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MATERIALS ENGINEERING AND INSPECTION SERVICES

SUMMARY EXAMINATION REPORT

FOR THE

1991 STEAM GENERATOR EDDY CURRENT INSPECTION

AT

R. E. GINNA NUCLEAR POWER STATION

REVISION 0
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1.0 INTRODUCTION

The following is a summary report of the results of the multifrequency eddy current examination performed during the 1991 Annual Refueling and Maintenance Outage at the R. E. Ginna Nuclear Power Station in Ontario, New York. The examinations were performed in both the "A" and "B" recirculating steam generators which are Westinghouse Series-44 design. Each generator contains 3260 Inconel 600 Mil Annealed U-Bend tubes having an outside diameter of 0.875" and a nominal wall thickness of 0.050".

The purpose of the eddy current examination was to assess any corrosion or mechanical damage that may have occurred during the cycle since the 1990 examination. Particular attention was given to the detection of:

1) Intergrannular attack (IGA) and intergrannular stress corrosion cracking (IGSCC) within the inlet tubesheet crevice region.
2) Intergrannular attack (IGA) and intergrannular stress corrosion cracking (IGSCC) within the outlet tubesheet crevice region (none detected).
3) Primary water stress corrosion cracking (PWSCC) at the inlet tubesheet roll transition.

4) Primary water stress corrosion cracking (PWSCC) at the outlet tubesheet roll transition (none detected).

5) Pitting and wastage between the tubesheet and first support plate.

6) Wear at the antivibration bar to tube intersections in the U-bend region.

7) Denting at all tube support intersections.

8) Primary water stress corrosion cracking (PWSCC) in the Row 1 and Row 2 U-bend area (none detected).

9) Intergrannular attack (IGA) and intergrannular stress corrosion cracking (IGSCC) at the #1 tube support plate region on the inlet side (none detected).

10) Stress corrosion cracking (SCC) at the #6 tube support plate region with dents (none detected).

The examination was performed by personnel from Rochester Gas and Electric (RG&E) and Allen Nuclear Associates, Inc. (ANA). All personnel were trained and qualified in the eddy current examination method and have been certified to a minimum of Level I for data acquisition and Level II for data analysis. In addition, all acquisition personnel were trained and qualified to site specific procedures and all analysis personnel were trained and qualified to the site specific "Steam Generator Data Analysis Guidelines - RG&E Ginna Station". These analysis guidelines were prepared in

accordance with Revision 2 of the Electric Power Research Institutes (EPRI) "PWR Steam Generator Inspection Guidelines".

The data analysis was performed by two independent teams. Both teams performed their analysis manually utilizing the Zetec Digital Data Analysis (DDA-4) System. The results of these two analyses were compared for discrepancies using the ISIS - TUBE computerized data management system. The typical data flow chart is shown on Figure 1 (Page 5). The following list describes some typical discrepancies between analysis teams requiring resolution by the Level III resolution team.

- Any indication that is reported as ≥20% by either team and is not reported by the other team or is sized at >10% difference.
- Any indication spanning the repair limit, (39% vs. 41%).
- Any difference of >1 inch in the axial location of a flaw.
- Any tube which was analyzed by one team but not the other.
- Any difference in the reported test extent.
- All indications identified as IGA and/or SCC regardless of whether one or both parties have reported it.
- Any tube reported as obstructed by one team but not the other.

- Any tube for which a retest was requested by one team but not the other.
- All Roll Transition Indications (DRT/DRI) reported by one team but not the other.

In addition to the above, all tubes requiring repair whether reported by one or both teams were reviewed by the resolution team (usually consisting of two Level III individuals). In all cases, the removal of a repairable indication from the data base required the concurrence of two Level III individuals.

Typical Data Flow Chart

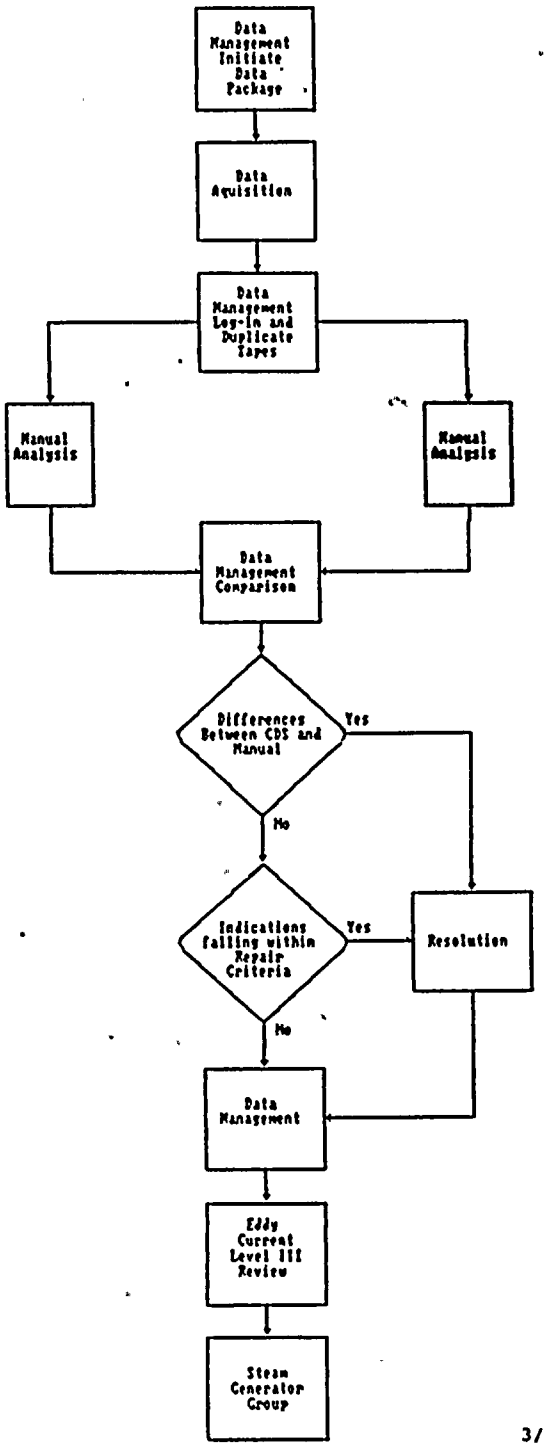

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Figure 1

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 25 kHz. The selected frequencies were all operated in the differential and absolute modes. The examination was performed primarily with a standard 0.740" or 0.720" O.D. bobbin coil probe with smaller diameter probes used to traverse the smaller radius U-bends and dented regions.

Prior to examination of the steam generators, an inspection program was established for the inlet and outlet sides of both the "A" and "B" steam generators. The inlet or hot leg examination program plan was generated to provide the examination of 100% of each open unsleeved steam generator tube from the tube end to the first tube support, along with 20% of these tubes being selected and examined for their full length (20% random sample as recommended in the Electric Power Research Institute (EPRI) guidelines). In addition, 20% of each type of sleeve was examined and the remaining tube examined full length. All previous tubes with indications greater than 20% through wall (TW) depth were examined as a minimum to the location of their degradation. All Row 1 and

Row 2 U-bend regions selected as part of the 20% random sample were examined with the Motorized Rotating Pancake Coil (MRPC) between the #6 TSP H and the #6 TSP C from the cold leg side.

A number of supplemental examinations were also performed to assist in flaw characterization and confirmation and to continue to monitor for the onset of new damage mechanisms.

Table 1 is a breakdown, by steam generator, of all tubes programmed for examination, numbers examined and to the extent examined.

STEAM GENERATOR "A"
1991 EDDY CURRENT INSPECTION EXTENTS
PRIOR TO CORRECTIVE ACTION

Total Tubes	3260
Out of Service	172
Sleeved Tubes	223
Open Unsleeved Tubes	2865

	REQ'D MIN[1]	NUMBER PROGM'D	NUMBER INSPT'D	% COMPLETE[2]
Hot Leg to #1 TSP	1852	1852	1852	100.0%
Full Length (20% Random)	573	986	986	172.1%
Previous Ind. ≥ 20%	27	27	27	100.0%
Sleeves	45	56	56	124.4%
Deplugged Tubes (F/L)	24	24	24	100.0%

Table 1

[1] Per Appendix B requirement.

[2] % Complete = Tubes Inspected/Required Minimum.

STEAM GENERATOR "B"
1991 EDDY CURRENT INSPECTION EXTENTS
PRIOR TO CORRECTIVE ACTION

Total Tubes	3260
Out of Service	316
Sleeved Tubes	832
Open Unsleeved Tubes	2112

	REQ'D MIN[1]	NUMBER PROGM'D	NUMBER INSPT'D	% COMPLETE[2]
Hot Leg to #1 TSP	1267	1267	1267	100.0%
Full Length (20% Random)	423	825	825	195.0%
Previous Ind. ≥ 20%	20	20	20	100.0%
Sleeves	167	231	230	137.7%
Deplugged Tubes (F/L)	16	16	16	100.0%

Table 1 (Cont'd)

[1] Per Appendix B requirement.

[2] % Complete = Tubes Inspected/Required Minimum.

3.0 DATA ANALYSIS RESULTS SUMMARY

The data analysis was performed using the Zetec DDA-4 Digital Data Analysis System with Edition 18.6 Revision 5.2 software and MRPC (Revision 14) supplements.

All data was 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 (where applicable). Other frequencies and their components were selected as necessary for the evaluation of indications. All recordable indications were logged into the computer and stored on floppy disk. The final report form summarizing all indications ≥20% TW (including IGA and PWSCC which is assumed to be >20%) for each generator can be found in Table 2. An explanation of the abbreviations and nomenclature used on these lists has been compiled for ease of interpretation.

LIST OF >20% INDICATION AND CREVICE INDICATION NOMENCLATURE

Top of List Information

ROW - ROW number from the tube identification.

COL - Column number from the tube identification.

IND. DESC. - Type of damage mechanism.

% TWD - Percent through wall depth or code for non-measurable indications.

VOLTS - Amplitude of the measured indication signal response.

INDICATION LOCATION - Reference point from which the indication was measured along with axial distance from that reference point.

Information Under % TWD

XX% - The measured percent TW depth of the indication.

Information Under IND. DESC.

ADI - Absolute Drift Indication Signal which is indicative of IGA.

ADS - Absolute Drift Signal which may be indicative of IGA.

DRT - Distorted Roll Transition may be indicative of PWSCC.

DRI - Distorted Roll Indication indicative of PWSCC.

SAI - Single Axial Indication - MRPC verified DRT, SCC or ADS

MAI - Multiple Axial Indication - MRPC verified DRT, SCC or ADS

SCI - Single Circumferential Indication

CCI - Circumferential Indication on B&W Explosive Plug

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

Information Under INDICATION LOCATION

HTE -	Hot Leg Tube End (Bottom).
HTS -	Top of inlet tubesheet.
TSP -	Tube Support Plate
CTE -	Cold Leg Tube End (Bottom).
CTS -	Top of outlet tubesheet.
AVB -	Antivibration Bars (Numbered from Hot Leg to Cold Leg).
-XX.X -	Axial distance below the secondary face of the tubesheet or support plates where the indication is located.
+XX.X -	Axial distance above the secondary face of the tubesheet or support plates where the indication is located.
H -	Hot Leg (inlet side)
C -	Cold Leg (outlet side)

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
8	3	DRT		2.62	HTS	- 19.5
		MAI		1.30	HTE	+ 2.2
21	7	ODI	22%	2.57	#2 AVB	+ 0.0
21	9	SCC	95%	0.53	HTS	- 18.6
7	15	DRT		2.54	HTS	- 19.5
		SAI		1.24	HTE	+ 3.0
8	15	DRT		2.98	HTS	- 19.6
		SAI		2.03	HTE	+ 2.5
9	16	ADS		3.94	HTS	- 9.8
9	17	WAS	20%	0.80	HTS	+ 1.7
10	17	WAS	20%	0:41	HTS	+ 0.8
9	18	WAS	46%	0.36	HTS	+ 1.2
13	18	ADS		2.67	HTS	- 14.6
		ADI		1.31	HTE	+ 2.6
2	19	ADI		2.15	HTS	- 15.1
9	19	DRI		6.01	HTS	- 19.3
		DRI		4.38	HTS	- 19.6
13	19	WAS	21%	0.84	HTS	+ 1.1
20	19	SCC	85%	1.26	HTS	- 19.1
7	20	WAS	24%	2.45	HTS	+ 2.5
		WAS	23%	3.63	HTS	+ 1.9
8	20	WAS	22%	2.85	HTS	+ 2.1
12	20	ADS		1.51	HTS	- 18.5
18	20	SCC	24%	0.29	HTS	- 17.5
		SCC	80%	0.26	HTS	- 17.9
		ADI		0.53	HTE	+ 3.3
9	21	WAS	26%	4.47	HTS	+ 2.6
		WAS	31%	4.95	HTS	+ 2.1
10	21	WAS	32%	1.65	HTS	+ 2.1
11	21	WAS	22%	1.77	HTS	+ 1.2
		WAS	25%	6.54	HTS	+ 2.0
13	21	WAS	21%	4.45	HTS	+ 2.5
		WAS	26%	1.19	HTS	+ 1.8
14	21	ADS		3.56	HTS	- 10.9
		WAS	25%	1.83	HTS	+ 1.5
		ADS		3.56	HTS	- 10.9
15	21	WAS	33%	1.03	HTS	+ 1.9
		WAS	23%	5.94	HTS	+ 1.3
17	21	WAS	30%	3.86	HTS	+ 1.0
19	21	SCC	80%	0.34	HTS	- 17.9
		SCC	94%	0.85	HTS	- 18.3
		MAI		0.50	HTE	+ 3.2
22	21	WAS	20%	0.60	HTS	+ 0.8
		ADS		1.69	HTS	- 12.3
38	21	ODI	26%	3.28	#3 AVB	+ 0.0
8	22	WAS	27%	0.90	HTS	+ 1.5
10	22	WAS	21%	2.77	HTS	+ 3.0
11	22	WAS	22%	3.70	HTS	+ 2.5
12	22	WAS	25%	3.36	HTS	+ 2.2
14	22	WAS	22%	5.35	HTS	+ 2.2
16	22	WAS	22%	2.45	HTS	+ 1.6
		WAS	26%	0.87	HTS	+ 1.2
18	22	WAS	23%	1.74	HTS	+ 0.3

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
23	22	WAS	22%	2.16	HTS	+ 0.6
10	23	WAS	35%	1.40	HTS	+ 2.0
		WAS	20%	1.17	HTS	+ 1.2
13	23	WAS	27%	13.98	HTS	+ 3.0
		WAS	23%	4.62	HTS	+ 2.0
14	23	WAS	24%	6.80	HTS	+ 2.9
		WAS	21%	2.51	HTS	+ 2.3
		WAS	36%	1.54	HTS	+ 1.6
23	23	WAS	20%	0.74	HTS	+ 1.4
7	24	DRT		1.88	HTS	- 19.4
		MAI		1.00	HTE	+ 2.4
10	24	WAS	24%	2.78	HTS	+ 1.9
11	24	WAS	24%	1.73	HTS	+ 2.8
		WAS	20%	0.82	HTS	+ 1.4
12	24	WAS	21%	7.35	HTS	+ 2.8
13	24	WAS	25%	7.88	HTS	+ 2.8
		WAS	20%	4.36	HTS	+ 2.3
22	24	WAS	20%	2.62	HTS	+ 1.1
23	24	WAS	22%	3.29	HTS	+ 1.3
26	24	WAS	22%	2.25	HTS	+ 0.8
27	24	ADS		4.12	HTS	- 15.5
		ADI		0.64	HTE	+ 3.3
7	25	DRT		2.14	HTS	- 19.4
		MAI		1.48	HTE	+ 2.1
8	25	DRT		1.97	HTS	- 19.4
		SAI		1.89	HTE	+ 1.8
12	25	WAS	25%	6.17	HTS	+ 2.2
13	25	WAS	33%	7.95	HTS	+ 2.5
14	25	WAS	28%	12.69	HTS	+ 2.6
17	25	WAS	20%	4.39	HTS	+ 2.9
		WAS	29%	11.00	HTS	+ 2.3
24	25	ADS		1.55	HTS	- 8.5
		ADI		0.31	HTS	- 13.5
		ADI		0.56	HTS	- 19.5
		ADI		0.54	HTE	+ 5.0
6	26	DRT		1.50	HTS	- 19.1
		MAI		1.07	HTE	+ 2.0
9	26	WAS	27%	6.25	HTS	+ 0.7
21	26	WAS	21%	6.15	HTS	+ 2.7
		SCC	68%	1.54	HTS	- 16.5
		SCC	56%	0.96	HTS	- 15.2
		WAS	20%	5.76	HTS	+ 2.0
		DRI		3.71	HTS	- 19.4
		WAS	20%	5.76	HTS	+ 2.0
23	26	WAS	28%	2.09	HTS	+ 1.7
		WAS	64%	0.73	HTS	+ 2.5
24	26	ADS		2.01	HTS	- 15.0
		WAS	31%	1.94	HTS	+ 1.4
25	26	SCC	95%	1.01	HTS	- 18.7
17	27	WAS	27%	7.59	HTS	+ 2.7
18	27	WAS	32%	10.67	HTS	+ 2.8
		WAS	41%	1.18	HTS	+ 3.1
22	27	WAS	27%	13.37	HTS	+ 2.4

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
24	27	WAS	26%	6.22	HTS	+ 1.1
25	27	WAS	21%	5.52	HTS	+ 0.8
2	28	DRT		2.89	HTS	- 19.4
		SAI		0.50	HTE	+ 2.8
7	28	DRI		1.98	HTS	- 19.6
23	28	WAS	25%	5.31	HTS	+ 2.2
24	28	WAS	21%	8.20	HTS	+ 1.4
15	29	WAS	26%	6.53	HTS	+ 3.0
24	29	WAS	21%	4.96	HTS	+ 1.4
27	29	SCC	82%	0.52	HTS	- 8.9
15	30	DRI		3.66	HTS	- 19.4
23	30	WAS	23%	2.14	HTS	+ 2.0
		WAS	30%	6.14	HTS	+ 1.4
24	30	WAS	27%	3.33	HTS	+ 1.6
25	30	WAS	23%	9.28	HTS	+ 1.4
		WAS	21%	2.37	HTS	+ 1.0
16	31	ADI		1.35	HTS	- 16.1
17	31	SCC	19%	0.40	HTS	- 4.9
		SCC	11%	0.42	HTS	- 5.9
		DRI		9.02	HTS	- 19.4
		MAI		2.27	HTE	+ 2.7
23	31	WAS	32%	6.83	HTS	+ 2.4
		WAS	35%	11.76	HTS	+ 1.8
24	31	WAS	27%	6.43	HTS	+ 1.4
26	31	ODI	20%	3.72	CTS	+ 1.4
27	31	WAS	21%	1.00	HTS	+ 0.9
34	31	DRT		3.80	HTS	- 19.7
		MAI		0.58	HTE	+ 1.6
14	32	ADS		3.70	HTS	- 4.1
20	32	WAS	35%	1.29	HTS	+ 2.5
		WAS	33%	5.58	HTS	+ 2.8
22	32	WAS	30%	13.32	HTS	+ 2.1
		WAS	31%	4.46	HTS	+ 1.5
23	32	WAS	31%	10.19	HTS	+ 2.5
		WAS	23%	2.95	HTS	+ 2.0
24	32	WAS	25%	11.13	HTS	+ 1.5
26	32	WAS	22%	3.77	HTS	+ 0.5
28	32	ODI	25%	1.84	CTS	+ 0.7
30	32	DRI		4.80	HTS	- 19.5
34	32	DRT		3.04	HTS	- 19.5
		MAI		0.77	HTE	+ 2.2
7	33	DRT		3.45	HTS	- 18.8
		SAI		1.12	HTE	+ 2.8
		SCC	10%	12.54	HTE	+ 1.3
21	33	WAS	22%	3.18	HTS	+ 1.6
		WAS	26%	5.03	HTS	+ 2.1
		WAS	21%	3.07	HTS	+ 1.2
22	33	WAS	25%	12.34	HTS	+ 2.2
		WAS	27%	2.99	HTS	+ 1.4
23	33	WAS	29%	8.33	HTS	+ 2.4
		WAS	24%	5.82	HTS	+ 1.9
24	33	WAS	22%	8.40	HTS	+ 1.6
25	33	WAS	23%	2.83	HTS	+ 1.7

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
		WAS	21%	3.66	HTS	+ 1.3
		WAS	27%	2.16	HTS	+ 0.8
18	34	ADI		5.48	HTS	- 9.1
19	34	WAS	29%	1.95	HTS	+ 2.4
		WAS	38%	1.11	HTS	+ 3.0
		WAS	32%	3.21	HTS	+ 2.0
20	34	WAS	21%	0.72	HTS	+ 3.0
21	34	WAS	21%	7.37	HTS	+ 2.1
		DRI		3.29	HTS	- 19.6
23	34	SCC	77%	1.81	HTS	- 17.8
25	34	WAS	22%	9.03	HTS	+ 1.6
27	34	WAS	20%	3.41	HTS	+ 0.4
1	35	DRI		7.27	HTS	- 19.2
7	35	DRT		2.62	HTS	- 19.5
		SAI		1.58	HTE	+ 2.7
17	35	SAI		1.21	HTE	+ 2.2
		DRT		2.45	HTS	- 19.4
18	35	ADI		7.36	HTS	- 3.4
		ADI		3.99	HTS	- 8.4
19	35	WAS	29%	1.67	HTS	+ 2.4
20	35	WAS	23%	0.82	HTS	+ 2.1
		WAS	24%	1.88	HTS	+ 2.4
21	35	WAS	21%	7.30	HTS	+ 2.2
		WAS	26%	3.02	HTS	+ 1.0
22	35	WAS	22%	6.66	HTS	+ 1.4
23	35	WAS	27%	6.89	HTS	+ 2.4
25	35	WAS	22%	6.83	HTS	+ 1.5
26	35	WAS	22%	0.71	HTS	+ 2.6
27	35	WAS	25%	2.61	HTS	+ 1.4
39	35	ODI	20%	2.18	#4 AVB	+ 0.0
		ODI	30%	4.20	#3 AVB	+ 0.0
20	36	WAS	24%	1.68	HTS	+ 2.8
		WAS	23%	1.59	HTS	+ 1.7
21	36	WAS	22%	3.38	HTS	+ 2.2
		WAS	33%	2.19	HTS	+ 1.7
		WAS	29%	1.89	HTS	+ 2.0
22	36	WAS	21%	2.77	HTS	+ 2.1
26	36	WAS	28%	6.67	HTS	+ 1.4
17	37	WAS	23%	0.71	HTS	+ 3.7
		WAS	21%	1.46	HTS	+ 4.7
18	37	WAS	27%	1.95	HTS	+ 2.8
		WAS	24%	2.02	HTS	+ 3.3
21	37	ODI	22%	1.60	CTS	+ 2.7
		WAS	25%	9.30	HTS	+ 1.8
		SCC	82%	7.21	HTS	- 19.5
		DRI		7.21	HTS	- 19.5
22	37	WAS	33%	0.83	HTS	+ 2.1
		WAS	27%	1.75	HTS	+ 1.3
		WAS	23%	6.25	HTS	+ 1.6
24	37	WAS	20%	3.15	HTS	+ 2.8
		WAS	21%	7.71	HTS	+ 2.2
25	37	WAS	22%	5.58	HTS	+ 2.2
		WAS	29%	9.52	HTS	+ 1.2

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
26	37	WAS	25%	5.20	HTS	+ 1.4
		WAS	23%	3.83	HTS	+ 1.9
28	37	DRT		2.97	HTS	- 19.5
		MAI		1.13	HTE	+ 2.9
40	37	DRT		1.97	HTS	- 19.5
		MAI		0.61	HTE	+ 2.3
16	38	SCC	57%	0.54	HTS	- 11.4
20	38	WAS	27%	1.39	HTS	+ 1.8
		WAS	24%	1.79	HTS	+ 2.4
23	38	WAS	24%	2.07	HTS	+ 2.9
		WAS	24%	1.77	HTS	+ 1.9
24	38	WAS	21%	3.00	HTS	+ 1.9
		DRT		2.50	HTS	- 19.6
		WAS	25%	1.05	HTS	+ 0.8
		WAS	32%	7.08	HTS	+ 1.3
		SAI		2.03	HTE	+ 2.8
25	38	WAS	23%	4.91	HTS	+ 1.2
		WAS	27%	6.63	HTS	+ 2.3
26	38	WAS	25%	5.75	HTS	+ 1.6
		WAS	30%	3.15	HTS	+ 2.1
11	39	ADS		1.20	HTS	- 16.7
18	39	WAS	24%	2.16	HTS	+ 2.6
19	39	ODI	55%	0.60	CTS	+ 3.0
20	39	ODI	23%	4.52	CTS	+ 2.3
22	39	WAS	21%	1.47	HTS	+ 1.1
		WAS	24%	1.87	HTS	+ 1.6
25	39	WAS	22%	6.91	HTS	+ 2.2
		WAS	22%	1.68	HTS	+ 1.1
26	39	WAS	20%	10.21	HTS	+ 2.5
		WAS	23%	3.37	HTS	+ 1.6
28	39	WAS	22%	4.42	HTS	+ 1.9
		DRT		2.29	HTS	- 19.6
		SAI		1.28	HTE	+ 3.0
14	40	DRT		1.83	HTS	- 19.5
		SAI		1.34	HTE	+ 2.2
17	40	DRI		5.33	HTS	- 19.9
18	40	WAS	29%	2.08	HTS	+ 2.0
		WAS	24%	2.25	HTS	+ 2.6
21	40	ODI	20%	6.16	CTS	+ 1.9
23	40	WAS	30%	0.95	HTS	+ 2.7
26	40	WAS	20%	3.82	HTS	+ 2.5
		WAS	23%	7.48	HTS	+ 2.1
27	40	WAS	25%	6.35	HTS	+ 2.5
		WAS	23%	7.23	HTS	+ 2.1
28	40	WAS	20%	6.26	HTS	+ 2.1
		DRT		3.34	HTS	- 19.7
		SAI		2.42	HTE	+ 2.8
7	41	DRT		4.36	HTS	- 19.7
		SAI		0.78	HTE	+ 2.5
8	41	DRI		5.12	HTS	- 19.8
14	41	WAS	24%	0.96	HTS	+ 0.4
		SAI		1.89	HTE	+ 2.6
		SCC	90%	0.38	HTS	- 18.5

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		
		SCC		0.32	HTE	+	3.5
18	41	WAS	47%	1.22	HTS	+	2.1
24	41	WAS	22%	1.67	HTS	+	1.8
25	41	WAS	29%	8.40	HTS	+	1.9
		WAS	27%	3.83	HTS	+	1.1
26	41	WAS	20%	3.52	HTS	+	0.9
		WAS	24%	4.18	HTS	+	1.9
		WAS	28%	1.65	HTS	+	1.6
28	41	WAS	26%	3.85	HTS	+	2.3
		WAS	28%	3.77	HTS	+	2.0
		DRI		4.06	HTS	-	19.6
29	41	WAS	23%	4.13	HTS	+	1.4
		WAS	28%	2.26	HTS	+	2.5
		WAS	23%	2.20	HTS	+	1.9
30	41	DRT		3.10	HTS	-	19.6
		MAI		0.99	HTE	+	2.8
22	42	WAS	29%	1.12	HTS	+	0.7
24	42	WAS	25%	2.08	HTS	+	2.0
25	42	WAS	21%	6.93	HTS	+	1.7
26	42	WAS	23%	6.71	HTS	+	1.8
27	42	WAS	25%	2.81	HTS	+	1.2
29	42	WAS	31%	3.72	HTS	+	1.8
		WAS	21%	2.93	HTS	+	1.3
		WAS	27%	1.67	HTS	+	1.0
37	42	ODI	28%	3.78	#3 AVB	+	0.0
		ODI	34%	5.16	#2 AVB	+	0.0
		ODI	26%	3.23	#4 AVB	+	0.0
10	43	WAS	24%	0.53	HTS	+	1.2
14	43	SCC	75%	0.70	HTS	-	8.3
18	43	WAS	21%	3.10	HTS	+	2.9
		WAS	33%	2.90	HTS	+	2.6
24	43	WAS	26%	4.69	HTS	+	0.9
25	43	WAS	20%	1.89	HTS	+	1.7
27	43	WAS	29%	5.03	HTS	+	1.8
28	43	WAS	33%	8.52	HTS	+	2.2
		WAS	23%	4.08	HTS	+	0.9
15	44	SCC	91%	0.63	HTS	-	2.4
		DRI		2.97	HTS	-	19.5
		SCC	88%	0.45	HTS	-	3.4
		ADI		0.57	HTS	-	5.2
22	44	WAS	21%	2.63	HTS	+	1.3
27	44	WAS	21%	6.26	HTS	+	2.2
		WAS	25%	5.59	HTS	+	1.3
28	44	WAS	28%	9.44	HTS	+	2.1
		WAS	31%	3.88	HTS	+	0.8
29	44	WAS	35%	9.60	HTS	+	1.2
12	45	WAS	34%	4.47	HTS	+	2.0
13	45	WAS	21%	2.36	HTS	+	1.8
21	45	WAS	21%	3.28	HTS	+	1.3
23	45	WAS	33%	0.67	HTS	+	0.7
25	45	WAS	20%	6.85	HTS	+	1.3
27	45	WAS	30%	7.57	HTS	+	1.0
		WAS	24%	7.80	HTS	+	2.1

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
28	45	SAI		1.25	HTE	+ 2.2
		WAS	20%	3.53	HTS	+ 0.9
		DRT		4.24	HTS	- 19.5
		WAS	22%	6.26	HTS	+ 1.9
29	45	WAS	23%	10.60	HTS	+ 1.2
16	46	WAS	21%	1.68	HTS	+ 2.4
		SCC	82%	1.13	HTS	- 5.0
25	46	WAS	30%	8.51	HTS	+ 1.2
26	46	WAS	35%	8.36	HTS	+ 1.3
6	47	DRI		6.03	HTS	- 19.4
13	47	DRI		3.61	HTS	- 19.6
18	47	WAS	20%	1.64	HTS	+ 2.7
21	47	DRI		2.98	HTS	- 19.6
30	47	WAS	26%	8.75	HTS	+ 0.9
3	48	ADI		1.67	HTS	- 17.6
16	48	SCC	67%	0.48	HTS	- 15.0
		ADI		0.70	HTE	+ 5.9
		ADI		0.78	HTS	- 14.5
17	48	WAS	22%	0.71	HTS	+ 0.5
20	48	SCC	78%	0.23	HTS	- 7.1
		SCC		0.37	HTS	- 7.0
28	48	WAS	23%	11.51	HTS	+ 1.1
30	48	WAS	31%	6.83	HTS	+ 1.0
42	48	ADS		2.19	HTS	- 16.2
2	49	ADI		2.81	HTS	- 13.4
		ADI		0.30	HTE	+ 5.6
14	49	ADI		5.33	HTS	- 4.5
16	49	WAS	21%	1.57	HTS	+ 4.6
17	49	WAS	20%	0.79	HTS	+ 3.7
19	49	ADI		5.34	HTS	- 4.2
		ADI		5.73	HTS	- 15.0
21	49	DRI		4.10	HTS	- 19.4
		MAI		9.09	HTE	+ 2.0
26	49	WAS	21%	5.87	HTS	+ 1.6
28	49	WAS	29%	10.06	HTS	+ 0.5
		WAS	28%	8.50	HTS	+ 1.5
31	49	SAI		2.69	HTE	+ 1.9
		DRT		4.05	HTS	- 19.5
16	50	ODI	20%	1.23	CTS	+ 1.9
17	50	WAS	20%	1.59	HTS	+ 0.7
18	50	WAS	22%	0.83	HTS	+ 1.7
23	50	WAS	25%	0.73	HTS	+ 0.7
24	50	WAS	31%	1.07	HTS	+ 1.9
		MAI		1.06	HTE	+ 2.9
		DRT		4.90	HTS	- 19.5
		MAI		2.28	HTE	+ 2.2
25	50	ADS		2.38	HTS	- 15.7
27	50	WAS	24%	3.92	HTS	+ 1.8
29	50	WAS	29%	5.31	HTS	+ 0.9
37	50	ODI	28%	3.88	#3 AVB	+ 0.0
19	51	WAS	25%	7.16	HTS	+ 1.5
21	51	SCC	96%	0.51	HTS	- 16.0
23	51	SAI		1.10	HTE	+ 2.2

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
28	51	WAS	25%	4.21	HTS	+ 1.3
30	51	SAI		2.47	HTE	+ 2.3
		DRT		4.87	HTS	- 19.4
45	51	ADS		3.98	CTS	- 3.6
		ADS		3.94	CTS	- 2.7
13	52	WAS	25%	4.51	HTS	+ 1.7
17	52	SCC	82%	0.85	HTS	- 17.0
		SCC	29%	0.29	HTS	- 12.1
		ADI		0.92	HTE	+ 3.3
23	52	DRT		3.04	HTS	- 19.6
		MAI		4.26	HTE	+ 3.3
		DRT		16.00	HTE	+ 2.0
		SCI		6.02	HTE	+ 2.5
45	52	PUL	100%	999.90	#6 TSP C	+ 1.8
		PUL	100%	999.90	#6 TSP H	+ 0.4
16	53	ODI	26%	1.52	HTS	+ 5.2
		WAS	22%	1.17	HTS	+ 4.4
17	53	WAS	21%	1.36	HTS	+ 3.1
19	53	WAS	29%	1.85	HTS	+ 2.1
		WAS	21%	2.19	HTS	+ 1.6
24	53	WAS	20%	0.60	HTS	+ 3.1
29	53	WAS	24%	4.51	HTS	+ 0.6
11	54	DRT		6.14	HTS	- 19.8
		MAI		2.04	HTE	+ 2.9
14	54	WAS	20%	0.70	HTS	+ 2.9
16	54	WAS	24%	3.58	HTS	+ 3.9
17	54	ODI	22%	1.04	CTS	+ 1.4
28	54	WAS	22%	2.80	HTS	+ 1.4
13	55	WAS	20%	1.65	HTS	+ 1.4
16	55	WAS	21%	5.84	HTS	+ 4.2
17	55	WAS	33%	1.10	HTS	+ 4.2
18	55	WAS	29%	0.94	HTS	+ 2.4
21	55	DRT		2.98	HTS	- 19.3
		SAI		1.05	HTE	+ 3.3
		SAI		1.53	HTE	+ 2.6
		SAI		4.36	HTE	+ 2.2
2	56	SCC	89%	0.44	HTS	- 18.6
3	56	DRI		4.23	HTS	- 19.2
		SAI		2.25	HTE	+ 2.8
7	56	DRI		4.19	HTS	- 19.5
		SAI		3.06	HTE	+ 3.0
8	56	WAS	20%	1.03	HTS	+ 0.7
9	56	ADI		3.16	HTS	- 15.1
16	56	WAS	30%	1.32	HTS	+ 3.9
17	56	ADS		3.00	HTS	- 10.6
		ADI		0.76	HTS	- 12.1
		ADI		0.65	HTE	+ 6.5
23	56	SAI		2.97	HTE	+ 2.2
24	56	DRI		10.90	HTS	- 19.3
28	56	WAS	20%	3.54	HTS	+ 1.0
29	56	WAS	26%	7.21	HTS	+ 0.8
18	57	ADI		5.04	HTS	- 17.4
19	57	SCC	88%	0.65	HTS	- 18.7

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
21	57	DRI		6.85	HTS	- 19.5
22	57	WAS	29%	9.78	HTS	+ 1.4
23	57	WAS	25%	3.56	HTS	+ 1.4
28	57	SAI		1.27	HTE	+ 2.4
		DRT		4.08	HTS	- 19.4
17	58	WAS	20%	1.65	HTS	+ 2.4
19	58	WAS	22%	7.51	HTS	+ 1.8
20	58	WAS	24%	1.52	HTS	+ 1.9
24	58	WAS	25%	3.58	HTS	+ 1.8
27	58	DRI		8.33	HTS	- 19.4
15	59	WAS	25%	6.20	HTS	+ 2.5
24	59	WAS	22%	3.25	HTS	+ 1.6
25	59	WAS	20%	2.78	HTS	+ 1.7
27	59	MAI		2.02	HTE	+ 2.2
		DRT		4.63	HTS	- 19.3
31	59	DRT		4.03	HTS	- 19.2
		MAI		1.29	HTE	+ 2.6
8	60	ADI		3.30	HTS	- 17.2
9	60	WAS	27%	0.98	HTS	+ 0.4
19	60	WAS	22%	8.42	HTS	+ 1.6
		DRT		2.80	HTS	- 19.5
20	60	WAS	26%	0.98	HTS	+ 1.7
		WAS	20%	2.09	HTS	+ 1.0
		WAS	25%	0.63	HTS	+ 1.2
23	60	WAS	20%	2.86	HTS	+ 1.3
		WAS	27%	0.66	HTS	+ 1.0
9	61	WAS	20%	2.57	HTS	+ 0.7
13	61	WAS	32%	2.24	HTS	+ 1.7
16	61	WAS	20%	3.13	HTS	+ 1.4
		WAS	27%	1.17	HTS	+ 1.9
17	61	WAS	23%	5.23	HTS	+ 1.4
19	61	WAS	29%	4.96	HTS	+ 1.5
20	61	WAS	20%	3.84	HTS	+ 1.6
21	61	WAS	20%	2.46	HTS	+ 1.5
38	61	DRI		3.30	HTS	- 19.5
14	62	WAS	20%	6.15	HTS	+ 1.8
15	62	WAS	23%	7.11	HTS	+ 1.9
18	62	WAS	20%	3.32	HTS	+ 1.5
		WAS	24%	0.99	HTS	+ 1.9
19	62	WAS	24%	7.01	HTS	+ 2.0
20	62	WAS	26%	3.95	HTS	+ 1.3
27	62	DRT		2.21	HTS	- 19.6
		MAI		1.84	HTE	+ 2.1
15	63	WAS	20%	5.83	HTS	+ 1.6
16	63	WAS	20%	2.95	HTS	+ 1.5
17	63	WAS	21%	9.74	HTS	+ 1.5
18	63	WAS	22%	4.93	HTS	+ 1.5
19	63	WAS	33%	1.19	HTS	+ 1.0
		WAS	24%	7.37	HTS	+ 1.5
20	63	WAS	22%	0.87	HTS	+ 1.6
38	63	ADS		2.45	HTS	- 11.5
9	64	WAS	20%	2.60	HTS	+ 0.6
10	64	WAS	21%	4.61	HTS	+ 0.7

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
13	64	WAS	24%	1.14	HTS	+ 2.0
		WAS	22%	6.32	HTS	+ 1.6
14	64	WAS	20%	1.31	HTS	+ 1.8
		WAS	23%	6.64	HTS	+ 1.5
16	64	WAS	26%	5.20	HTS	+ 1.5
17	64	ADI		3.62	HTS	- 14.8
19	64	WAS	22%	9.66	HTS	+ 1.6
20	64	WAS	22%	1.93	HTS	+ 1.0
31	64	DRT		4.53	HTS	- 18.6
		SAI		1.03	HTE	+ 1.8
8	65	SCC	70%	0.48	HTS	- 18.9
		SCC		0.31	HTE	+ 3.5
9	65	WAS	21%	6.53	HTS	+ 0.5
10	65	WAS	20%	4.20	HTS	+ 0.4
11	65	WAS	24%	1.64	HTS	+ 0.8
13	65	WAS	22%	3.66	HTS	+ 1.2
15	65	WAS	27%	2.96	HTS	+ 1.6
16	65	WAS	20%	1.75	HTS	+ 1.2
22	65	WAS	20%	0.97	HTS	+ 1.3
2	66	DRT		4.22	HTS	- 19.6
		SAI		1.77	HTE	+ 2.6
10	66	WAS	20%	4.37	HTS	+ 0.9
		WAS	20%	2.05	HTS	+ 0.5
11	66	WAS	23%	2.97	HTS	+ 1.0
13	66	WAS	21%	8.22	HTS	+ 1.3
14	66	WAS	27%	3.86	HTS	+ 1.8
15	66	WAS	27%	6.15	HTS	+ 1.6
18	66	WAS	26%	6.05	HTS	+ 1.7
19	66	WAS	20%	10.86	HTS	+ 1.7
20	66	WAS	25%	1.26	HTS	+ 1.1
21	66	WAS	26%	2.55	HTS	+ 1.6
1	67	DRT		3.81	HTS	- 19.4
9	67	SAI		1.17	HTE	+ 2.0
		WAS	25%	3.05	HTS	+ 1.4
		WAS	26%	2.71	HTS	+ 0.7
		DRT		2.72	HTS	- 19.4
		WAS	29%	4.29	HTS	+ 0.9
11	67	WAS	26%	2.85	HTS	+ 1.3
14	67	SAI		1.92	HTE	+ 2.6
		DRT		2.68	HTS	- 19.5
19	67	WAS	25%	3.05	HTS	+ 2.0
27	67	DRT		3.66	HTS	- 19.5
		SAI		1.54	HTE	+ 2.0
38	67	ODI	25%	3.00	#3 AVB	+ 0.0
		ODI	29%	3.94	#4 AVB	+ 0.0
6	68	SAI		1.57	HTE	+ 1.8
		DRT		1.17	HTS	- 19.5
8	68	WAS	24%	2.08	HTS	+ 1.3
11	68	WAS	22%	3.32	HTS	+ 1.6
13	68	WAS	25%	3.63	HTS	+ 1.6
19	68	ADS		5.40	HTS	- 17.8
9	69	WAS	29%	3.65	HTS	+ 1.2
		DRI		7.64	HTS	- 19.2

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
12	69	WAS	21%	7.05	HTS	+ 1.5
9	70	SAI		3.12	HTE	+ 2.0
		WAS	28%	5.07	HTS	+ 1.3
		DRT		2.96	HTS	- 19.5
11	70	WAS	23%	5.23	HTS	+ 1.3
14	70	WAS	22%	5.14	HTS	+ 1.9
38	70	ODI	23%	2.76	#2 AVB	+ 0.0
6	71	WAS	24%	6.52	HTS	+ 0.7
17	71	WAS	25%	2.63	HTS	+ 0.7
21	71	ADI		4.20	HTS	- 18.2
12	72	WAS	24%	3.49	HTS	+ 1.2
16	72	SAI		1.43	HTE	+ 2.1
		DRT		2.93	HTS	- 19.7
8	73	WAS	25%	1.78	HTS	+ 1.0
12	73	WAS	26%	10.60	HTS	+ 1.3
17	73	ADI		1.44	HTS	- 18.2
8	74	WAS	26%	3.89	HTS	+ 0.8
25	74	DRT		3.98	HTS	- 19.6
		SAI		3.75	HTE	+ 1.9
28	74	ADI		2.82	HTS	- 18.7
30	75	DRT		4.52	HTS	- 19.6
		MAI		4.00	HTE	+ 1.8
31	75	DRT		4.80	HTS	- 19.6
		SAI		1.80	HTE	+ 2.0
12	77	SCC	76%	1.02	HTS	- 16.2
27	77	DRT		4.89	HTS	- 19.7
		SAI		1.98	HTE	+ 2.0
9	78	DRT		6.10	HTS	- 19.7
		MAI		2.13	HTE	+ 1.7
29	81	ADS		4.11	CTS	- 2.6
7	82	SCC	76%	0.42	HTS	- 19.1
		DRT		3.67	HTS	- 19.6
		SAI		3.22	HTE	+ 2.5
13	83	DRT		3.60	HTS	- 19.5
		SAI		1.78	HTE	+ 2.0
11	85	DRT		3.35	HTS	- 19.8
16	87	ODI	34%	0.91	HTS	+ 12.0
18	87	ADS		1.92	HTS	- 9.0
1	89	ODI	30%	0.38	HTS	+ 11.0
11	91	WAS	23%	3.08	HTS	+ 1.1

NO OF TUBES:372

NUMBER OF INDICATIONS: 570

SCC 76-100%	20
SCC 51-75%	6
SCC 26-50%	1
SCC 1-25%	4
ADI	30

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location
5	2	ADI		2.54	HTS - 17.8
11	5	DRT		2.83	HTS - 19.4
18	5	ODI	28%	2.36	#1 TSP C + 0.1
		ODI	28%	2.23	#1 TSP C + 0.0
14	6	ADI		2.38	HTS - 13.7
18	6	ODI	29%	1.66	#1 TSP C + 0.0
		ODI	33%	2.12	#2 TSP C + 0.0
2	8	ADS		1.59	HTS - 17.7
		SAI		0.51	HTE + 4.0
24	8	ODI	27%	2.83	#1 TSP C + 0.0
11	10	DRI		4.01	HTS - 19.3
7	11	SCC	90%	0.34	HTS - 18.1
		SAI		0.59	HTE + 3.2
11	12	DRT		3.00	HTS - 19.3
17	12	DRT		3.99	HTS - 19.2
		MAI		0.69	HTE + 2.6
2	13	ADS		0.93	HTS - 18.0
25	13	DRT		2.77	HTS - 19.1
11	14	DRI		4.69	HTS - 19.5
18	14	ADS		1.76	HTS - 18.0
6	16	ADI		2.19	HTS - 17.2
27	16	SCC	95%	1.50	HTS - 18.4
7	17	WAS	20%	3.40	HTS + 1.1
2	20	ADI		2.39	HTS - 17.6
8	22	WAS	27%	0.83	HTS + 1.5
11	22	WAS	22%	9.32	HTS + 1.3
7	23	WAS	23%	2.41	HTS + 1.8
11	23	WAS	24%	7.95	HTS + 1.6
		WAS	30%	4.04	HTS + 1.1
14	23	WAS	26%	0.51	HTS + 1.9
15	23	WAS	28%	1.58	HTS + 1.0
24	23	WAS	23%	0.62	HTS + 1.3
1	24	ADS		1.44	HTS - 2.2
10	24	WAS	20%	5.56	HTS + 1.3
11	24	WAS	23%	0.60	HTS + 1.4
		DRT		1.43	HTS - 19.5
13	24	WAS	23%	6.17	HTS + 1.3
17	24	DRI		2.06	HTS - 19.4
		SCC	79%	0.46	HTS - 14.1
		MAI		0.52	HTE + 4.3
		SAI		0.89	HTE + 14.4
		SAI		0.90	HTE + 7.2
33	24	SCC	92%	3.15	HTS - 18.6
12	25	ADS		4.86	HTS - 17.0
		ADI		1.07	HTE + 4.5
16	25	DRI		2.01	HTS - 19.6
24	25	WAS	36%	3.39	HTS + 1.1
		WAS	33%	5.27	HTS + 0.6
		WAS	34%	5.39	HTS + 0.9
27	25	SCC	84%	1.02	HTS - 18.7
29	25	DRI		1.62	HTS - 19.2
16	26	WAS	26%	5.15	HTS + 1.7
17	26	WAS	27%	3.01	HTS + 1.7

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
		WAS	27%	8.60	HTS	+ 1.1
		WAS	32%	5.63	HTS	+ 1.5
18	26	WAS	33%	15.49	HTS	+ 1.4
19	26	WAS	33%	13.56	HTS	+ 1.3
20	26	WAS	21%	7.02	HTS	+ 1.2
22	26	WAS	34%	1.06	HTS	+ 1.4
		WAS	25%	5.39	HTS	+ 1.1
13	27	WAS	22%	5.80	HTS	+ 1.1
14	27	ADS		4.78	HTS	- 6.8
17	27	ADS		3.17	HTS	- 17.4
		SAI		0.40	HTE	+ 4.3
23	27	WAS	22%	6.22	HTS	+ 1.7
15	28	ADI		3.03	HTS	- 6.0
28	28	SCC	70%	0.57	HTS	- 10.3
2	29	ADS		2.06	HTS	- 15.9
		SAI		0.24	HTE	+ 5.8
19	29	WAS	20%	14.33	HTS	+ 1.4
26	29	SCC	34%	0.26	HTS	- 14.4
		SAI		0.54	HTE	+ 7.4
29	29	SCC	60%	0.55	HTS	- 18.4
		DRI		4.76	HTS	- 19.1
11	30	ADS		5.93	HTS	- 17.0
17	30	WAS	28%	1.18	HTS	+ 2.1
31	30	DRT		3.71	HTS	- 19.6
		SAI		1.35	HTE	+ 2.7
25	31	WAS	23%	1.15	HTS	+ 1.5
39	31	SCC	79%	1.87	HTS	- 18.4
42	31	ODI	31%	3.72	CTS	+ 15.1
9	32	ADS		1.86	HTS	- 15.0
19	32	SCC	86%	2.61	HTS	- 19.2
		SCC	58%	0.38	HTS	- 14.6
		SCC	54%	0.60	HTS	- 11.9
43	32	CCI		0.11	HTE	+ 3.0
20	33	ADS		5.38	HTS	- 10.0
		SAI		0.23	HTS	- 11.5
40	33	SCC	98%	1.69	HTS	- 19.0
9	34	ADI		5.65	HTS	- 15.0
12	34	SCC	70%	0.36	HTS	- 7.0
		MAI		0.62	HTS	- 5.3
23	34	ADI		2.00	HTS	- 5.3
25	34	WAS	21%	0.61	HTS	+ 1.3
26	34	WAS	20%	0.59	HTS	+ 1.0
3	35	ADS		1.52	HTS	- 16.2
26	35	SCC	54%	0.21	HTS	- 17.8
		SAI		0.44	HTE	+ 4.3
32	35	ADS		2.01	HTS	- 18.8
		MAI		0.39	HTE	+ 3.0
33	35	SCC	65%	0.44	HTS	- 18.3
		SAI		0.76	HTE	+ 3.1
5	37	OBS		0.00		+ 0.0
7	37	ADS		3.67	HTS	- 15.5
26	37	DRT		6.45	HTS	- 19.1
		MAI		0.98	HTE	+ 2.4

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
6	38	SCC	48%	0.26	HTS	- 17.7
28	38	WAS	21%	6.24	HTS	+ 1.1
24	39	ODI	21%	1.94	CTS	+ 0.6
		WAS	25%	1.92	HTS	+ 1.1
33	39	SCC	48%	0.34	HTS	- 15.3
		SAI		0.70	HTE	+ 5.1
23	40	WAS	21%	7.06	HTS	+ 1.4
24	40	WAS	25%	1.16	HTS	+ 1.0
32	40	SCC	60%	0.42	HTS	- 6.2
		SAI		0.57	HTS	- 8.8
33	40	SCC	42%	0.32	HTS	- 18.9
		SAI		0.84	HTE	+ 2.8
2	41	ADI		3.80	HTS	- 14.8
4	41	WAS	20%	5.70	HTS	+ 0.5
20	41	WAS	20%	1.52	HTS	+ 2.6
23	41	WAS	23%	4.53	HTS	+ 1.6
24	41	WAS	25%	4.61	HTS	+ 1.6
		WAS	32%	3.11	HTS	+ 1.1
27	42	WAS	28%	0.63	HTS	+ 2.2
6	43	SCC	73%	0.34	HTS	- 18.9
		SCC	86%	1.00	HTS	- 17.0
		SCC	68%	0.35	HTS	- 16.1
23	43	ADI		3.40	HTS	- 16.2
		ADI		1.95	HTS	- 5.7
22	44	ADS		2.33	HTS	- 4.7
		SAI		0.46	HTS	- 6.2
18	45	ODI	22%	6.79	CTS	+ 1.3
25	45	SCC	79%	0.34	HTS	- 18.1
		SCC	62%	0.35	HTS	- 8.2
		SAI		0.75	HTS	- 6.6
27	45	SCC	57%	0.96	HTS	- 6.9
		SCC	70%	0.50	HTS	- 8.3
		SCC	69%	0.66	HTS	- 7.9
20	46	WAS	39%	1.28	HTS	+ 3.2
		SCC	72%	1.63	HTS	- 7.2
27	46	WAS	20%	8.15	HTS	+ 1.7
33	46	ADS		2.79	HTS	- 10.8
		SAI		0.15	HTS	- 13.0
39	46	ADS		2.30	HTS	- 16.9
		ADI		5.07	HTE	+ 5.6
6	47	WAS	23%	0.56	HTS	+ 0.8
7	47	ADS		2.77	HTS	- 13.1
		MAI		0.40	HTE	+ 4.5
21	47	CCI		0.24	HTE	+ 1.5
21	48	SCC	67%	0.46	HTS	- 5.7
3	49	ADS		2.63	HTS	- 0.8
		SAI		1.66	HTE	+ 3.2
		SAI		0.40	HTS	- 1.7
		SAI		0.43	HTS	- 6.0
22	49	SAI		0.38	HTS	- 18.0
		SCC	60%	0.29	HTS	- 17.8
30	49	SCC	74%	0.18	HTS	- 16.8
		SAI		1.49	HTE	+ 4.6

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
33	49	ADI		2.52	HTS	- 16.0
43	49	SCC	90%	1.61	HTS	- 18.4
25	50	WAS	33%	1.68	HTS	+ 3.4
		WAS	25%	2.91	HTS	+ 3.0
		WAS	34%	0.75	HTS	+ 3.7
27	50	ADI		2.77	HTS	- 16.4
28	50	SCC	43%	0.64	HTS	- 6.2
		SCC	39%	0.96	HTS	- 18.4
39	50	SCC	83%	0.90	HTS	- 18.3
40	50	SCC	98%	0.94	HTS	- 18.2
9	51	MAI		0.33	HTE	+ 5.1
		ADS		2.06	HTS	- 16.5
12	51	ADS		2.46	HTS	- 15.6
		SAI		1.39	HTE	+ 6.1
		SAI		0.49	HTE	+ 3.3
14	51	ADS		6.29	HTS	- 16.6
		MAI		0.33	HTS	- 14.9
24	51	SCC	76%	0.77	HTS	- 8.1
		WAS	35%	0.57	HTS	+ 3.3
		SCC	76%	1.01	HTS	- 18.4
28	51	ADI		4.18	HTS	- 17.0
		SCC	74%	19.56	HTS	- 11.0
17	52	MAI		0.63	HTE	+ 2.5
		DRT		1.71	HTS	- 19.6
23	52	SAI		0.37	HTE	+ 4.2
		ADI		1.74	HTS	- 18.1
24	52	SCC	68%	1.26	HTS	- 14.2
		SCC	43%	0.90	HTS	- 15.7
26	52	SCC	77%	3.19	HTS	- 18.2
		DRI		3.97	HTS	- 19.5
27	52	WAS	34%	0.75	HTS	+ 3.2
		MAI		0.58	HTE	+ 4.8
		ADI		2.78	HTS	- 16.0
28	52	MAI		0.39	HTE	+ 4.1
		ADI		1.91	HTS	- 15.3
29	52	WAS	20%	1.21	HTS	+ 2.7
		SCC	78%	0.98	HTS	- 19.1
9	53	ADI		1.70	HTS	- 16.7
10	53	SCC	47%	0.34	HTS	- 17.2
		SAI		0.49	HTE	+ 4.0
25	53	WAS	37%	0.83	HTS	+ 4.3
26	53	SCC	58%	1.88	HTS	- 14.7
		DRI		18.83	HTS	- 19.5
13	54	ADS		2.64	HTS	- 16.2
		SAI		1.03	HTE	+ 3.8
		MAI		0.80	HTE	+ 2.8
19	54	WAS	21%	9.25	HTS	+ 2.2
		ADS		0.71	HTS	- 4.1
		SAI		0.96	HTS	- 4.4
22	54	DRI		1.20	HTS	- 19.7
		SAI		0.96	HTE	+ 3.3
26	54	WAS	23%	1.03	HTS	+ 3.1

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
		DRI		2.95	HTS	- 19.6
18	55	ODI	20%	1.88	CTS	+ 2.6
		WAS	34%	1.19	HTS	+ 2.0
19	55	SCC	66%	0.61	HTS	- 10.5
		SCC	75%	0.69	HTS	- 5.6
26	55	SCC	64%	0.53	HTS	- 6.7
		DRI		6.76	HTS	- 19.6
		SCC	45%	0.48	HTS	- 14.6
		SAI		0.38	HTE	+ 7.9
		SAI		1.35	HTE	+ 2.9
28	55	WAS	30%	0.78	HTS	+ 3.8
		WAS	20%	2.29	HTS	+ 0.9
33	55	SCC	46%	2.41	HTS	- 18.6
13	56	ADS		0.49	HTS	- 17.1
20	56	SCC	58%	0.68	HTS	- 8.0
25	56	ADS		8.26	HTS	- 17.4
		MAI		1.49	HTE	+ 2.7
		MAI		0.80	HTE	+ 3.9
		SCI		1.25	HTE	+ 2.4
		MAI		0.74	HTE	+ 4.6
		SCI		1.92	HTE	+ 1.8
26	56	SCC	68%	2.37	HTS	- 12.5
		MAI		0.87	HTE	+ 5.7
		SAI		0.96	HTE	+ 2.5
27	56	WAS	27%	1.00	HTS	+ 3.6
28	56	WAS	29%	0.83	HTS	+ 0.9
30	56	DRI		15.45	HTS	- 19.4
1	57	IDV		0.68	HTE	+ 16.2
19	58	SCC	67%	0.50	HTS	- 14.3
20	58	WAS	22%	0.86	HTS	+ 2.5
25	58	SCC	69%	0.38	HTS	- 5.2
		ADS		3.62	HTS	- 18.3
		SAI		1.22	HTS	- 5.4
		SAI		0.57	HTE	+ 2.2
28	58	ADI		3.35	HTS	- 16.5
31	58	WAS	23%	1.54	HTS	+ 0.5
2	59	ADI		1.32	HTS	- 17.3
15	59	SCC	96%	0.63	HTS	- 15.5
29	59	WAS	21%	0.90	HTS	+ 1.0
		DRT		1.13	HTS	- 19.5
		MAI		1.23	HTE	+ 2.3
		WAS	27%	0.96	HTS	+ 0.4
39	59	SCC	82%	0.82	HTS	- 18.2
13	60	SCC	51%	0.29	HTS	- 15.5
		SAI		0.44	HTE	+ 5.5
		SCC	60%	0.41	HTS	- 16.2
19	60	ADI		3.63	HTS	- 7.4
		SCC	25%	0.28	HTS	- 18.2
		SAI		0.82	HTE	+ 2.3
24	60	SAI		0.79	HTE	+ 7.2
25	60	SCC	96%	0.35	HTS	- 4.7
		SAI		0.43	HTS	- 5.1
		SAI		0.47	HTS	- 7.0

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
27	60	WAS	24%	1.54	HTS	+ 1.5
26	61	WAS	33%	0.40	HTS	+ 1.4
27	61	MAI		0.37	HTS	- 7.5
		ADS		1.58	HTS	- 6.3
5	62	ADS		3.22	HTS	- 13.7
21	62	WAS	20%	0.63	HTS	+ 0.8
30	62	WAS	23%	4.43	HTS	+ 0.7
34	62	ADI		1.17	HTS	- 18.4
3	63	SCC	78%	0.48	HTS	- 16.3
		SAI		0.58	HTE	+ 4.5
22	63	WAS	30%	6.22	HTS	+ 2.2
		WAS	23%	2.87	HTS	+ 1.7
27	63	WAS	21%	2.33	HTS	+ 1.8
28	63	WAS	27%	5.29	HTS	+ 1.8
		SCC	81%	0.41	HTS	- 9.8
		SAI		0.36	HTS	- 9.9
26	64	WAS	21%	1.39	HTS	+ 2.5
		WAS	24%	2.39	HTS	+ 1.5
		WAS	27%	5.17	HTS	+ 2.2
7	65	ADI		3.84	HTS	- 16.9
23	65	WAS	29%	0.77	HTS	+ 1.8
24	65	ADS		2.30	HTS	- 18.2
		SAI		0.57	HTE	+ 3.2
9	66	DRI		2.30	HTS	- 19.4
36	66	SCC	97%	0.74	HTS	- 17.9
24	67	ADS		1.78	HTS	- 7.7
10	69	SAI		0.80	HTE	+ 3.2
		SCC	47%	0.42	HTS	- 19.2
12	69	ADI		3.18	HTS	- 17.1
22	69	DRI		1.37	HTS	- 19.1
38	69	SCC	53%	0.61	HTS	- 18.1
13	70	WAS	20%	2.93	HTS	+ 1.0
18	72	ADS		4.26	HTS	- 17.5
		SAI		0.64	HTE	+ 2.9
10	73	WAS	20%	2.40	HTS	+ 0.6
19	73	ADS		3.39	HTS	- 9.4
8	74	WAS	23%	0.57	HTS	+ 0.8
10	75	WAS	23%	1.94	HTS	+ 0.8
25	77	DRT		1.90	HTS	- 19.2
		MAI		3.89	HTE	+ 2.7
1	78	DRT		2.36	HTS	- 19.3
		SAI		0.87	HTE	+ 2.5
26	80	DRT		3.95	HTS	- 19.5
		SAI		2.51	HTE	+ 2.1
17	82	DRT		4.76	HTS	- 20.3
		SAI		1.83	HTE	+ 2.4
22	82	DRT		5.51	HTS	- 19.2
17	83	DRT		4.39	HTS	- 19.6
		SAI		7.67	HTE	+ 2.3
19	83	WAS	29%	0.66	HTS	+ 0.2
20	83	SCC	99%	0.62	HTS	- 18.9
14	84	DRT		1.92	HTS	- 19.3

TABLE 2

REPORTABLE INDICATIONS

Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	
4	90	ADS		2.81	HTS	- 16.1
1	92	ODI	27%	1.44	HTS	+ 11.6
		ODI	37%	2.00	CTS	+ 11.3

NO OF TUBES: 198

NUMBER OF INDICATIONS: 318

SCC 76-100%	24
SCC 51-75%	31
SCC 26-50%	11
SCC 1-25%	1
ADI	25

4.0 OBSERVATIONS

The results of the examination indicate that IGA and IGSCC continue to be active within the tubesheet crevice region on the inlet side of each steam generator. As in the past, IGA/SCC is much more prevalent in the "B" steam generator with 42 new IGA indications and 37 new IGSCC indications reported. In the "A" steam generator, 14 new IGA indications and 16 new IGSCC indications were reported.

The majority of the inlet tubesheet crevice corrosion indications are IGA/SCC of the mil-annealed Inconel 600 tube material. This form of corrosion is believed to be the result of the tubesheet crevices forming an alkaline environment. This 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 exists. Table 3 shows the steam generator IGA/SCC history.

Ginna Steam Generators
Crevice Corrosion Indication History

	Not Sizeable		0-25%		26-50%		51-75%		76-100%		TOTAL	
	A	B	A	B	A	B	A	B	A	B	A	B
Mar 1979	0	0	0	0	0	0	0	2	0	0	0	2
Dec 1979	0	0	0	0	0	6	0	5	0	0	0	11
Apr 1980	0	19	0	1	0	2	0	7	0	2	0	31
Nov 1980	0	2	0	0	0	0	0	1	0	0	0	3
Apr 1981	0	0	0	5	0	4	0	5	0	0	0	14
Feb 1982	0	1	0	0	0	1	0	6	0	5	0	13
Oct 1982	0	27	0	4	0	5	1	7	0	16	1	59
Apr 1983	3	11	1	3	0	15	0	7	0	15	4	51
Mar 1984	0	5	0	0	1	0	0	1	0	2	1	8
Mar 1985	0	23	0	4	0	6	1	9	1	27	2	69
Feb 1986	2	3	2	9	0	1	1	14	0	25	5	52
Feb 1987	17	82	0	1	1	8	3	16	13	46	34	153
Feb 1988	3	22	0	0	0	1	2	7	2	11	7	41
Mar 1988	0	1	0	0	0	0	0	1	0	4	0	6
Mar 1989	14	150	0	0	0	4	2	35	8	79	24	268
Apr 1990	16	108	2	1	3	8	6	8	11	32	38	157
Apr 1991	14	42	0	1	0	6	2	12	14	18	30	79
TOTALS:	69	496	5	29	5	67	18	143	49	282	146	1017

TABLE 3

4.0 OBSERVATIONS (CONT)

Along with IGA/SCC in the crevice, PWSCC at the roll transition appears to have a slight increase in growth during the last operating cycle. This mechanism was first addressed in 1989 and this year there were 19 PWSCC indications in "B" steam generator and 59 PWSCC indications in "A" steam generator. These numbers include tubes that may have PWSCC in combination with IGA or SCC in the crevice.

A large volume, typically <20% TW, wastage type condition exists just above the tubesheet secondary face of both generators. A small percentage of the tubes, generally toward the center of the bundle, have this condition. Several of the tubes did have penetrations >20% TW. Two new tubes in the "A" steam generator were listed for corrective action from this condition. These tubes were essentially unchanged from prior inspections but were repaired as a preventative measure. It is believed that these wastage indications were caused by the original water chemistry when phosphate was used as a buffering medium.

Small indications of probable copper deposits were also found in the tubesheet crevice region randomly located throughout each steam generator.

4.0 OBSERVATIONS (CONT)

Minor denting has been detected at the tubesheet secondary 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 on size than that at the tubesheet secondary side face. In general, minor distortions of most of the tube support signals were seen.

The denting phenomenon and minor distortions at the tubesheet and support plates can be attributed to secondary side corrosion product buildup in the annular region between the tube outside surface and the carbon steel support member. Comparisons with previous data indicates that a small increase in the extent or magnitude of denting has occurred from what has been detected by previous inspections.

Indications were detected at the support plates in the cold leg of the "B" steam generator. These indications were present and recorded in previous years and were programmed as part of the ≥20% TW examination.

4.0 OBSERVATIONS (CONT)

MRPC at the #1 tube support plate intersections in the Hot Leg of both steam generators showed no indications within the support plates. This sample included tubes with and without denting at the support intersection.

MRPC at #6 tube support plate intersections with dents in the Cold Leg of both steam generators showed no indications in or near the support plates.

In summary, the "A" Steam Generator had 89 tubes that were found to have "new" tubesheet crevice indications. The "B" Steam Generator had 98 "new" tubesheet crevice indications.

There were eight (8) tubes in the "A" Steam Generator and four (4) tubes in the "B" Steam Generator recorded with indications at the anti-vibration bar intersections. These indications are less than the repair limit. Many of them were recorded in earlier outages and have not changed significantly since previous examinations. In light of the fact that only a small number of tubes exhibit these indications, AVB fretting wear is not considered to be an active damage mechanism or major concern at this time but will be monitored for any growth during future outages.

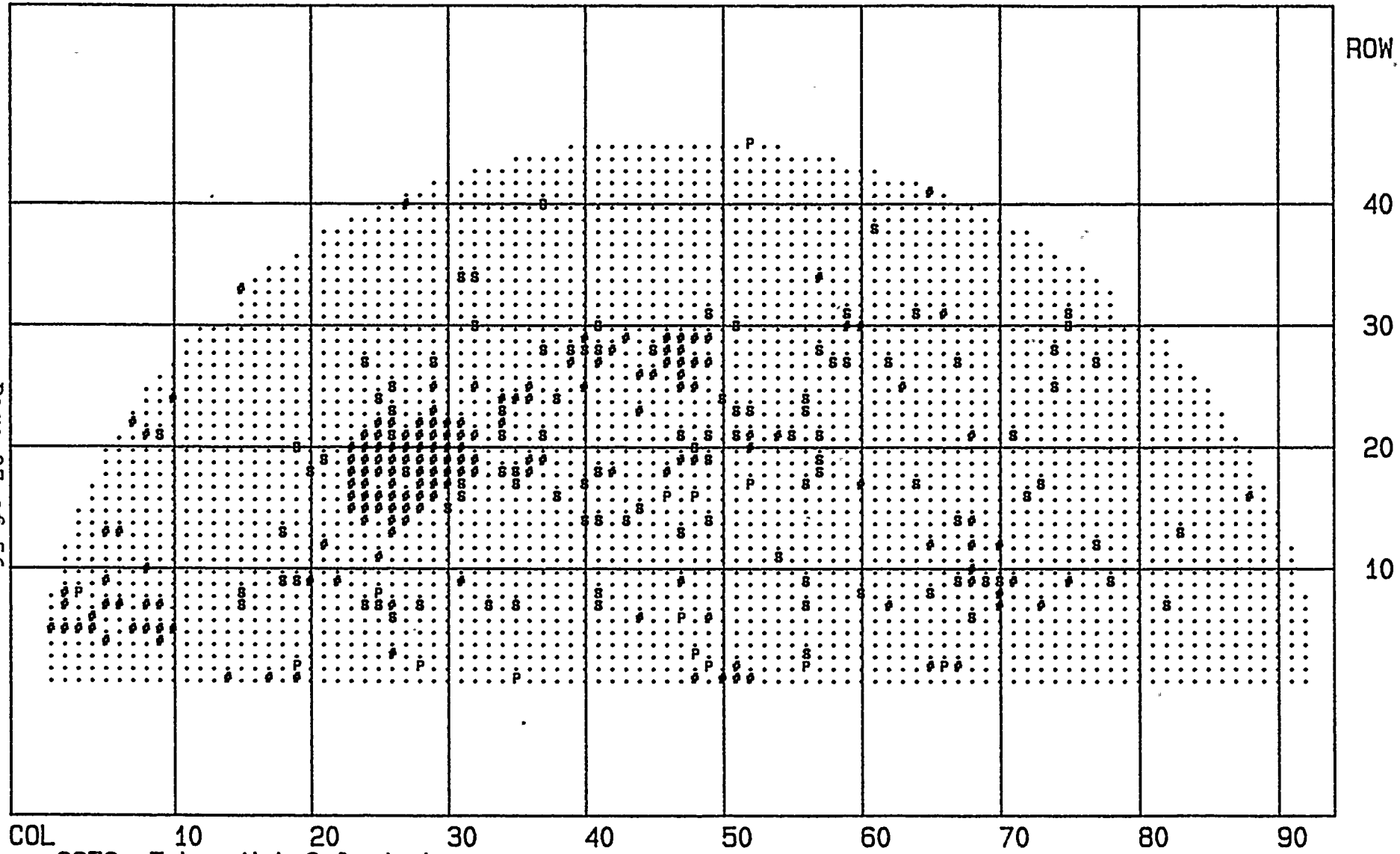
5.0 CORRECTIVE ACTION

Table 4 has been generated to identify tubes with crevice indications or with indications which exceed the repair criteria. This table also shows the axial location of the indication and what corrective action was taken on these tubes. Tubes requiring repair due to hot leg tubesheet crevice indications were identified by the appropriate codes: an absolute drift indication signal (ADI) of the Mix-2 Channel and/or quantifiable IGSCC indications on the 400 kHz data.

There were 22 tubes deplugged in the "A" generator and 15 tubes deplugged in the "B" generator and returned to service by sleeving. These tubes were recorded with repairable indications in earlier outages. A full length examination was performed to insure no indications existed that would prevent them from being returned to service.

The "A" steam generator had a total of 91 new indications and 1 pulled tube that required repair. The "B" steam generator had a total of 98 new indications and 1 obstructed sleeved tube that required repair.

A Ginna Steam Generator Tube Inspection and Corrective Action History has been tabulated on Table 5.



.: 2972: Tubes Not Selected
#: 172: Tubes Out of Service
P: 14: Plugged in 1991
S: 102: Sleeved in 1991

Rochester Gas & Electric Corp.
Ginna Nuclear Power Station
S/G - A Hot Leg 04/25/91

Figure 2

ACRI ISIS Tubes

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
plug	8	3	MAI		1.30	HTE	+ 2.2	HTE+ 6.0
sleeve	21	9	SCC	95%	0.53	HTS	- 18.6	#6 TSP H
sleeve	7	15	SAI		1.24	HTE	+ 3.0	HTE+ 6.0
sleeve	8	15	SAI		2.03	HTE	+ 2.5	HTE+ 6.0
sleeve	9	18	ODI	46%	0.36	HTS	+ 1.2	#1 TSP H
sleeve	13	18	ADI		1.31	HTE	+ 2.6	HTS+ 0.0
plug	2	19	ADI		2.15	HTS	- 15.1	#1 TSP H
sleeve	9	19	DRI		6.01	HTS	- 19.3	#6 TSP H
			DRI		4.38	HTS	- 19.6	#6 TSP H
sleeve	20	19	SCC	85%	1.26	HTS	- 19.1	#1 TSP H
sleeve	18	20	SCC	24%	0.29	HTS	- 17.5	#1 TSP H
			SCC	80%	0.26	HTS	- 17.9	#1 TSP H
			ADI		0.53	HTE	+ 3.3	HTS+ 0.0
sleeve	19	21	SCC	80%	0.34	HTS	- 17.9	#1 TSP H
			SCC	94%	0.85	HTS	- 18.3	#1 TSP H
			MAI		0.50	HTE	+ 3.2	HTS+ 0.0
sleeve	7	24	MAI		1.00	HTE	+ 2.4	HTE+ 6.0
sleeve	27	24	ADI		0.64	HTE	+ 3.3	HTS+ 0.0
sleeve	7	25	MAI		1.48	HTE	+ 2.1	HTE+ 6.0
plug	8	25	SAI		1.89	HTE	+ 1.8	HTE+ 6.0
sleeve	24	25	ADI		0.54	HTE	+ 5.0	HTS+ 0.0
			ADI		0.31	HTS	- 13.5	HTS+ 0.0
			ADI		0.56	HTS	- 19.5	HTS+ 0.0
sleeve	6	26	MAI		1.07	HTE	+ 2.0	HTE+ 6.0
sleeve	21	26	SCC	56%	0.96	HTS	- 15.2	#6 TSP H
			SCC	68%	1.54	HTS	- 16.5	#6 TSP H
			DRI		3.71	HTS	- 19.4	#6 TSP H

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	23	26	ODI	64%	0.73	HTS	+ 2.5	#6 TSP H
sleeve	25	26	SCC	95%	1.01	HTS	- 18.7	#6 TSP H
sleeve	18	27	ODI	41%	1.18	HTS	+ 3.1	#6 TSP H
plug	2	28	SAI		0.50	HTE	+ 2.8	HTE+ 6.0
sleeve	7	28	DRI		1.98	HTS	- 19.6	#1 TSP H
sleeve	27	29	SCC	82%	0.52	HTS	- 8.9	#1 TSP H
sleeve	15	30	DRI		3.66	HTS	- 19.4	#6 TSP H
sleeve	16	31	ADI		1.35	HTS	- 16.1	#1 TSP H
sleeve	17	31	SCC	19%	0.40	HTS	- 4.9	#6 TSP H
			SCC	11%	0.42	HTS	- 5.9	#6 TSP H
			DRI		9.02	HTS	- 19.4	#6 TSP H
			MAI		2.27	HTE	+ 2.7	HTS+ 0.0
sleeve	34	31	MAI		0.58	HTE	+ 1.6	HTE+ 6.0
sleeve	30	32	DRI		4.80	HTS	- 19.5	#6 TSP H
sleeve	34	32	MAI		0.77	HTE	+ 2.2	HTE+ 6.0
sleeve	7	33	SAI		1.12	HTE	+ 2.8	HTE+ 6.0
sleeve	18	34	ADI		5.48	HTS	- 9.1	#6 TSP H
sleeve	21	34	DRI		3.29	HTS	- 19.6	#6 TSP H
sleeve	23	34	SCC	77%	1.81	HTS	- 17.8	#6 TSP H
plug	1	35	DRI		7.27	HTS	- 19.2	#1 TSP H
sleeve	7	35	SAI		1.58	HTE	+ 2.7	HTE+ 6.0
sleeve	17	35	SAI		1.21	HTE	+ 2.2	HTE+ 6.0
sleeve	18	35	ADI		7.36	HTS	- 3.4	#6 TSP H
			ADI		3.99	HTS	- 8.4	#6 TSP H

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	21	37	SCC	82%	7.21	HTS	- 19.5	#6 TSP H
			DRI		7.21	HTS	- 19.5	#6 TSP H
sleeve	28	37	MAI		1.13	HTE	+ 2.9	HTE+ 6.0
sleeve	40	37	MAI		0.61	HTE	+ 2.3	HTE+ 6.0
sleeve	16	38	SCC	57%	0.54	HTS	- 11.4	#6 TSP H
sleeve	24	38	SAI		2.03	HTE	+ 2.8	HTE+ 6.0
sleeve	28	39	SAI		1.28	HTE	+ 3.0	HTE+ 6.0
sleeve	14	40	SAI		1.34	HTE	+ 2.2	HTE+ 6.0
sleeve	17	40	DRI		5.33	HTS	- 19.9	#6 TSP H
sleeve	28	40	SAI		2.42	HTE	+ 2.8	HTE+ 6.0
sleeve	7	41	SAI		0.78	HTE	+ 2.5	HTE+ 6.0
sleeve	8	41	DRI		5.12	HTS	- 19.8	#1 TSP H
sleeve	14	41	SCC	90%	0.38	HTS	- 18.5	#1 TSP H
			SCC		0.32	HTE	+ 3.5	HTS+ 0.0
			SAI		1.89	HTE	+ 2.6	HTS+ 0.0
sleeve	18	41	WAS	47	1.2	HTS	+ 2.1	#1 TSP H
			ODI	47%	1.22	HTS	+ 2.1	#1 TSP H
sleeve	28	41	DRI		4.06	HTS	- 19.6	#6 TSP H
sleeve	30	41	MAI		0.99	HTE	+ 2.8	HTE+ 6.0
sleeve	14	43	SCC	75%	0.70	HTS	- 8.3	#1 TSP H
sleeve	15	44	SCC	91%	0.63	HTS	- 2.4	#6 TSP H
			SCC	88%	0.45	HTS	- 3.4	#6 TSP H
			ADI		0.57	HTS	- 5.2	HTS+ 0.0
			DRI		2.97	HTS	- 19.5	#6 TSP H
sleeve	28	45	SAI		1.25	HTE	+ 2.2	HTE+ 6.0
plug	16	46	SCC	82%	1.13	HTS	- 5.0	#1 TSP H

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
plug	6	47	DRI		6.03	HTS	- 19.4	#1 TSP H
sleeve	13	47	DRI		3.61	HTS	- 19.6	#6 TSP H
sleeve	21	47	DRI		2.98	HTS	- 19.6	#6 TSP H
plug	3	48	ADI		1.67	HTS	- 17.6	#1 TSP H
plug	16	48	SCC	67%	0.48	HTS	- 15.0	#6 TSP H
			ADI		0.78	HTS	- 14.5	HTS+ 0.0
			ADI		0.70	HTE	+ 5.9	HTS+ 0.0
sleeve	20	48	SCC	78%	0.23	HTS	- 7.1	#6 TSP H
			SCC		0.37	HTS	- 7.0	HTS+ 0.0
plug	2	49	ADI		2.81	HTS	- 13.4	#1 TSP H
			ADI		0.30	HTE	+ 5.6	HTS+ 0.0
sleeve	14	49	ADI		5.33	HTS	- 4.5	#6 TSP H
sleeve	19	49	ADI		5.34	HTS	- 4.2	#6 TSP H
			ADI		5.73	HTS	- 15.0	#6 TSP H
sleeve	21	49	DRI		4.10	HTS	- 19.4	#1 TSP H
			MAI		9.09	HTE	+ 2.0	HTE+ 3.0
sleeve	31	49	WAS	12	2.4	HTS	+ 0.6	#1 TSP H
			SAI		2.69	HTE	+ 1.9	HTE+ 6.0
sleeve	24	50	MAI		2.28	HTE	+ 2.2	HTE+ 3.0
			MAI		1.06	HTE	+ 2.9	HTE+ 6.0
sleeve	21	51	SCC	96%	0.51	HTS	- 16.0	#1 TSP H
sleeve	23	51	SAI		1.10	HTE	+ 2.2	HTE+ 3.0
sleeve	30	51	SAI		2.47	HTE	+ 2.3	HTE+ 6.0
plug	17	52	SCC	82%	0.85	HTS	- 17.0	#6 TSP H
			SCC	29%	0.29	HTS	- 12.1	#6 TSP H
			ADI		0.92	HTE	+ 3.3	HTS+ 0.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	Extent Tested
sleeve	23	52	MAI		4.26	HTE + 3.3	HTS+ 0.0
			SCI		16.00	HTE + 2.0	HTE+ 3.0
			SCI		6.02	HTE + 2.5	HTS+ 6.0
plug	45	52	PUL		999.90	#6 TSP H+ 0.4	#6 TSP H
			PUL		999.90	#6 TSP C+ 1.8	#6 TSP C
sleeve	11	54	MAI		2.04	HTE + 2.9	HTE+ 6.0
sleeve	21	55	SAI		1.53	HTE + 2.6	HTS+ 6.0
			SAI		4.36	HTE + 2.2	HTE+ 3.0
			SAI		1.05	HTE + 3.3	HTS+ 0.0
plug	2	56	SCC	89%	0.44	HTS - 18.6	#1 TSP H
sleeve	3	56	DRI		4.23	HTS - 19.2	#1 TSP H
			SAI		2.25	HTE + 2.8	HTE+ 6.0
sleeve	7	56	SAI		3.06	HTE + 3.0	HTE+ 6.0
			DRI		4.19	HTS - 19.5	#1 TSP H
sleeve	9	56	ADI		3.16	HTS - 15.1	#1 TSP H
sleeve	17	56	ADI		0.65	HTE + 6.5	HTS+ 6.0
			ADI		0.76	HTS - 12.1	HTS+ 0.0
sleeve	23	56	SAI		2.97	HTE + 2.2	HTE+ 3.0
sleeve	24	56	DRI		10.90	HTS - 19.3	#1 TSP H
sleeve	18	57	ADI		5.04	HTS - 17.4	#6 TSP H
sleeve	19	57	SCC	88%	0.65	HTS - 18.7	#1 TSP H
sleeve	21	57	DRI		6.85	HTS - 19.5	#6 TSP H
sleeve	28	57	SAI		1.27	HTE + 2.4	HTE+ 6.0
sleeve	27	58	DRI		8.33	HTS - 19.4	#6 TSP H
sleeve	27	59	MAI		2.02	HTE + 2.2	HTE+ 6.0
sleeve	31	59	MAI		1.29	HTE + 2.6	HTE+ 6.0
sleeve	8	60	ADI		3.30	HTS - 17.2	#1 TSP H

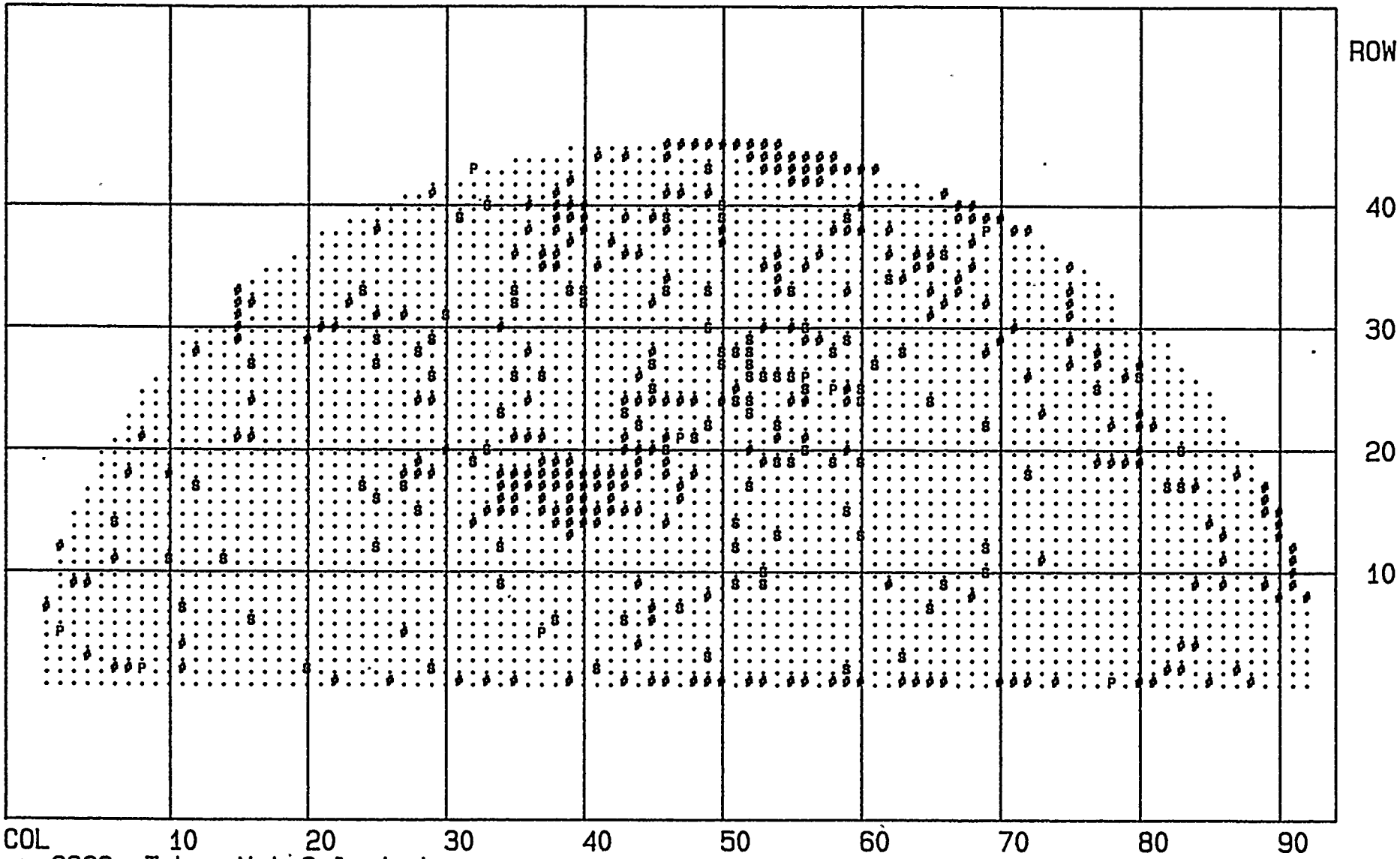
REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	38	61	DRI		3.30	HTS	- 19.5	#6 TSP H
sleeve	27	62	MAI		1.84	HTE	+ 2.1	HTE+ 6.0
sleeve	17	64	ADI		3.62	HTS	- 14.8	#1 TSP H
sleeve	31	64	SAI		1.03	HTE	+ 1.8	HTE+ 6.0
sleeve	8	65	SCC	70%	0.48	HTS	- 18.9	#1 TSP H
			SCC		0.31	HTE	+ 3.5	HTS+ 0.0
plug	2	66	SAI		1.77	HTE	+ 2.6	HTE+ 6.0
sleeve	9	67	WAS	25	3.0	HTS	+ 1.4	#1 TSP H
			WAS	29	4.3	HTS	+ 0.9	#1 TSP H
			WAS	26	2.7	HTS	+ 0.7	#1 TSP H
			SAI		1.17	HTE	+ 2.0	HTE+ 6.0
sleeve	14	67	SAI		1.92	HTE	+ 2.6	HTE+ 6.0
sleeve	27	67	SAI		1.54	HTE	+ 2.0	HTE+ 6.0
sleeve	6	68	SAI		1.57	HTE	+ 1.8	HTE+ 6.0
sleeve	9	69	DRI		7.64	HTS	- 19.2	#6 TSP H
sleeve	9	70	SAI		3.12	HTE	+ 2.0	HTE+ 6.0
sleeve	21	71	ADI		4.20	HTS	- 18.2	#1 TSP H
sleeve	16	72	SAI		1.43	HTE	+ 2.1	HTE+ 6.0
sleeve	17	73	ADI		1.44	HTS	- 18.2	#6 TSP H
sleeve	25	74	SAI		3.75	HTE	+ 1.9	HTE+ 6.0
sleeve	28	74	ADI		2.82	HTS	- 18.7	#6 TSP H
sleeve	30	75	MAI		4.00	HTE	+ 1.8	HTE+ 6.0
sleeve	31	75	SAI		1.80	HTE	+ 2.0	HTE+ 6.0
sleeve	12	77	SCC	76%	1.02	HTS	- 16.2	#1 TSP H

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	27	77	SAI		1.98	HTE	+ 2.0	HTE+ 6.0
sleeve	9	78	MAI		2.13	HTE	+ 1.7	HTE+ 6.0
sleeve	7	82	SCC	76%	0.42	HTS	- 19.1	#1 TSP H
			SAI		3.22	HTE	+ 2.5	HTE+ 6.0
sleeve	13	83	SAI		1.78	HTE	+ 2.0	HTE+ 6.0

NO OF TUBES: 116



.: 2829: Tubes Not Selected
#: 314: Tubes Out of Service
P: 9: Plugged in 1991
S: 108: Sleeved in 1991

Rochester Gas & Electric Corp.
Ginna Nuclear Power Station
S/G - B Hot Leg 04/25/91

Figure 3

ACRI ISIS Tubes

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
plug	5	2	ADI		2.54	HTS	- 17.8	#1 TSP H
sleeve	14	6	ADI		2.38	HTS	- 13.7	#2 TSP H
plug	2	8	SAI		0.51	HTE	+ 4.0	HTS+ 0.0
sleeve	11	10	DRI		4.01	HTS	- 19.3	#1 TSP H
sleeve	7	11	SCC	90%	0.34	HTS	- 18.1	#6 TSP H
			SAI		0.59	HTE	+ 3.2	HTS+ 0.0
sleeve	17	12	MAI		0.69	HTE	+ 2.6	HTE+ 6.0
sleeve	11	14	DRI		4.69	HTS	- 19.5	#1 TSP H
sleeve	6	16	ADI		2.19	HTS	- 17.2	#6 TSP H
sleeve	27	16	SCC	95%	1.50	HTS	- 18.4	#6 TSP H
sleeve	2	20	ADI		2.39	HTS	- 17.6	#6 TSP H
sleeve	17	24	SCC	79%	0.46	HTS	- 14.1	#1 TSP H
			SAI		0.89	HTE	+ 14.4	HTS+ 0.0
			DRI		2.06	HTS	- 19.4	#1 TSP H
			MAI		0.52	HTE	+ 4.3	HTS+ 0.0
			SAI		0.90	HTE	+ 7.2	HTS+ 0.0
sleeve	33	24	SCC	92%	3.15	HTS	- 18.6	#6 TSP H
sleeve	12	25	ADI		1.07	HTE	+ 4.5	HTS+ 0.0
sleeve	16	25	DRI		2.01	HTS	- 19.6	#1 TSP H
sleeve	27	25	SCC	84%	1.02	HTS	- 18.7	#6 TSP H
sleeve	29	25	DRI		1.62	HTS	- 19.2	#1 TSP H
sleeve	17	27	SAI		0.40	HTE	+ 4.3	HTS+ 0.0
sleeve	15	28	ADI		3.03	HTS	- 6.0	#1 TSP H
sleeve	28	28	SCC	70%	0.57	HTS	- 10.3	#6 TSP H
sleeve	2	29	SAI		0.24	HTE	+ 5.8	HTS+ 0.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	26	29	SCC	34%	0.26	HTS	- 14.4	#6 TSP H
			SAI		0.54	HTE	+ 7.4	HTS+ 0.0
sleeve	29	29	SCC	60%	0.55	HTS	- 18.4	#1 TSP H
			DRI		4.76	HTS	- 19.1	#1 TSP H
sleeve	31	30	SAI		1.35	HTE	+ 2.7	HTE+ 6.0
sleeve	39	31	SCC	79%	1.87	HTS	- 18.4	#1 TSP H
sleeve	19	32	SCC	86%	2.61	HTS	- 19.2	#6 TSP H
			SCC	54%	0.60	HTS	- 11.9	#6 TSP H
			SCC	58%	0.38	HTS	- 14.6	#6 TSP H
plug	43	32	CCI		0.11	HTE	+ 3.0	HTE+ 3.5
sleeve	20	33	SAI		0.23	HTS	- 11.5	HTS+ 0.0
sleeve	40	33	SCC	98%	1.69	HTS	- 19.0	#6 TSP H
sleeve	9	34	ADI		5.65	HTS	- 15.0	#1 TSP H
sleeve	12	34	SCC	70%	0.36	HTS	- 7.0	#1 TSP H
			MAI		0.62	HTS	- 5.3	HTS+ 0.0
sleeve	23	34	ADI		2.00	HTS	- 5.3	#1 TSP H
sleeve	26	35	SCC	54%	0.21	HTS	- 17.8	#6 TSP H
			SAI		0.44	HTE	+ 4.3	HTS+ 0.0
sleeve	32	35	MAI		0.39	HTE	+ 3.0	HTS+ 0.0
sleeve	33	35	SCC	65%	0.44	HTS	- 18.3	#6 TSP H
			SAI		0.76	HTE	+ 3.1	HTS+ 0.0
plug	5	37	OBS	500mil		HTE	+ 17.0	HTE+17.0
sleeve	26	37	MAI		0.98	HTE	+ 2.4	HTE+ 6.0
sleeve	6	38	SCC	48%	0.26	HTS	- 17.7	#6 TSP H
sleeve	33	39	SCC	48%	0.34	HTS	- 15.3	#6 TSP H
			SAI		0.70	HTE	+ 5.1	HTS+ 0.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	32	40	SCC	60%	0.42	HTS	- 6.2	#1 TSP H
			SAI		0.57	HTS	- 8.8	HTS+ 0.0
sleeve	33	40	SCC	42%	0.32	HTS	- 18.9	#6 TSP H
			SAI		0.84	HTE	+ 2.8	HTS+ 0.0
sleeve	2	41	ADI		3.80	HTS	- 14.8	#1 TSP H
sleeve	6	43	SCC	73%	0.34	HTS	- 18.9	#6 TSP H
			SCC	86%	1.00	HTS	- 17.0	#6 TSP H
			SCC	68%	0.35	HTS	- 16.1	#6 TSP H
sleeve	23	43	ADI		1.95	HTS	- 5.7	#1 TSP H
			ADI		3.40	HTS	- 16.2	#1 TSP H
sleeve	22	44	SAI		0.46	HTS	- 6.2	HTS+ 0.0
sleeve	25	45	SCC	79%	0.34	HTS	- 18.1	#1 TSP H
			SCC	62%	0.35	HTS	- 8.2	#1 TSP H
			SAI		0.75	HTS	- 6.6	HTS+ 0.0
sleeve	27	45	SCC	57%	0.96	HTS	- 6.9	#6 TSP H
			SCC	69%	0.66	HTS	- 7.9	#6 TSP H
			SCC	70%	0.50	HTS	- 8.3	#6 TSP H
sleeve	20	46	SCC	72%	1.63	HTS	- 7.2	#6 TSP H
sleeve	33	46	SAI		0.15	HTS	- 13.0	HTS+ 0.0
sleeve	39	46	ADI		5.07	HTE	+ 5.6	HTS+ 0.0
sleeve	7	47	MAI		0.40	HTE	+ 4.5	HTS+ 0.0
plug	21	47	CCI		0.24	HTE	+ 1.5	HTE+ 1.5
sleeve	21	48	SCC	67%	0.46	HTS	- 5.7	#6 TSP H
sleeve	3	49	SAI		0.43	HTS	- 6.0	HTS+ 0.0
			SAI		1.66	HTE	+ 3.2	HTS+ 0.0
			SAI		0.40	HTS	- 1.7	HTS+ 0.0
sleeve	22	49	SCC	60%	0.29	HTS	- 17.8	#1 TSP H
			SAI		0.38	HTS	- 18.0	HTS+ 0.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
sleeve	30	49	SCC	74%	0.18	HTS	- 16.8	#1 TSP H
			SAI		1.49	HTE	+ 4.6	HTS+ 0.0
sleeve	33	49	ADI		2.52	HTS	- 16.0	#1 TSP H
sleeve	43	49	SCC	90%	1.61	HTS	- 18.4	#1 TSP H
sleeve	27	50	ADI		2.77	HTS	- 16.4	#1 TSP H
sleeve	28	50	SCC	43%	0.64	HTS	- 6.2	#1 TSP H
			SCC	39%	0.96	HTS	- 18.4	#6 TSP H
sleeve	39	50	SCC	83%	0.90	HTS	- 18.3	#1 TSP H
sleeve	40	50	SCC	98%	0.94	HTS	- 18.2	#1 TSP H
sleeve	9	51	MAI		0.33	HTE	+ 5.1	HTS+ 0.0
sleeve	12	51	SAI		0.49	HTE	+ 3.3	HTS+ 0.0
			SAI		1.39	HTE	+ 6.1	HTS+ 0.0
sleeve	14	51	MAI		0.33	HTS	- 14.9	HTS+ 0.0
sleeve	24	51	SCC	76%	1.01	HTS	- 18.4	#6 TSP H
			SCC	76%	0.77	HTS	- 8.1	#6 TSP H
sleeve	28	51	SCC	74%	19.56	HTS	- 11.0	#6 TSP H
			ADI		4.18	HTS	- 17.0	#6 TSP H
sleeve	17	52	MAI		0.63	HTE	+ 2.5	HTE+ 6.0
sleeve	23	52	SAI		0.37	HTE	+ 4.2	HTE+ 6.0
			ADI		1.74	HTS	- 18.1	#1 TSP H
sleeve	24	52	SCC	43%	0.90	HTS	- 15.7	#6 TSP H
			SCC	68%	1.26	HTS	- 14.2	#6 TSP H
sleeve	26	52	SCC	77%	3.19	HTS	- 18.2	#6 TSP H
			DRI		3.97	HTS	- 19.5	#6 TSP H
sleeve	27	52	MAI		0.58	HTE	+ 4.8	HTE+ 6.0
			ADI		2.78	HTS	- 16.0	#1 TSP H
sleeve	28	52	MAI		0.39	HTE	+ 4.1	HTE+ 6.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
			ADI		1.91	HTS	- 15.3	#1 TSP H
sleeve	29	52	SCC	78%	0.98	HTS	- 19.1	#6 TSP H
sleeve	9	53	ADI		1.70	HTS	- 16.7	#1 TSP H
sleeve	10	53	SCC	47%	0.34	HTS	- 17.2	#6 TSP H
			SAI		0.49	HTE	+ 4.0	HTS+ 0.0
sleeve	26	53	SCC	58%	1.88	HTS	- 14.7	#6 TSP H
			DRI		18.83	HTS	- 19.5	#6 TSP H
sleeve	13	54	SAI		1.03	HTE	+ 3.8	HTS+ 0.0
			MAI		0.80	HTE	+ 2.8	HTS+ 0.0
sleeve	19	54	SAI		0.96	HTS	- 4.4	HTS+ 0.0
sleeve	22	54	DRI		1.20	HTS	- 19.7	#1 TSP H
			SAI		0.96	HTE	+ 3.3	HTE+ 6.0
sleeve	26	54	DRI		2.95	HTS	- 19.6	#6 TSP H
sleeve	19	55	SCC	75%	0.69	HTS	- 5.6	#6 TSP H
			SCC	66%	0.61	HTS	- 10.5	#6 TSP H
sleeve	26	55	SCC	64%	0.53	HTS	- 6.7	#6 TSP H
			SCC	45%	0.48	HTS	- 14.6	#6 TSP H
			SAI		0.38	HTE	+ 7.9	HTE+ 6.0
			SAI		1.35	HTE	+ 2.9	HTE+ 6.0
			DRI		6.76	HTS	- 19.6	#6 TSP H
sleeve	33	55	SCC	46%	2.41	HTS	- 18.6	#1 TSP H
sleeve	20	56	SCC	58%	0.68	HTS	- 8.0	#6 TSP H
sleeve	25	56	MAI		0.80	HTE	+ 3.9	HTS+ 0.0
			MAI		1.49	HTE	+ 2.7	HTS+ 0.0
			SCI		1.25	HTE	+ 2.4	HTE+ 6.0
			MAI		0.74	HTE	+ 4.6	HTE+ 6.0
			SCI		1.92	HTE	+ 1.8	HTS+ 0.0
plug	26	56	SCC	68%	2.37	HTS	- 12.5	#6 TSP H
			SAI		0.96	HTE	+ 2.5	HTE+ 6.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location		Extent Tested
			MAI		0.87	HTE	+ 5.7	HTE+ 6.0
sleeve	30	56	DRI		15.45	HTS	- 19.4	#6 TSP H
sleeve	19	58	SCC	67%	0.50	HTS	- 14.3	#6 TSP H
plug	25	58	SCC	69%	0.38	HTS	- 5.2	#1 TSP H
			SAI		0.57	HTE	+ 2.2	HTS+ 0.0
			SAI		1.22	HTS	- 5.4	HTS+ 0.0
sleeve	28	58	ADI		3.35	HTS	- 16.5	#1 TSP H
sleeve	2	59	ADI		1.32	HTS	- 17.3	#1 TSP H
sleeve	15	59	SCC	96%	0.63	HTS	- 15.5	#1 TSP H
sleeve	29	59	MAI		1.23	HTE	+ 2.3	HTE+ 6.0
sleeve	39	59	SCC	82%	0.82	HTS	- 18.2	#1 TSP H
sleeve	13	60	SCC	51%	0.29	HTS	- 15.5	#1 TSP H
			SCC	60%	0.41	HTS	- 16.2	#1 TSP H
			SAI		0.44	HTE	+ 5.5	HTS+ 0.0
sleeve	19	60	SCC	25%	0.28	HTS	- 18.2	#6 TSP H
			ADI		3.63	HTS	- 7.4	#6 TSP H
			SAI		0.82	HTE	+ 2.3	HTS+ 0.0
sleeve	24	60	SAI		0.79	HTE	+ 7.2	HTE+ 6.0
sleeve	25	60	SCC	96%	0.35	HTS	- 4.7	#1 TSP H
			SAI		0.43	HTS	- 5.1	HTS+ 0.0
			SAI		0.47	HTS	- 7.0	HTS+ 0.0
sleeve	27	61	MAI		0.37	HTS	- 7.5	HTS+ 0.0
sleeve	34	62	ADI		1.17	HTS	- 18.4	#6 TSP H
sleeve	3	63	SCC	78%	0.48	HTS	- 16.3	#1 TSP H
			SAI		0.58	HTE	+ 4.5	HTS+ 0.0
sleeve	28	63	SCC	81%	0.41	HTS	- 9.8	#1 TSP H
			SAI		0.36	HTS	- 9.9	HTS+ 0.0

REPAIRABLE INDICATIONS

Repair Type	Row	Col	Ind. Desc.	%TWD	Volts	Indication Location	Extent Tested
sleeve	7	65	ADI		3.84	HTS - 16.9	#1 TSP H
sleeve	24	65	SAI		0.57	HTE + 3.2	HTS+ 0.0
sleeve	9	66	DRI		2.30	HTS - 19.4	#1 TSP H
sleeve	36	66	SCC	97%	0.74	HTS - 17.9	#1 TSP H
sleeve	10	69	SCC	47%	0.42	HTS - 19.2	#1 TSP H
			SAI		0.80	HTE + 3.2	HTS+ 0.0
sleeve	12	69	ADI		3.18	HTS - 17.1	#1 TSP H
sleeve	22	69	DRI		1.37	HTS - 19.1	#6 TSP H
plug	38	69	SCC	53%	0.61	HTS - 18.1	#6 TSP H
sleeve	18	72	SAI		0.64	HTE + 2.9	HTS+ 0.0
sleeve	25	77	MAI		3.89	HTE + 2.7	HTE+ 6.0
plug	1	78	SAI		0.87	HTE + 2.5	HTE+ 6.0
sleeve	26	80	SAI		2.51	HTE + 2.1	HTE+ 6.0
sleeve	17	82	SAI		1.83	HTE + 2.4	HTE+ 6.0
sleeve	17	83	SAI		7.67	HTE + 2.3	HTS+ 0.0
sleeve	20	83	SCC	99%	0.62	HTS - 18.9	#1 TSP H

NO OF TUBES: 117

GINNA
STEAM GENERATOR TUBE INSPECTION
AND CORRECTIVE ACTION HISTORY

DATE	NO. TUBES INSPECTED A HOT	A COLD	B HOT	B COLD	TOTAL TUBES REQUIRING CORRECTIVE ACTION A	B	TYPE OF DEGRADATION	>40% REQUIRED REPAIRS A	B	NO. TUBES PLUGGED A	B	NO. TUBES SLEEVED A	B	NO.PLUGGED RETURNED TO SERVICE WITH SLV A	B	NO.PLUGGED RETURNED TO SERVICE WITHOUT SLV A	B	NO. SLEEVES PLUGGED A	B	NO. PULLED TUBES A	B	TOTAL PLUGGED A	B	TOTAL SLEEVED A	B	COMMENT
IN FACTORY					1	0		1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
APR 1972	1050				0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MAR 1974	3259	516	1098	516	19	0	WASTAGE	19	0	19	0	0	0	0	0	0	0	0	0	2	0	19	0	0	0	
NOV 1974	1701	430	672	39	2	0	WASTAGE	2	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	
MAR 1975	2174	442	1931	442	46	11	CRACKING/WASTAGE	46	11	46	11	0	0	0	0	0	0	0	0	2	0	46	11	0	0	
JAN 1976	0	0	53	0	0	2	WASTAGE	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
FEB 1976	3192	3192	3247	3247	39	2	WASTAGE	39	2	39	2	0	0	0	0	0	0	0	0	0	0	39	2	0	0	
APR 1976	100	0	1025	75	0	15	CRACKING	0	15	0	15	0	0	0	0	0	0	0	0	0	0	0	15	0	0	
APR 1977	2003	268	1525	268	13	2	WASTAGE	13	1	13	1	0	0	0	0	0	0	0	0	0	0	13	1	0	0	
JUL 1977			300		0	6	ID CRACKING	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	5	0	0	
JAN 1978					0	8	CRACKING/WASTAGE	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	8	0	0	
APR 1978	2049	325	1714	375	1	15	ID CRACKING	1	15	1	15	0	0	0	0	0	0	0	0	0	1	1	15	0	0	
FEB 1979	2049	325	1714	375	0	6	CRACKING/WAS/IGA	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	6	0	0	
DEC 1979					0	13	IGA/WASTAGE	0	13	0	13	0	0	0	0	0	0	0	0	0	0	0	13	0	0	
APR 1980	3139	325	3182	375	1	31	"A"PITTING/"B"IGA	1	13	1	34	0	0	0	0	0	0	0	0	0	3	1	34	0	0	1
NOV 1980	3138	325	3151	375	0	0	IGA	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5	2
MAY 1981	3138	325	3141	400	0	4	IGA/WASTAGE	0	6	0	4	0	16	0	0	0	0	0	0	0	3	0	4	0	16	3
FEB 1982	3137	526	3140	526	0	18	IGA/MECH.DAM	0	16	0	18	0	0	0	0	0	0	0	0	0	1	0	18	0	0	4
SEP 1982	3138	382	3129	893	1	33	IGA	1	28	1	33	0	0	0	0	0	0	0	0	0	0	1	33	0	0	
APR 1983	3137	633	3096	832	4	4	IGA/SCC	0	23	0	3	4	74	0	0	0	0	0	1	0	1	0	4	4	73	5
MAR 1984	3137	717	3093	963	1	1	IGA/SCC	0	5	1	1	0	9	0	0	0	0	0	1	0	0	1	2	0	8	
MAR 1985	3135	3135	3087	3087	3	4	IGA/SCC/WASTAGE	3	70	2	4	2	67	0	0	0	0	0	0	0	0	2	4	2	67	6
FEB 1986	3134	623	3083	770	6	27	IGA/SCC/WASTAGE	2	49	0	27	6	30	0	3	0	0	0	0	0	0	0	24	6	33	7
FEB 1987	3128	0	2884	0	34	73	IGA/SCC	17	78	10	72	24	80	0	0	0	0	0	3	0	0	10	75	24	77	8
FEB 1988	3122	1517	2723	1301	7	41	IGA/SCC	4	18	14	58	0	0	0	0	0	0	1	1	0	0	15	59	-1	-1	9
MAR 1988	0	0	208	0	0	9	IGA/SCC	0	6	0	8	0	0	0	0	0	0	0	1	0	0	0	9	0	-1	10
MAR 1989	3128	1668	2805	1486	177	445	IGA/SCC/PWSCC/WAS	21	142	36	73	132	306	9	64	8	18	4	5	0	0	22	-4	137	365	11
MAR 1990	2949	663	2437	653	75	211	IGA/SCC/PWSCC/WAS	18	70	22	20	56	163	0	28	0	0	5	1	2	0	24	-8	51	190	12
APR 1991	2945	1093	2359	1092	116	117	IGA/SCC/PWSCC/WAS	16	35	14	9	80	93	22	15	0	0	1	2	1	0	-7	-6	101	106	13
					546	1098				222	442	304	843	31	110	8	18	11	15	7	9	190	326	324	938	

K. J. Wachter
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Rev. 0

TABLE 5

STEAM GENERATOR
TUBE INSPECTION AND CORRECTIVE ACTION HISTORY
COMMENTS
(FROM TABLE 5)

(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 only 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 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 and 3 preventatively. Pulled Hot Leg tubes R21 C46 with a 100 kHz ECT indication, R7 C45 and R28 C 45 which were clean tubes.

(4) Recovery from the January 25, 1982 Tube Rupture Event including 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

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

27	tubes were sleeved with 27" CE 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.

(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 27" CE welded sleeve

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 27" CE welded sleeves
1	CE welded sleeve (installed in 1987) was plugged with a CE welded sleeve plug due to rejection of 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 the 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 as "leak limiting" due to the marginal acceptance of the upper welds.

(9) In the "A" steam generator, 15 tubes were plugged as follows:

7	tubes had tubesheet crevice indications
7	tubes for no confirmed AVB support
1	CE sleeve for unverified upper expansion

In "B" steam generator, 61 tubes were plugged as follows:

39	tubes had tubesheet crevice indications
2	tubes were missplugged in the hot leg during 1987 outage
8	tubes to box existing plugs were AVB support could not be verified.
10	tubes for no confirmed AVB support
1	tube for flow peaking consideration due to AVB placement
8	Westinghouse Explosive Plugs were removed and replaced with welded "Top Hat" Plugs

(10) The "B" steam generator had 9 tubes plugged for the following reasons:

6	tubes had tubesheet crevice indications identified by a review of the February data. These were removed from service with CE mechanical plugs.
2	tubes had signal changes from February to March. The tubes were removed from service with CE mechanical plugs.
1	B&W tubesheet sleeve identified by the hydrostatic pressure test was removed from service with a B&W explosive plug in the hot leg and a CE mechanical in the cold leg.

(11) A total of 177 tubes in "A" steam generator were repaired in 1989 as follows:

137	CE 27" welded sleeves (straight and periphery)
40	Tube and/or sleeve plugs
2	Previously plugged tubes stabilized (not counted as repaired)

A total of 445 tubes were repaired in "B" steam generator were repaired as follows:

367	CE 27" welded sleeves (straight and periphery)
78	Tubes and/or sleeve plugs
1	Previously plugged tube stabilized (not counted as repaired)

(12) A total of 75 tubes in "A" steam generator were repaired in 1990 as follows:

51	CE 27" welded sleeves (straight and periphery)
24	Tube and/or sleeve plugs (includes pulled tubes R25-C63 and R31-C66)

A total of 211 tubes were repaired in "B" steam generator were repaired as follows:

191	CE 27" welded sleeves (straight and periphery) including 28 deplugged tubes
20	Tubes and/or sleeve plugs (includes B&W tubesheet sleeve noted during hydro)

(13) A total of 116 tubes, including 24 deplugged tubes, in "A" steam generator were repaired in 1991 as follows:

61	CE 27" welded sleeves (straight and periphery)
41	CE 30" welded sleeves (straight)
14	Tube and/or sleeve plugs (includes pulled tube R45-C52 and deplugged tubes R17-C52 and R16-C48)

A total of 117 tubes, including 16 deplugged tubes, in "B" steam generator were repaired as follows:

80	CE 27" welded sleeves (straight and periphery)
28	CE 30" welded sleeves (straight)
9	Tube and/or sleeve plugs (includes sleeved tube R5-C37, deplugged tube R26-C56 and 2 B&W Explosive plug repairs)