83	40	92	M 2	HTS - 18.8	PLG SCC	#1 TSP H	9	700
21	13	86	3.37	24	73	M 2	HTS - 18.2	PLG SCC	#1 TSP H	9	700
21	2	87	1.53	74	ADS	M 2	HTS - 18.3	PLG IGA	#1 TSP H	9	700
21	9	89	6.82	40	92	M 2	HTS - 18.9	PLG SCC	#1 TSP H	9	700

STEAM GENERATOR "B" TUBES RECEIVING CORRECTIVE ACTION - FEBRUARY 1987

PLANT: GINNA GENERATOR: B TOTAL TUBES: 3260

P = PLUGGED TUBES 1987 (75) S = CE 27° SLEEVE (80)

TOTAL TUBES ASSIGNED: 155

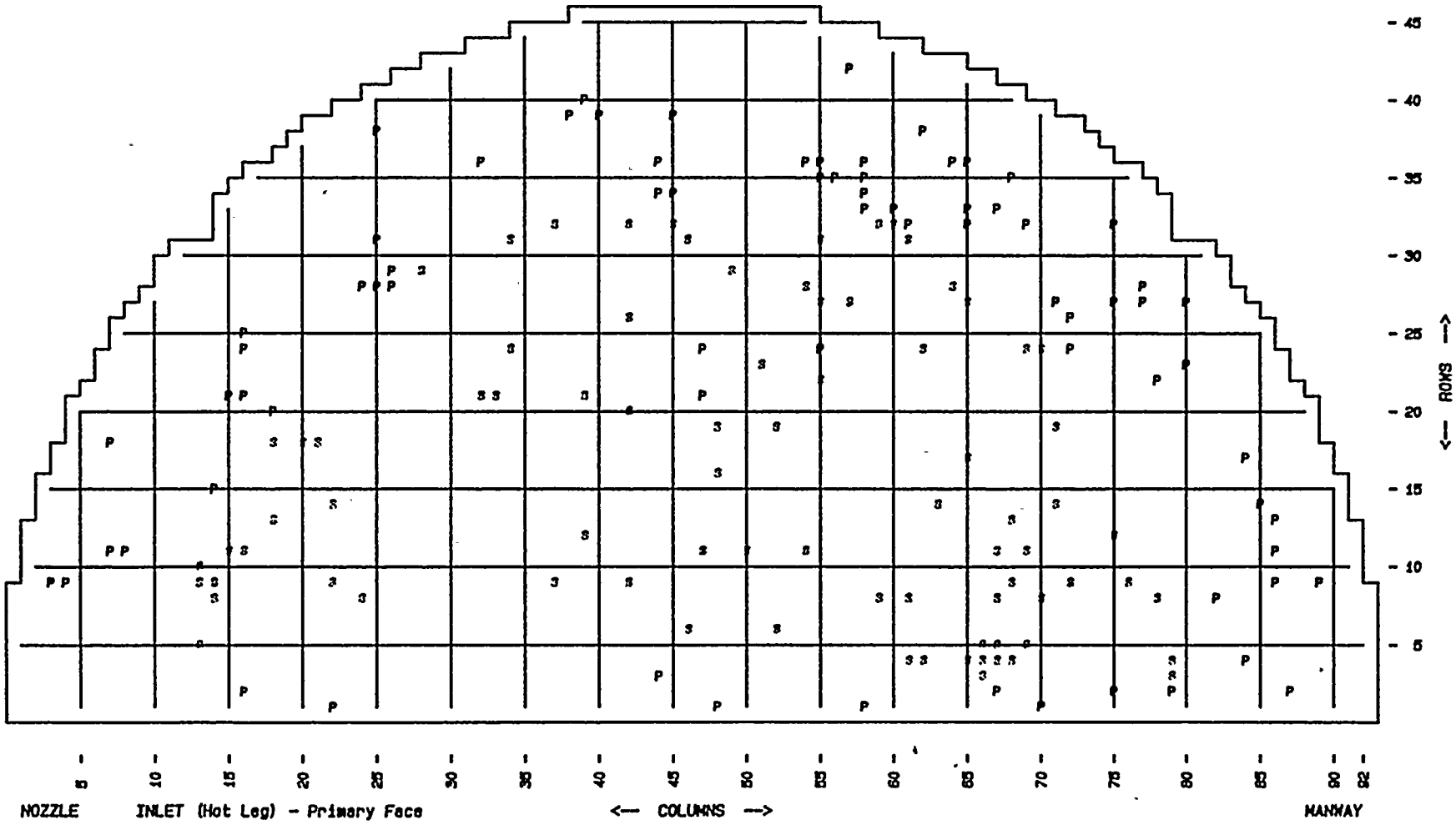


TABLE 6

STEAM GENERATOR TUBE INSPECTION AND CORRECTIVE ACTION HISTORY

DATE	NO. TUBES INSPECTED				PRIMARY TO SECONDARY LEAKAGE, gpm	TOTAL TUBES REQUIRING CORRECTIVE ACTION		NO. DEFECTS TYPE OF DEGRADATION	REQUIRING REPAIR >40%		NO. TUBES PLUGGED		NO. TUBES SLEEVED		NO. TUBES PULLED		COMMENT	
	A		B			A	B		A	B	A	B	A	B	A	B	A	B
	Hot	Cold	Hot	Cold														
IN FACTORY					--------	1	---	-----	1	--	1	--	--	--	--	--	--	
APRIL 1972	1050				--------	0	0	-----	0	0	0	0	--	--	--	--	--	--
MARCH 1974	3259	516	1098	516	--------	19	0	WASTAGE	19	0	19	0	--	--	2	--	--	--
NOV. 1974	1701	430	672	39	--------	2	0	WASTAGE	2	0	2	0	--	--	--	--	--	--
MARCH 1975	2174	442	1931	442	0.005 A S/G	46	11	CRACKING/WASTAGE	46	11	46	11	--	--	2	--	--	--
JAN. 1976	----	---	53	---	0.091 B S/G	0	2	WASTAGE	0	2	0	2	--	--	--	--	--	--
FEB. 1976	3192	3192	3247	3247	--------	39	2	WASTAGE	39	2	39	2	--	--	--	--	--	--
APRIL 1976	100	---	1025	75	0.099 B S/G	0	15	CRACKING	0	15	0	15	--	--	--	--	--	--
APRIL 1977	2003	268	1525	268	--------	13	1	WASTAGE	13	1	13	1	--	--	--	--	--	--
JULY 1977	----	---	300	---	0.012 B S/G	--	5	ID CRACKING	--	5	--	5	--	--	--	--	--	--
JAN. 1978	----	---	----	---	0.060 B S/G	--	8	CRACKING/WASTAGE	--	8	--	8	--	--	--	--	--	--
APRIL 1978	2049	325	1714	375	--------	1	15	ID CRACKING	1	15	--	--	--	--	--	1	--	--
FEB. 1979	2049	325	1714	375	--------	--	6	CRACKING/WASTAGE 2-IGA	--	6	--	--	--	--	--	--	--	--
DEC. 1979	----	---	----	---	0.007 B S/G	--	13	11-IGA, 2-WASTAGE	--	13	--	13	--	--	--	--	--	--
APRIL 1980	3139	325	3182	375	--------	1	31	"A" PITTING/ "B" IGA	1	13	1	31	--	--	--	3	--	(1)
NOV. 1980	3138	325	3151	375	--------	--	3	IGA	--	2	--	0	--	5	--	--	--	(2)
MAY 1981	3138	325	3141	400	--------	--	15	IGA, WASTAGE	--	6	--	7	--	16	--	3	--	(3)
FEB. 1982	3137	526	3140	526	700 B S/G	--	16	IGA, MECH. DAM	--	16	--	19	--	--	--	1	--	(4)
SEP. 1982	3138	382	3129	893	--------	1	32	IGA	1	28	1	33	--	--	--	--	--	--
APRIL 1983	3137	633	3096	832	--------	4	78	IGA, SCC	--	23	--	34	4	74	--	1	--	(5)
MARCH 1984	3137	717	3093	963	--------	1	10	IGA, SCC	--	5	1	1	--	9	--	--	--	--
MARCH 1985	3135	3135	3087	3087	--------	3	67	IGA, SCC, WASTAGE	3	70	2	4	2	67	--	--	--	(6)
FEB. 1986	3134	623	3083	770	--------	6	54	IGA, SCC, WASTAGE	2	49	--	27	6	30	--	--	--	(7)
FEB. 1987	3128	---	2884	---	_____	34	153	IGA, SCC	17	78	10	73	24	80	--	--	--	(8)
	TOTALS					171	537		145	388	136	274	36	281	4	9		
	PERCENTAGES					5.2	16.4		4.4	11.3	4.1	8.4	1.1	8.6	.1	.3		

STEAM GENERATOR TUBE INSPECTION AND CORRECTIVE ACTION HISTORY COMMENTS (FROM TABLE 6)

(1) Pulled R15 C55 and R17 C41 from the hot leg and R17 C40 from the cold leg to determine IGA conditions in the "B" steam generator. R17 C41 and ECT indications at all frequencies, R15 C44 had just 100 kHz Absolute ECT indication and R17 C40 had no ECT indication. Both hot leg tubes had approximately 50% IGA, R17 C41 had a 60% SCC indication associated with the IGA.

(2) Manually sleeved five (5) tubes with nickel plated - Inconel 600 thermally treated sleeves. Three tubes had IGA indications, two others were preventatively sleeved.

(3) Sleeved 16 tubes with co-extruded sleeves, 13 with defects with 3 preventatively. Pulled R21 C46 with a 100 kHz ECT indications, R7 C45 and R28 C45 which were clean. All tubes pulled were from the hot leg.

(4) Recovery from the January 25, 1982 Tube Rupture Event included removing 26 tube sections by EDM and ID Cutters along with the one tube pulled from the secondary side.

(5) The four tubes identified with IGA in the "A" steam generator were sleeved with 22" tubesheet sleeves. The 78 tubes identified in the "B" steam generator with IGA and/or SCC in the crevice were repaired as follows:

41 tubes were sleeved with 36" brazed sleeves

9 tubes were sleeved with 28" brazed sleeves

24 tubes were sleeved with 22" tubesheet sleeves

1 tube and 2 sleeves were plugged

1 tube R34 C54 was pulled for metallurgical analysis

STEAM GENERATOR TUBE INSPECTION AND
CORRECTIVE ACTION HISTORY COMMENTS
(FROM TABLE 6)

(6) The two tubes identified with IGA in the crevice in the "A" steam generator inlet were sleeved with 20" tubesheet sleeves. One indication >40% TWD in the U-bend was permanently plugged. The 70 tubes identified in the "B" steam generator were repaired as follows:

56 tubes were sleeved with 20" tubesheet sleeves

10 tubes were sleeved with 36" brazed sleeves

3 tubes were mechanically plugged (CE removable)

1 tube was explosively plugged

1 tube was sleeved with a 36" brazed sleeve due to the domino effect.

(7) The five tubes identified with crevice indications in the "A" steam generator inlet were sleeved with 27" Combustion Engineering Sleeves (CE). One tube identified with general O.D. indication above the secondary side tubesheet was also sleeved with a CE 27" sleeve. The 57 tubes identified in the "B" steam generator were repaired as follows:

27 tubes were sleeved with CE 27" Sleeves

27 tubes were mechanically plugged (CE removable)

3 CE Mechanical Plugs installed in 1985 were removed and sleeved with 27" sleeves

The present sleeve installation status is 83 brazed sleeves, 88 tube sheet sleeves, 30 welded CE sleeves in the "B" steam generator with 6 tubesheet sleeves and 6 welded CE sleeves in the "A" steam generator.

TABLE 6 (CON'T)

STEAM GENERATOR TUBE INSPECTION AND CORRECTIVE ACTION HISTORY COMMENTS (FROM TABLE 6)

(8) The 34 tubes identified with crevice indications in the "A" steam generator inlet were repaired as follows:

10 tubes were mechanically plugged (CE Removable)

24 tubes were sleeved with CE 27" welded sleeves

The 153 tubes identified with crevice indications in the "B' steam generator inlet were repaired as follows:

72 tubes were mechanically plugged (CE Removable)

80 tubes were sleeved with CE 27" welded sleeves

1 CE welded sleeve (installed in 1987) was plugged with a CE welded sleeve plug due to rejection of the upper weld.

Other repairs required in the "B" steam generator are as follows:

2 B&W test brazed sleeves (installed in 1980) were plugged due to the loss of the primary to secondary pressure boundary as detected by Hydro Test.

5 Westinghouse explosive plugs installed prior to 1987 were removed due to leakage and replaced with CE welded plugs.

1 CE Mechanical plug on the cold leg was removed and replaced with a CE Mechanical plug

4 CE welded sleeves (installed in 1987), are considered leak limiters due to the marginal acceptance of the upper welds.