

**ROCHESTER GAS AND ELECTRIC CORPORATION**

**89 East Avenue, Rochester, NY 14649**

**MATERIALS ENGINEERING AND INSPECTION SERVICES**

**SUMMARY EXAMINATION REPORT**

**FOR THE**

**1993 STEAM GENERATOR EDDY CURRENT INSPECTION**

**AT**

**R. E. GINNA NUCLEAR POWER STATION**

**REVISION 0**

**13 April 1993**

**PREPARED BY:**

*Michael J. Davison*

Michael J. Davison  
Engineering Assistant - NDE  
Materials Engineering and  
Inspection Services

**DATE:**

*4/13/93*

**REVIEWED BY:**

*Gerald W. Geiken*

Gerald W. Geiken  
Supervisor  
Materials Engineering and  
Inspection Services

**DATE:**

*4/14/93*

**APPROVED BY:**

*Michael J. Saporito*

Michael J. Saporito  
Manager  
Materials Engineering and  
Inspection Services

**DATE:**

*4/15/93*

9304260281 930419  
PDR ADDCK 05000244  
Q PDR

## TABLE OF CONTENTS

1.0	<u>INTRODUCTION</u>	1
2.0	<u>DATA ACQUISITION PROGRAM</u>	6
3.0	<u>DATA ANALYSIS RESULTS SUMMARY</u>	11
4.0	<u>OBSERVATIONS</u>	45
5.0	<u>CORRECTIVE ACTION</u>	50
Figure 1		5
Figure 2		52
Figure 3		59
Table 1		9
Table 2-A		14
Table 2-B		31
Table 3		46
Table 4-A		53
Table 4-B		60
Table 5		68



## **1.0 INTRODUCTION**

The following is a summary report of the results of the multifrequency eddy current examination performed during the 1993 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 Mill 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 1992 examination. Particular attention was given to the detection of:

- 1) Intergranular attack (IGA) and intergranular stress corrosion cracking (IGSCC) within the inlet tubesheet crevice region.
- 2) Intergranular attack (IGA) and intergranular 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 tube support intersections.
- 8) Primary water stress corrosion cracking (PWSCC) in the Row 1 and Row 2 U-bend area (none detected).
- 9) Intergranular attack (IGA) and intergranular stress corrosion cracking (IGSCC) at hot leg support plate intersections (none detected).
- 10) Stress corrosion cracking (SCC) at the tube support plate regions 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. All examination activities were performed in accordance with MEIS NDE-500-series procedures. 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 EDDYNET Data Analysis System. The results of these two analyses were compared for discrepancies using the EDDYNET compare program. 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 resolvers.

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

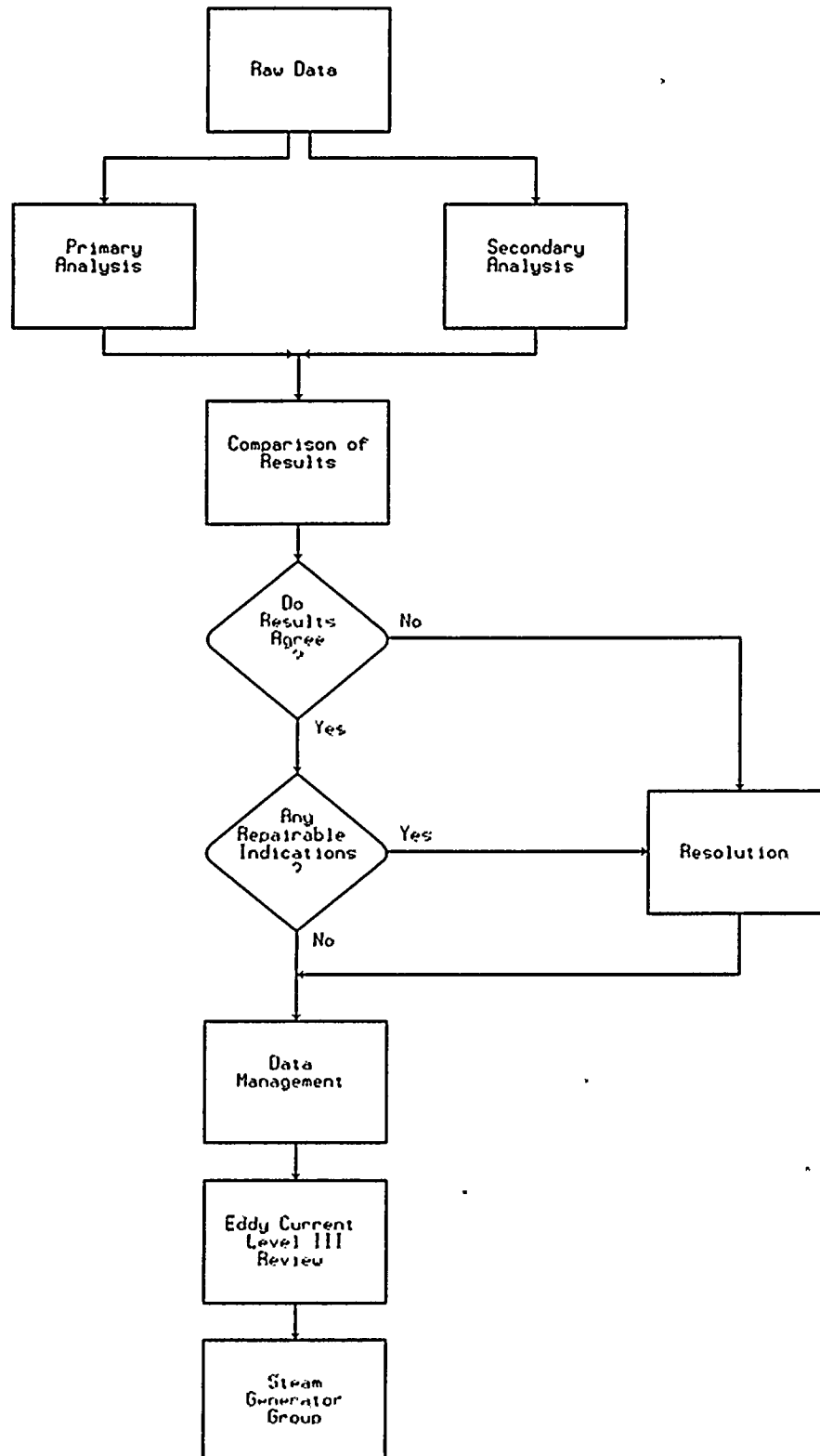
- o Any tube reported as restricted by one team but not the other (may have been missed or improperly entered by one analysis team).
- o Any tube for which a retest was requested by one team but not the other.
- o All Roll Transition Indications reported by one team but not the other.

In addition to the above, all tubes requiring repair whether reported by one or both teams were reviewed by the resolvers. In all cases, the removal of a repairable indication from the data base received the concurrence of two Resolution personnel.





## Typical Data Flow Chart



**Figure 1**



## **2.0 DATA ACQUISITION PROGRAM**

The initial eddy current examination of the "A" and "B" steam generators was performed utilizing a standard bobbin coil technique with data acquisition being performed with the EDDYNET Acquisition System. The frequencies selected were 400, 200, 100 and 25 kHz. The examination was performed primarily through the 1st tube support through the tubesheet region to examine open crevice, roll transition regions, and the area between the top of the inlet tubesheet to the 1st tube support plate. 20% of all open tubes were also examined throughout the full length of tubing.

Additional eddy current examinations of the "A" and "B" steam generators were performed utilizing the Zetec 3-coil Motorized Rotating Pancake Coil (MRPC) probe to examine the roll transition region, selected crevices and support plates. The frequencies used for these examinations were 400, 300, 100, and 25 kHz. All row 1 and 2 U-bends were also examined with MRPC.

During the 1992 eddy current examination, the full crevice region was evaluated utilizing the Motorized Rotating Pancake Coil (MRPC) technique with subsequent bobbin examinations being performed in all tubes identified

by MRPC as having repairable indications in B S/G/ Evaluations of the bobbin data indicated that the bobbin technique is capable of detecting all crevice indications detected by MRPC except those located at or in close proximity to the roll transition. As a results of these bobbin evaluations and discussion with Mssrs. Emmett Murphy and Al Johnson of the U. S. Nuclear Regulatory Commission on October 28, 1992, RG&E concluded that standard bobbin examination of the crevice region with ensuing substantiation by MRPC and a 100% MRPC examination of the roll transition region in 1993 would provide repairable indication detection capability comparable to the 100% crevice MRPC examination employed in 1992.

Prior to the 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 through the first tube support plate, 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) with the bobbin coil. In addition, 20% of each type of sleeve was examined and the remaining tube examined full length. All Row 1 and Row 2 U-Bend regions were examined with the Motorized Rotating Pancake Coil (MRPC) between 06H and 06C 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 the extent examined.

STEAM GENERATOR "A"  
1993 EDDY CURRENT INSPECTION EXTENTS  
PRIOR TO CORRECTIVE ACTION

Total Tubes	3260
Out of Service	185
Sleeved Tubes	<u>555</u>
Open Unsleeved Tubes	2520

	<u>REQ'D MIN<sup>1</sup></u>	<u>NUMBER PROGM'D</u>	<u>NUMBER INSPT'D</u>	<u>PERCENT COMPLETE<sup>2</sup></u>
Hot Leg to 1st TSP	2520	2520	2520	100.0%
Full Length (20% Random)	696	696	696	100.0%
Roll Transition MRPC	2520	2520	2520	100.0%
U-Bend MRPC (Rows 1 & 2)	165	165	165	100.0%
Previous Ind. $\geq$ 20%	81	81	81	100.0%
Sleeves	117	117	117	100.0%
Deplugged Tubes (F/L)	0	0	0	0.0%

Table 1

---

<sup>1</sup> Per Appendix B requirement.

<sup>2</sup> % Complete = Tubes Inspected/Required Minimum.

**STEAM GENERATOR "B"**  
**1993 EDDY CURRENT INSPECTION EXTENTS**  
**PRIOR TO CORRECTIVE ACTION**

Total Tubes	3260
Out of Service	313
Sleeved Tubes	<u>1134</u>
Open Unsleeved Tubes	1813

	<u>REQ'D MIN<sup>1</sup></u>	<u>NUMBER PROGM'D</u>	<u>NUMBER INSPT'D</u>	<u>PERCENT COMPLETE<sup>2</sup></u>
Hot Leg to 1st TSP	1813	1813	1813	100.0%
Full Length (20% Random)	416	416	416	100.0%
Roll Transition MRPC	1813	1813	1813	100.0%
U-Bend MRPC (Rows 1 & 2)	144	144	144	100.0%
Previous Ind. $\geq$ 20%	27	27	27	100.0%
Sleeves	232	232	232	100.0%
Deplugged Tubes (F/L)	48	48	48	100.0%

Table 1 (Cont'd)

---

<sup>1</sup> Per Appendix B requirement.

<sup>2</sup> % Complete = Tubes Inspected/Required Minimum.

### 3.0 DATA ANALYSIS RESULTS SUMMARY

The data analysis was performed using the Zetec EDDYNET System (Version 20).

For the MRPC examinations, all data was reviewed by displaying the 400 kHz or 300 kHz pancake coil data on the CRT along with the vertical component of the pancake and axial sensitive coils in strip chart form. Other frequencies and coils were selected as necessary for the evaluation of indications. No depth sizing was performed with the MRPC data. Any tube containing a flaw detected by the MRPC examination was repaired.

For the bobbin coil examination, 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 optical disk. The final report form summarizing all indications  $\geq 20\%$  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.
VOLTS -	Amplitude of the measured indication signal response.
IND.DESC.-	Type of damage mechanism.
% TWD -	Percent through wall depth or code for non-measurable indications.
INDICATION LOCATION -	Reference point from which the indication was measured along with axial distance from that reference point.

### Information Under IND. DESC.

ADI -	Absolute Drift Indication Signal which is indicative of IGA.
ADS -	Absolute Drift Signal which may be indicative of IGA.
CRI -	Circumferential Roll Transition Indication
CCI -	Circumferential Indication not at the Roll Transition (B&W Plugs)
DPT -	De-Plugged Tube
DRT -	Distorted Roll Transition may be indicative of PWSCC.
DRI -	Distorted Roll Indication indicative of PWSCC.
MAI -	Multiple Axial Indication - MRPC identified or verified crevice indication(s).
MRI -	Multiple Roll Indication - MRPC identified or verified axial roll transition indication(s).
NQI -	Non-Quantifiable Indication - Differential signal indicative of SCC
NQS -	Non-Quantifiable Indication - Differential signal which may be indicative of SCC.
PTF -	Parent Tube Flaw
SAI -	Single Axial Indication - MRPC identified or verified crevice indication.
SCC -	Stress Corrosion Cracking
SRI -	Single Roll Indication - MRPC identified or verified axial roll transition indication.

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

Information Under % TWD

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

Information Under INDICATION LOCATION

TEH - Hot Leg Tube End (Bottom).

TSH - Top of inlet tubesheet.

TSP - Tube Support Plate

TEC - Cold Leg Tube End (Bottom).

TSC - 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 primary or secondary face of the tubesheet or support plates where the indication is located.

0XH - Tube Support Plate Location Hot Leg 1-6

0XC - Tube Support Plate Location Cold Leg 1-6



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
6	2	0.6	ADS		TEH +20.9
4	3	1.7	SRI		TEH +2.1
6	3	0.7	SRI		TEH +1.9
13	3	1.6	ADS		TEH +10.4 to +14.2
7	4	1.2	MRI		TEH +2.2
11	4	0.4	ADS		TEH +5.8
13	4	0.7	ADS		TEH +9.8
2	5	2.1	SRI		TEH +2.3
		1.5	SRI		TEH +2.5
		0.6	ADS		TEH +14.6
3	5	10.9	SBI		TEH +0.1
		3.7	SBI		TEH +0.4
15	5	1.6	ADS		TEH +7.4
17	6	1.6	ADS		TEH +11.9
21	6	0.8	ADS		TEH +2.9
15	7	0.6	ADS		TEH +4.3
6	8	2.3	MRI		TEH +1.7
2	9	2.7	SRI		TEH +1.7
6	9	2.5	SRI		TEH +1.7
12	10	0.8	MRI		TEH +2.5
5	11	2.9	MRI		TEH +2.4
3	12	1.8	SRI		TEH +2.4
16	12	0.3		21	TSH +1.3
26	14	5.3	MRI		TEH +2.2
2	16	0.7	SAI		TEH +3.3

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
10	16	0.8		93	TEH +2.8
		0.9	MAI		TEH +3.2
		0.3		93	TEH +8.8
19	16	4.4	SRI		TEH +3.0
9	17	2.3	SRI		TEH +2.3
		0.7		20	TSH +1.6
12	17	0.7	SAI		TEH +3.3
21	17	0.5	SAI		TEH +2.6 to +3.5
25	17	0.8	SAI		TEH +3.9
10	18	0.4		80	TEH +7.2
		1.6	MAI		TEH +8.7
		4.2	ADS		TEH +14.6
29	18	3.6	SRI		TEH +2.1
4	19	0.9		20	TSH +0.8
13	19	1.2		32	TSH +0.8
14	19	1.7	SAI		TEH +5.0
		3.0	ADS		TEH +6.7
16	19	0.9	SAI		TEH +3.3
24	19	3.0	SRI		TEH +2.3
33	19	7.2	MBS		TEH +0.8
7	20	2.6		25	TSH +2.3
11	20	1.2		23	TSH +2.0
12	20	0.5	NQI		TEH +3.2
14	20	1.8	ADS		TEH +6.4
15	20	0.8	SAI		TEH +2.8

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
1	21	25.5	SBI		TEH	+0.3
		10.6	SBI		TEH	+0.3
		3.8	SRI		TEH	+2.7
4	21	1.8	ADS		TEH	+6.8
8	21	5.7		23	TSH	+2.0
10	21	3.0		39	TSH	+2.0
11	21	8.9		27	TSH	+2.2
13	21	5.4		22	TSH	+2.1
14	21	4.1	ADI		TEH	+4.6
		3.3	ADI		TEH	+10.7
		4.3		24	TSH	+1.6
15	21	6.6		29	TSH	+1.3
16	21	5.5		25	TSH	+1.1
17	21	2.6	CRI		TEH	+1.8
		5.1		32	TSH	+0.9
22	21	1.8	CRI		TEH	+2.3
		0.8	CRI		TEH	+2.3
		0.6	MAI		TEH	+5.0
		1.2	ADS		TEH	+8.4
		0.8	SAI		TEH	+8.6
		1.3	ADS		TEH	+9.6
24	21	0.9	SAI		TEH	+4.1
		0.3	NQS		TEH	+4.3
38	21	2.4		26	AV3	+0.0
3	22	1.4	ADS		TEH	+18.1
10	22	1.8		24	TSH	+3.0
11	22	5.0		26	TSH	+2.5
12	22	6.2		25	TSH	+2.2
14	22	8.6		24	TSH	+2.6
15	22	5.0		23	TSH	+1.8

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
16	22	6.3		22	TSH	+1.5
17	22	1.6	CRI		TEH	+2.2
		7.2		22	TSH	+1.5
18	22	1.4	SAI		TEH	+2.7
		1.7	SAI		TEH	+3.8
		2.2	ADI		TEH	+6.4
		5.7		28	TSH	+1.0
23	22	3.0		28	TSH	+0.5
25	22	0.9	ADS		TEH	+9.2
10	23	6.3		20	TSH	+2.3
13	23	16.4		32	TSH	+3.0
28	23	2.7	ADS		TEH	+3.8
10	24	2.6		21	TSH	+1.8
11	24	5.2		22	TSH	+2.0
		2.4		21	TSH	+2.4
12	24	7.6		21	TSH	+2.7
13	24	10.2		27	TSH	+2.7
26	24	2.5		20	TSH	+0.9
39	24	2.5	SRI		TEH	+2.9
12	25	7.2		24	TSH	+2.0
13	25	0.3	NQS		TEH	+8.3
		9.2		29	TSH	+2.3
14	25	14.6		34	TSH	+2.5
17	25	11.2		29	TSH	+2.2
39	25	5.7	MRI		TEH	+2.8
9	26	2.8	SRI		TEH	+2.7

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
24	26	1.4 1.9	ADS	32	TEH +7.1 TSH +1.2
17	27	6.6 6.1		20 25	TSH +2.3 TSH +2.9
25	27	0.5 4.1	MAI ADS		TEH +3.9 TEH +4.7
6	28	0.4 0.4	SAI SAI		TEH +4.1 TEH +4.6
13	28	0.8	SRI		TEH +2.6
23	28	6.5 1.7		29 21	TSH +2.3 TSC +2.3
24	28	8.1		25	TSH +1.1
26	28	0.4	SAI		TEH +3.9
34	28	0.3	SRI		TEH +2.5
12	29	1.0	ADS		TEH +7.9
14	29	5.5	ADS		TEH +3.4
15	29	5.9		23	TSH +3.0
6	30	1.8	ADS		TEH +17.1
12	30	1.3		20	TSC +2.5
23	30	5.1		26	TSH +1.4
24	30	6.7		27	TSH +1.4
28	30	0.5	MRI		TEH +2.6
14	31	1.9 0.4	ADS	29	TEH +4.9 TSH +1.4
16	31	2.4	12		TSC +2.9
23	31	5.3		29	TSH +2.4

Table 2-A

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
24	31	0.5	MAI		TEH	+3.3
25	31	0.8	SAI		TEH	+3.0
26	31	2.3		23	TSC	+1.2
27	31	0.4	SAI		TEH	+3.0
39	31	1.1	MRI		TEH	+2.8
1	32	1.2	ADS		TEH	+3.9
14	32	3.0	ADI		TEH	+17.3
20	32	7.1		31	TSH	+2.8
22	32	13.8		27	TSH	+2.0
23	32	9.9		28	TSH	+2.2
24	32	0.5 11.4	SRI	24	TEH TSH	+2.6 +1.6
8	33	0.4	SRI		TEH	+2.5
14	33	1.0 5.4	MAI ADI		TEH TEH	+2.5 +3.9 to +5.3
19	33	3.0 2.5 6.4	ADI ADI	25	TEH TEH TSH	+3.5 +15.7 +2.8
21	33	6.2		25	TSH	+1.8
22	33	11.8		26	TSH	+2.3
23	33	9.9		28	TSH	+2.1
24	33	8.6		28	TSH	+1.6
25	33	2.7	ADS		TEH	+4.2
40	33	1.9	ADS		TEH	+10.8
43	33	1.3	MBM		06H	+0.5

Table 2-A

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
7	34	0.5	SRI		TEH	+2.5
11	34	9.1	ADS		TEH	+5.6
16	34	0.7		56	TEH	+5.2
25	34	1.7	ADS		TEH	+12.2
		9.6		26	TSH	+1.7
31	34	0.9	ADS		TEH	+5.7
12	35	2.3	ADS		TEH	+8.0
19	35	5.6		26	TSH	+2.4
20	35	2.2		23	TSH	+2.3
22	35	5.7		21	TSH	+1.5
23	35	6.2		25	TSH	+2.3
25	35	6.6		26	TSH	+1.9
35	35	3.2	SRI		TEH	+2.7
		0.9	ADS		TEH	+9.3
36	35	0.4	SAI		TEH	+3.8
20	36	1.5		25	TSH	+2.8
21	36	1.1	SRI		TEH	+2.7
		5.9		21	TSH	+2.0
26	36	7.0		29	TSH	+1.5
1	37	1.7	ADS		TEH	+3.2
17	37	4.3		78	TEH	+7.6
		2.9		79	TEH	+9.1
18	37	3.9		21	TSH	+2.8
22	37	5.9		22	TSH	+1.8

Table 2-A

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
24	37	2.1 7.8	MRI	20	TEH	+2.5
					TSH	+2.4
25	37	10.1 5.9		26 24	TSH	+1.3 +2.2
26	37	4.9 3.9		26 25	TSH	+1.4 +2.2
34	37	1.6	SRI		TEH	+2.3
5	38	1.6		27	TSH	+0.3
23	38	1.6 1.4		22 20	TSH	+1.8 +2.3
25	38	9.3		27	TSH	+1.4
26	38	8.4		22	TSH	+1.8
12	39	0.5		21	TSH	+1.4
18	39	1.5		21	TSH	+2.6
20	39	1.2		24	TSH	+0.3
22	39	2.7		23	TSH	+1.2
23	39	0.6		31	TSH	+0.6
25	39	2.3 6.5		23 22	TSH	+1.0 +2.2
26	39	10.3		21	TSH	+2.5
34	39	0.8 3.2	SAI ADS		TEH TEH	+5.5 +7.1
6	40	1.6	SRI		TEH	+2.3
15	40	1.0	CRI		TEH	+2.2
18	40	0.9 1.5		22 23	TSH	+2.0 +2.6
21	40	4.1		22	TSC	+1.9
24	40	2.6		26	TSH	+1.6

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
26	40	9.4		22	TSH	+2.4
27	40	9.6		23	TSH	+2.3
2	41	0.9	SRI		TEH	+2.3
11	41	0.9	SRI		TEH	+2.4
20	41	1.3		20	TSC	+2.1
22	41	0.8		20	TSH	+0.9
24	41	1.0		22	TSH	+1.3
		1.4		20	TSH	+1.7
25	41	3.9		25	TSH	+1.1
		8.3		21	TSH	+1.8
26	41	5.9		22	TSH	+2.2
29	41	2.1		24	TSH	+2.5
34	41	2.8		29	AV2	+0.0
2	42	2.3	SRI		TEH	+2.3
3	42	1.8	ADS		TEH	+5.1
23	42	1.3	CRI		TEH	+2.3
		1.3	CRI		TEH	+2.3
		2.4		28	TSH	+1.1
24	42	1.4		22	TSH	+0.4
26	42	6.3		23	TSH	+1.8
27	42	5.6		20	TSH	+2.1
29	42	3.8		23	TSH	+1.1
		5.5		24	TSH	+1.9
31	42	0.8		71	TEH	+2.7
		0.6		64	TEH	+4.6
32	42	1.0	SRI		TEH	+2.3

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
37	42	0.6	AVW		AV1	+0.0
		1.8		21	AV1	+0.0
		3.7		34	AV2	+0.0
		1.1			AV2	+0.0
		0.7	AVW		AV3	+0.0
		2.7	AVW	28	AV3	+0.0
		2.1		24	AV4	+0.0
		0.6	AVW		AV4	+0.0
1	43	0.9	SAI		TEH	+5.0
		1.9	ADS		TEH	+5.4
4	43	4.5	SRI		TEH	+2.7
16	43	1.3	CRI		TEH	+2.3
		1.3	CRI		TEH	+2.3
20	43	0.7		24	TSH	+2.1
22	43	1.6		21	TSH	+0.7
24	43	0.4	SRI		TEH	+2.3
		2.2		21	TSH	+1.4
27	43	3.5		25	TSH	+1.8
28	43	8.3		23	TSH	+1.8
45	43	0.6		35	TSH	+10.4
18	44	1.3		20	TSH	+2.7
28	44	0.7	SRI		TEH	+2.3
29	44	3.8		21	TSH	+1.6
31	44	4.4	CRI		TEH	+2.3
32	44	0.7	SAI		TEH	+2.9
19	45	0.8		30	TSH	+3.6
29	45	3.5		33	TSH	+0.9

Table 2-A

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
30	45	6.7 1.7	MRI	30	TEH	+2.7
					TSH	+1.1
31	45	2.0	ADS		TEH	+4.1
17	46	2.1 1.8	CRI ADS		TEH	+2.3
					TEH	+11.8
19	46	0.6		31	TSH	+0.8
25	46	7.0		23	TSH	+1.2
26	46	4.5		30	TSH	+1.4
30	47	7.6		20	TSH	+0.8
14	48	4.2		22	TEC	+3.5
30	48	5.0		22	TSH	+1.0
33	48	0.7 2.9	SAI ADS		TEH	+4.4
					TEH	+7.3
17	49	5.7	16		TSH	+0.5
20	49	0.9		31	TSH	+1.4
28	49	1.9	ADS		TEH	+4.6
14	50	3.0	ADS		TEH	+12.1
17	50	2.7 5.1	MAI ADS		TEH	+17.7 to +19.3
					TEH	+20.2
23	50	1.7 1.1	CRI	28	TEH	+2.3
					TSH	+0.6
25	50	0.7 0.9	SAI NQI		TEH	+3.0
					TEH	+3.0
27	50	2.0		21	TSH	+1.4
29	50	2.4		20	TSH	+0.5
30	50	0.3		28	TSH	+1.2

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
32	50	1.4	SAI		TEH +5.0
		1.3	ADS		TEH +6.6
		0.9	SAI		TEH +12.6
		0.7	SAI		TEH +13.4
43	50	1.2	AVW		AV1 +0.0
		1.2	AVW		AV1 +0.0
19	51	5.6		21	TSH +1.5
25	51	3.9	ADI		TEH +4.3
13	52	4.5		29	TSH +1.7
18	52	2.5	ADI		TEH +19.2
2	53	0.8	CRI		TEH +2.2
13	53	1.4	CRI		TEH +2.2
19	53	1.3		28	TSH +1.6
23	53	1.3	CRI		TEH +2.3
		0.5	SAI		TEH +4.1
		1.3	ADS		TEH +5.1
28	53	0.6		97	TEH +4.5
29	53	3.3		24	TSH +0.7
18	54	3.1		31	TSH +2.7
26	54	3.8	CRI		TEH +2.3
42	54	3.8	ADS		TEH +8.9
17	55	2.5		32	TSH +3.5
26	56	1.2	SAI		TEH +16.0
		2.1	ADS		TEH +16.3
8	57	4.7	ADS		TEH +5.8
22	57	10.0		21	TSH +1.4
23	57	3.7		21	TSH +1.4

Table 2-A

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
37	57	0.5	AVW		AV2 -0.0
		0.5	AVW		AV2 -0.0
		1.9		22	AV2 +0.0
		0.6	AVW		AV3 +0.1
		0.6	AVW		AV3 +0.1
		2.2		24	AV3 +0.0
		0.9	AVW		AV4 +0.1
		0.9	AVW		AV4 +0.1
		3.4		32	AV4 +0.0
1	58	6.4	ADS		TEH +7.5
24	58	3.8		23	TSH +1.8
26	58	3.0	CRI		TEH +2.2
38	58	2.1	SRI		TEH +2.4
2	59	2.3	ADS		TEH +5.4
9	59	1.6		32	TSH +0.4
15	59	6.8		22	TSH +2.5
17	59	3.2		20	TSH +2.2
24	59	3.3		20	TSH +1.9
25	59	1.8		23	TSH +1.2
1	60	12.4	ADS		TEH +12.7
20	60	3.0		21	TSH +1.5
13	61	4.7		35	TSH +1.4
17	61	3.8		20	TSH +1.9
19	61	4.5		27	TSH +1.6
20	61	2.8	ADS		TEH +2.9
		4.5		20	TSH +1.5
24	61	3.1		20	TSH +1.0
29	61	1.7		20	AV3 +0.0
		1.5	AVW		AV3 -0.1
		1.5	AVW		AV3 -0.1

Table 2-A

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
15	62	6.8		21	TSH +1.9
18	62	3.5	MRI		TEH +6.2 to +15.3
		2.5	ADS		TEH +9.3
		2.3	ADS		TEH +18.0
		3.7		20	TSH +1.5
19	62	7.0		23	TSH +1.5
20	62	4.3		22	TSH +1.4
3	63	1.0	ADS		TEH +4.6
4	63	1.3	ADS		TEH +4.4
5	63	2.3	ADS		TEH +8.1
18	63	4.1	ADS		TEH +7.8
		4.7		20	TSH +1.5
19	63	6.5		23	TSH +1.4
28	63	0.4	AVW		AV3 +0.4
31	63	1.9	MRI		TEH +2.4
1	64	0.5	SRI		TEH +3.0
2	64	4.6	ADS		TEH +9.1
7	64	2.0	ADS		TEH +4.4
13	64	5.3		21	TSH +1.6
16	64	0.7	SRI		TEH +2.5
19	64	8.6		22	TSH +1.5
32	64	0.9	NQS		01H -0.3
11	65	4.1		22	TSH +0.9
13	65	3.6		20	TSH +1.3
15	65	5.4		26	TSH +1.5

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
17	65	1.8	ADS		TEH +11.5
12	66	3.8		26	TSH +1.4
13	66	7.9		22	TSH +1.4
14	66	5.5		28	TSH +1.9
15	66	7.3		23	TSH +1.8
18	66	7.3		28	TSH +1.8
19	66	9.7		22	TSH +1.8
21	66	2.1		22	TSH +1.6
11	67	4.7		21	TSH +1.5
19	67	4.9		23	TSH +1.8
24	67	1.0	SRI		TEH +2.3
26	67	0.5	SRI		TEH +2.2
35	67	1.0	SRI		TEH +2.3
38	67	1.4	SRI		TEH +2.3
3	68	1.3	SRI		TEH +2.6
8	68	6.9		21	TSH +0.9
13	68	4.4		21	TSH +1.6
19	68	3.6	ADS		TEH +3.5
27	68	0.9	SRI		TEH +2.1
2	69	0.6	SRI		TEH +2.3
3	69	0.9	SRI		TEH +3.2
7	69	0.4		25	TSH +1.5
8	69	4.8		20	TSH +0.7

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
12	69	8.0		22	TSH +1.6
16	69	1.3	SRI	20	TEH +2.5
		0.7			TSH +1.5
22	69	0.9	ADS		TEH +6.8
27	69	1.4	SRI		TEH +2.2
31	69	0.5	SRI		TEH +2.3
38	69	0.8	SRI		TEH +2.3
11	70	1.3		21	TSH +1.5
14	70	4.8		22	TSH +1.8
21	70	0.2		56	TEH +3.5
		1.9	ADI		TEH +4.6
38	70	0.7	AVW		AV2 +0.0
		0.7	AVW		AV2 +0.0
		2.0		23	AV2 +0.0
12	72	3.9		22	TSH +1.4
17	72	3.8	CRI		TEH +2.5
		0.4	NQI		TEH +3.9
20	72	0.2	NQS		TEH +4.1
37	72	0.5	AVW		AV2 +0.0
		2.1		24	AV2 +0.0
		0.5	AVW		AV2 +0.0
		0.3	AVW		AV3 +0.0
		0.3	AVW		AV3 +0.0
8	73	1.9		24	TSH +0.9
12	73	10.1		26	TSH +1.2
13	73	1.2	SRI		TEH +2.8
8	74	5.1		23	TSH +0.7
12	74	4.9		20	TSH +1.1

Table 2-A



R. G. &amp; E.

SG/A 93MAR

Ginna Station

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
13	74	1.5		23	TSH +1.1
7	75	3.5	SRI		TEH +2.5
10	75	3.5		23	TSH +1.1
5	78	1.1	SRI		TEH +2.6
8	78	0.7	SRI		TEH +2.4
12	78	0.6	SAI		TEH +2.8
9	80	1.0	SRI		TEH +2.3
11	80	0.7	SAI		TEH +2.7
		0.7	SAI		TEH +2.8
20	80	3.4	ADI		TEH +4.0
14	82	1.4	SRI		TEH +2.4
7	83	5.6	SRI		TEH +2.4
10	83	1.3	ADS		TEH +4.1
12	84	5.4	MRI		TEH +1.8
23	86	0.3	NQS		01H -0.8
16	87	0.8		32	TSH +12.1

Number of Tubes: 336

Number of Indications: 437

Table 2-A



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
2	1	1.2	ADS		TEH +15.8
3	1	0.5	ADS		TEH +14.4
9	2	1.0	SRI		TEH +2.7
6	3	1.1	ADS		TEH +19.6
8	3	0.8	ADS		TEH +5.8
12	3	2.3	MBS		TEH +0.4
13	3	4.1	ADS		TEC +6.1 to +15.6
14	3	0.6	ADS		TEH +15.2
12	4	2.5	MBS		TEH +0.6
12	5	2.0	MBI		TEH +0.6
		2.7	ADI		TEH +4.8
13	5	1.8	ADS		TEH +7.0
14	5	1.7	ADS		TEH +13.6 to +6.1
18	5	1.6	ADS		TEH +15.0
3	8	2.3	ADS		TEH +3.6
		1.3	SAI		TEH +4.5
15	8	0.7	ADS		TEH +3.1
20	8	0.8	ADS		TEH +9.9
5	9	1.4	ADS		TEH +7.2
21	9	0.6	ADS		TEH +9.7
4	10	0.7	NQS		TEH +4.1
		0.6	SAI		TEH +4.1
		1.2	SAI		TEH +5.1
15	10	0.6	ADS		TEH +4.0
13	11	0.5	ADS		TEH +11.8

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
14	11	0.5	ADS		TEH +6.0
14	12	1.2	ADS		TEH +20.0
29	12	1.3	SRI		TEH +3.1
2	13	0.3	MAI		TEH +3.5 to +5.3
		1.9	ADI		TEH +4.9
6	13	1.6	ADS		TEH +3.6
		0.5	SAI		TEH +8.0
		1.5	ADS		TEH +10.0
3	16	0.3	ADS		TEH +4.1
10	16	0.4	ADS		TEH +5.1
		0.4	ADS		TEH +6.7
28	16	1.1	ADS		TEH +3.5
10	17	5.5		22	TSH +1.0
14	17	0.1	NQS		TEH +3.8
15	17	0.5	SAI		TEH +3.3
		0.1	NQS		TEH +4.0
32	17	0.7	SRI		TEH +2.5
14	18	0.7		23	TSH +0.8
16	18	0.9	MAI		TEH +3.7 to +5.0
		0.2	NQS		TEH +4.1
26	18	2.0	SRI		TEH +2.2
5	19	0.2	NQS		TEH +5.0
22	19	2.0	SRI		TEH +2.3
25	19	1.0	MRI		TEH +1.9
26	19	1.1	MRI		TEH +2.2
33	19	3.1	ADS		TEH +4.6

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
7	20	0.2	ADS		TEH	+3.9
10	20	0.7	ADS		TEH	+5.4
16	20	0.5	ADS		TEH	+5.2
24	20	0.4		72	TEH	+5.1
27	21	2.0	CRI		TEH	+2.5
11	22	0.6	MAI		TEH	+4.6
		2.0	ADS		TEH	+5.4
33	22	1.0	ADS		TEH	+4.6
1	23	1.0	ADS		TEH	+4.9
11	23	0.8	ADS		TEH	+5.7
		11.9		20	TSH	+1.3
11	24	0.8	SAI		TEH	+2.8
14	24	0.5		87	TEH	+4.3
21	24	2.3	ADS		TEH	+4.3
13	25	1.0	ADS		TEH	+5.8
24	25	0.8	ADI		TEH	+4.7
		12.4		21	TSH	+0.7
11	26	1.2	SRI		TEH	+2.2
13	26	0.6	ADS		TEH	+5.2
		1.6	SAI		TEH	+11.8
19	26	9.6		27	TSH	+1.3
20	26	7.3		20	TSH	+1.2
24	26	12.1		28	TSH	+1.4
1	27	3.2	SAI		TEH	+3.2
		3.5	ADS		TEH	+3.6

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
13	27	1.1 3.0	MAI ADS		TEH	+4.8 +5.0
27	27	0.3	NQS		TEH	+3.8
10	28	1.3	ADI		TEH	+6.4
16	28	3.5	SRI		TEH	+2.6
31	28	2.1	SRI		TEH	+2.6
1	29	4.9 0.8	MAI	75	TEH TEH	+3.2 +3.3
19	29	0.7 14.9	ADS	22	TEH TSH	+14.1 +1.4
23	29	8.0		21	TSH	+1.2
1	30	0.1	NQS		TEH	+5.9
8	30	0.5	ADS		TEH	+9.8
11	30	0.9	ADI		TEH	+5.5
17	30	0.9 1.7 0.9		25 20 25	TSH TSH TSH	+0.9 +2.0 +19.4
29	30	2.3	SRI		TEH	+2.5
33	30	1.3 0.3	SAI	86	TEH TEH	+3.4 +4.5
35	30	1.7	ADS		TEH	+5.9 to +2.9
6	31	0.5	ADS		TEH	+8.5
9	32	1.6	ADS		TEH	+7.3
3	33	0.9	ADS		TEH	+7.5
31	33	1.5	SRI		TEH	+2.7
1	34	1.0	ADS		TEH	+5.2

Table 2-B





## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
25	34	1.8	ADS		TEH	+6.2
		0.6	SAI		TEH	+6.9
		0.9	SAI		TEH	+13.4
38	34	1.7	SRI		TEH	+2.7
22	35	1.6	SRI		TEH	+2.6
27	35	2.8		20	TSH	+0.9
38	35	1.7		81	TEH	+3.2
		3.0	SAI		TEH	+3.6
41	35	1.0	SRI		TEH	+2.7
8	36	1.1	MAI		TEH	+3.4 to +7.5
		1.2	ADS		TEH	+7.6
28	37	0.2		83	TEH	+5.0
30	37	0.2	NQI		TEH	+16.6
34	37	2.2	MAI		TEH	+3.1
		0.7	ADI		TEH	+4.0
38	37	0.8	SRI		TEH	+2.7
41	37	0.8	SAI		TEH	+3.4
25	38	1.4		22	TSC	+0.6
28	38	0.3	ADI		TEH	+4.7
37	38	0.5	NQS		TEH	+2.8
		1.9	MAI		TEH	+3.0 to +3.9
6	39	2.7	ADS		TEH	+6.6
24	39	2.2		23	TSC	+0.6
45	39	1.7		25	TSH	+41.8
4	40	1.1	ADS		TEH	+7.6
8	40	2.3	ADS		TEH	+9.3

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
24	40	1.7 6.4	ADS	23	TEH TSH	+5.0 to +16.1 +1.2
25	40	0.6 0.6	ADS	24	TEH TSH	+7.6 +2.3
12	41	1.0 1.1	MAI ADS		TEH TEH	+3.5 +7.4
23	41	5.2		20	TSH	+1.4
24	41	1.0 6.4 2.3	ADS	24 21	TEH TSH TSC	+15.6 +1.3 +0.5
4	42	1.3	ADS		TEH	+5.6
6	42	1.1 5.2	ADS	31	TEH TSH	+6.4 +0.5
11	42	1.7	ADS		TEH	+6.7
23	42	0.7 1.1 0.7 0.7	SAI ADS SAI ADS		TEH TEH TEH TEH	+4.9 to +6.3 +5.3 +16.6 to +18.0 +17.8
29	42	0.7 1.2	MAI ADS		TEH TEH	+8.2 to +17.2 +8.9
22	43	0.6		21	TSH	+0.8
27	43	0.3	NQI		TEH	+6.1
29	43	0.7 1.4 1.9 1.7	SAI SAI SAI ADS		TEH TEH TEH TEH	+5.6 +7.2 to +8.1 +9.2 to +11.8 +12.2
37	43	2.1 0.5	ADS MAI		TEH TEH	+4.9 +5.6
1	44	0.9	ADI		TEH	+11.6

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location		
2	44	0.5 1.4	MAI ADS		TEH TEH	+3.0 to +7.2	+7.3
3	44	0.7 0.8		28 24	TSC TSC	+1.8 +1.8	
5	44	2.8	ADS		TEH	+8.7	
8	44	1.0 1.0 1.8	MAI MAI ADS		TEH TEH TEH	+3.3 to +3.3 to +8.8	+9.3 +9.3
13	44	4.1 1.8	ADI ADI		TEH TEH	+7.5 +9.2	
31	44	1.1	SAI		TEH	+3.9	
2	45	1.4 0.3	MAI NQS		TEH TEH	+3.6 to +4.1	+7.8
3	45	0.6	ADS		TEH	+11.2	
5	45	0.5	ADS		TEH	+4.5	
9	45	0.9 0.6 1.2	SAI ADS	20	TEH TEH TSH	+6.4 +7.1 +0.5	
30	45	0.7 2.6	MAI ADS		TEH TEH	+3.0 to +5.8	+4.8
33	45	1.0	MAI		TEH	+3.2	
2	46	1.1 0.7 0.8	MAI ADS ADS		TEH TEH TEH	+2.9 to +7.9 +11.2	+7.4
7	46	1.1	ADI		TEH	+10.4	
8	46	0.2 0.5 1.2	MAI ADI	35	TEH TEH TSH	+5.5 to +9.0 +46.8	+8.8

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
1	47	1.2 1.4	SAI ADS		TEH	+3.2 +5.9
4	47	1.8 1.4	SAI ADS		TEH	+9.0 +10.0
5	47	1.0 0.3	SAI	47	TEH	+5.1 +5.1
6	47	1.1 0.7	ADS	21	TEH TSH	+6.0 +0.8
20	47	4.5	BLG		TEH	+10.9
34	47	0.4 0.8	SAI ADS		TEH	+3.2 +4.1
4	48	1.2 1.1	NQS MAI		TEH	+6.8 +7.4 to +5.9
6	48	1.5	ADS		TEH	+8.6
30	48	0.4	ADS		TEH	+6.8
36	48	0.9	ADS		TEH	+5.1
7	49	1.1 1.6	SAI ADS		TEH	+2.8 +5.4
10	49	0.2 1.2	MAI ADS		TEH	+4.4 +5.8
12	49	0.4 2.0	MAI ADS		TEH	+4.7 to +5.8 +5.6
14	50	0.4 1.1	MAI ADS		TEH	+3.8 +5.2
25	50	0.5 1.4	ADS	34	TEH TSH	+5.9 +3.3
32	50	0.6 1.6	MAI ADS		TEH	+4.4 +5.6

Table 2-B



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
33	50	0.6	MAI		TEH	+3.8
34	50	0.6	MAI		TEH	+3.6 to +4.6
		1.8	ADI		TEH	+5.3
		0.9	ADI		TEH	+7.9
43	50	2.0	ADS		TEH	+4.5
3	51	1.3	ADS		TEH	+9.4
4	51	0.5	SAI		TEH	+3.2
6	51	1.6		24	TSH	+0.3
20	51	0.9	SAI		TEH	+3.6
33	51	1.0	ADS		TEH	+5.4
12	52	0.6	ADS		TEH	+6.9
25	52	0.6	MAI		TEH	+3.2
5	53	1.0	ADS		TEH	+4.2
		1.3	ADS		TEH	+7.8
11	53	0.5	SAI		TEH	+6.9 to +8.5
		1.0	ADS		TEH	+7.4
23	54	0.2	NQS		TEH	+16.6
		0.5	MAI		TEH	+18.4 to +19.5
25	54	0.4		90	TEH	+7.9
29	54	1.9	ADI		TEH	+6.4
18	55	0.8		38	TSH	+1.9
37	55	1.6	ADS		TEH	+11.2
13	56	0.5	ADS		TEH	+5.3
		0.6	SAI		TEH	+5.7
27	56	1.0	SRI		TEH	+2.6

Table 2-B





## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
5	57	0.6	ADS		TEH	+4.1
37	57	1.1	ADS		TEH	+5.4
2	58	0.5	SAI		TEH	+5.1
		0.2	NQS		TEH	+5.3
3	58	2.0	ADS		TEH	+7.6
6	58	1.3	ADS		TEH	+7.1
7	58	1.0	ADI		TEH	+7.8
16	58	0.7	ADS		TEH	+5.0
		1.4	ADS		TEH	+9.8
27	58	0.2	NQS		TEH	+5.2
		0.7	SAI		TEH	+8.4
5	59	1.3	ADS		TEH	+8.1
11	59	1.7	ADS		TEH	+6.7
16	59	0.6	ADS		TEH	+6.6
		1.0	ADS		TEH	+9.1
		0.5		28	TSH	+2.6
19	59	1.2	ADS		TEH	+12.7
23	59	0.4	NQS		TEH	+9.1
3	60	0.8	ADS		TEH	+6.1
21	60	1.3		25	TSH	+0.6
34	60	0.8	ADS		TEH	+4.0
36	60	1.2	ADS		TEH	+3.8
5	61	3.4	ADS		TEH	+6.2
18	61	1.7	ADS		TEH	+12.1
		0.7	MAI		TEH	+12.5

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
19	61	1.3 0.9	ADS MAI		TEH +8.3 TEH +9.7	
5	62	2.6	ADS		TEH +7.6	
12	62	2.5	ADI		TEH +7.6	
10	63	1.0	SAI		TEH +6.0	
22	63	10.7		22	TSH +1.7	
23	63	1.2 10.3		26 22	TSH +1.6 TSH +2.1	
2	64	0.3 0.6 1.7	MAI MAI ADS		TEH +4.7 TEH +9.1 TEH +9.7	to +9.9
14	64	0.4 1.0	SAI ADS		TEH +5.2 TEH +7.0	
21	64	1.6	ADS		TEH +5.7	
5	65	2.2	ADS		TEH +3.4	to +7.4
11	65	0.3 0.6	NQS MAI		TEH +4.6 TEH +5.2	to +5.7
15	65	0.9 1.5	ADS ADS		TEH +4.8 TEH +10.6	
25	65	1.6	ADS		TEH +6.3	
30	65	1.2 1.1	CRI	20	TEH +2.4 TSH +1.0	
15	66	0.6	NQS		TSH +2.0	
16	66	2.1	ADS		TEH +6.2	
19	66	1.4	ADS		TEH +3.3	to +6.0

Table 2-B



## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
30	66	0.9 1.5	SAI ADS		TEH	+9.6 +12.4
1	67	2.3	ADI		TEH	+4.1
3	67	1.3	ADS		TEH	+7.6
23	67	1.6	ADS		TEH	+12.6
37	67	0.7	ADS		TEH	+6.2
21	68	0.3	NQS		TEH	+4.1
23	68	0.7 1.6	SAI ADS		TEH	+4.3 +12.4
27	68	0.4	SRI		TEH	+3.2
7	69	0.6 1.2	MAI ADS		TEH	+5.4 +6.3
21	69	0.2 0.4	NQS SAI		TEH	+5.0 +14.6
27	69	0.4 0.3		77 86	TEH	+3.8 +4.6
34	69	1.0 4.2	SAI ADI		TEH	+2.7 +3.4
4	70	2.4	ADS		TEH	+6.6
19	70	0.8 2.3	MAI ADS		TEH	+3.2 +4.2
11	71	2.1		21	TSH	+0.6
24	71	0.3 0.8 0.4 0.4	NQS MAI NQS		TEH	+3.3 +3.6 +4.6 +4.6
				83		
28	71	0.4 0.5	SAI NQS		TEH	+4.4 +5.2

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	
7	72	1.4	ADS		TEH	+3.3
12	72	1.0		21	TSC	+1.6
14	72	1.4	ADI		TEH	+4.5
20	72	1.6	ADI		TEH	+12.2
1	73	0.4		92	TEH	+3.9
18	73	0.3	NQI		TEH	+4.8
21	73	0.9	ADI		TEH	+18.4
6	74	1.9	ADI		TEH	+4.4
8	74	2.9	ADI		TEH	+5.7
1	76	2.8	ADS		TEH	+3.2
		2.7	ADS		TEH	+9.5
4	76	1.0		21	TSH	+0.3
7	76	0.3	SAI		TEH	+2.9
		2.0	ADS		TEH	+5.8
20	76	0.3	SAI		TEH	+3.7
24	76	0.2	SAI		TEH	+2.8
12	77	0.2	SAI		TEH	+4.0
		1.1	ADS		TEH	+4.5
		1.0	ADS		TEH	+4.6
5	78	1.1	ADS		TEH	+3.0
10	78	1.2	ADS		TEH	+7.6
16	78	1.0	ADS		TEH	+4.4
5	79	1.8	ADS		TEH	+5.6
13.	79	2.8	ADS		TEH	+9.7
21	79	0.3	SAI		TEH	+3.2

Table 2-B

## REPORTABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location
10	80	0.8	MAI		TEH +4.8
		1.1	ADS		TEH +7.7
8	81	0.5	SAI		TEH +3.5
		0.3	NQS		TEH +5.2
13	81	0.3	SAI		TEH +2.8
12	87	13.5	MBI		TEH +0.3
		0.9	SAI		TEH +3.0
7	88	0.8		75	TEH +3.0
		2.4	MAI		TEH +3.4
		1.5		94	TEH +3.8
12	88	3.2	MBS		TEH +0.4
13	88	3.9	MBS		TEH +0.3
14	88	13.4	MBS		TEH +0.8
15	88	1.0	MBS		TEH +0.7
16	88	3.7	MBS		TEH +0.3
17	88	9.7	MBS		TEH +0.2
19	88	7.0	BLG		TSH +2.9
14	89	8.0	MBS		TEH +0.7
4	90	1.0	ADS		TEH +4.8
1	92	1.3		29	TSH +11.1
		2.2		38	TSC +11.4

Number of Tubes: 255

Number of Indications: 362

Table 2-B

#### 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 103 new crevice indications reported. In the "A" steam generator, 41 new crevice indications were reported.

The majority of the inlet tubesheet crevice corrosion indications are IGA/SCC of the Mill Annealed Inconel 600 tube material. This form of corrosion is believed to be the result of an alkaline environment forming in the tubesheet crevices. This environment has developed over the years as deposits and active species such as 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		1-25%		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
Apr 1992	33	104	0	0	0	0	0	2	1	12	34	118
Mar 1993	114	110	0	0	0	1	3	3	4	9	121	123
TOTALS:	216	710	5	29	5	68	21	148	54	303	301	1,258

TABLE 3





Along with IGA/SCC in the crevices, there appears to have been a slight decrease in PWSCC at the roll transition during the last operating cycle. This mechanism was first addressed in 1989 and this year there were 20 Roll Transition (PWSCC) indications in "B" steam generator and 80 Roll Transition (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. A number of these tubes did have penetrations >20% TW but have not showed an increase in the growth rate for several cycles. No tubes were listed for corrective action from this condition. 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.

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 in 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.

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.

The eight (8) tubes in the "A" Steam Generator recorded with indications at the anti-vibration bar intersections were examined again to monitor growth rates. 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 and no measurable growth has been noted, AVB fretting wear is not considered to be an active damage mechanism or major concern at this time but will be periodically monitored for any growth.

In summary, the "A" Steam Generator had 121 tubes that were found to have "new" tubesheet crevice indications (41 IGA/SCC and 80 roll transitions). The "B" Steam Generator had 123 "new" tubesheet crevice indications (103 IGA/SCC and 20 roll transitions).

## **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:

- a) an absolute drift signal (ADS) of the Mix-2 Channel
- b) quantifiable IGSCC indications on the 400 kHz data
- c) roll transition or crevice indications as identified from the MRPC examination

There were no tubes unplugged in the "A" generator and 48 tubes unplugged in the "B" generator in an effort to return them to service by sleeving. These tubes were recorded with repairable indications in earlier outages. A full length examination was performed after unplugging to insure no indications existed that would prevent them from being returned to service.

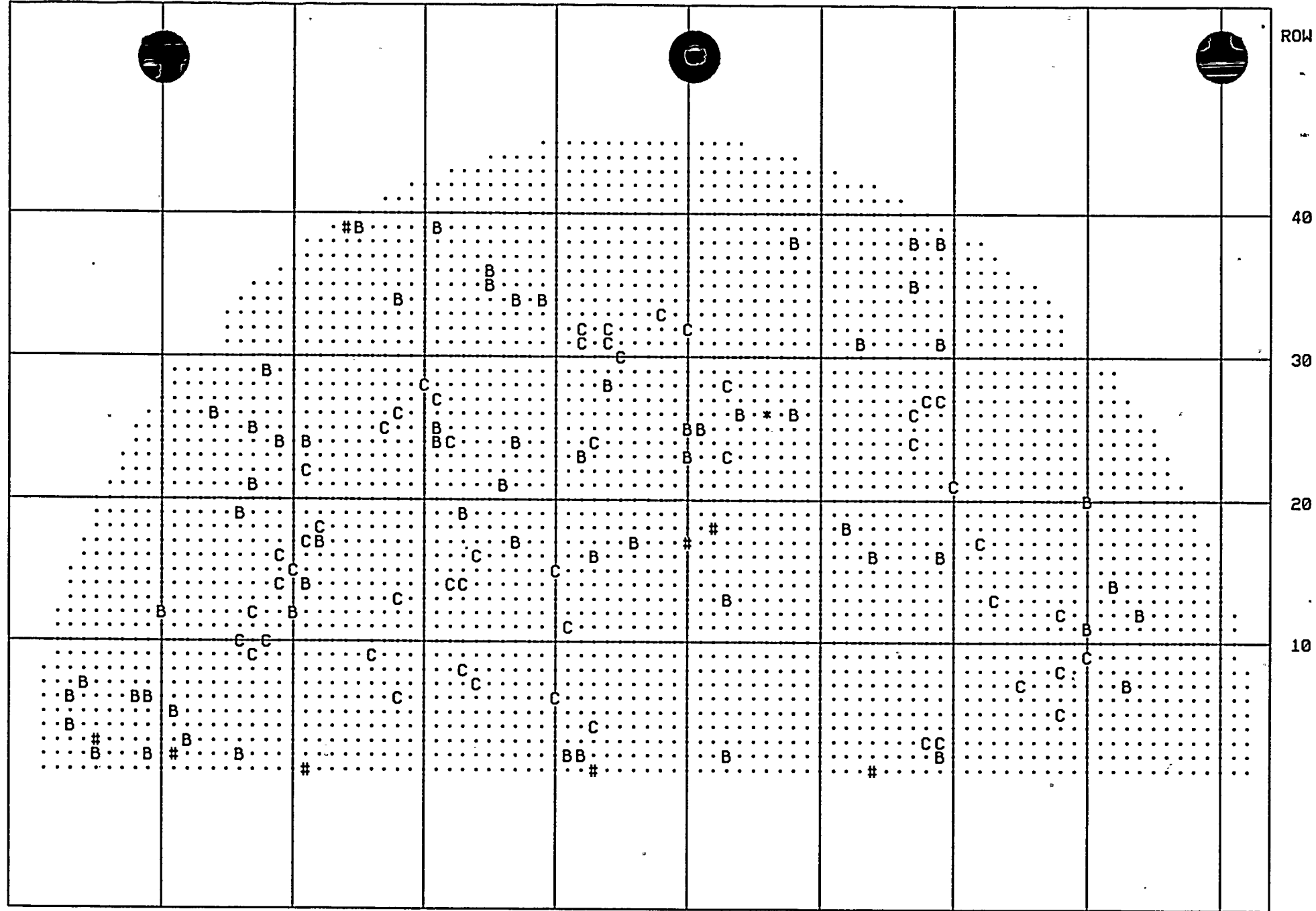
The breakdown of corrective action (repairs) performed are as follows:

The A steam generator had a total of 121 tubes with indications identified by eddy current. One tube was obstructed by a foreign object and was subsequently plugged, for a total of 122 repairs.

The B steam generator had a total of 123 tubes with indications identified by eddy current. Of the 48 deplugged tubes, 46 tubes were returned to service by sleeving (2 deplugged tubes were re-plugged). A total of 171 repairs were made in B steam generator.

A Ginna Steam Generator Tube Inspection and Corrective Action History has been tabulated on page 68 as Table 5.





COL  
 #: 8: Installed in 1993: CE Plugs  
 C: 51: CE Sleeves  
 B: 62: B&W Sleeves  
 \*: 1: B&W Exp.Slv.Plug

Rochester Gas & Electric Corp.  
 Ginna Nuclear Power Station  
 S/G - A Hot Leg 04/15/93  
 Inlet

ACRI ISIS Tubes



R. G. &amp; E.

SG/A 93MAR

Ginna Station

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
4	3	1.7	SRI		TEH +2.1	BW Sleeve
6	3	0.7	SRI		TEH +1.9	BW Sleeve
7	4	1.2	MRI		TEH +2.2	BW Sleeve
2	5	2.1	SRI		TEH +2.3	BW Sleeve
		1.5	SRI		TEH +2.5	
3	5	10.9	SBI		TEH +0.1	CE Plug
		3.7	SBI		TEH +0.4	
6	8	2.3	MRI		TEH +1.7	BW Sleeve
2	9	2.7	SRI		TEH +1.7	BW Sleeve
6	9	2.5	SRI		TEH +1.7	BW Sleeve
12	10	0.8	MRI		TEH +2.5	BW Sleeve
5	11	2.9	MRI		TEH +2.4	BW Sleeve
3	12	1.8	SRI		TEH +2.4	BW Sleeve
26	14	5.3	MRI		TEH +2.2	BW Sleeve
2	16	0.7	SAI		TEH +3.3	BW Sleeve
10	16	0.8		93	TEH +2.8	CE Sleeve
		0.9	MAI		TEH +3.2	
		0.3		93	TEH +8.8	
19	16	4.4	SRI		TEH +3.0	BW Sleeve
9	17	2.3	SRI		TEH +2.3	CE Sleeve
12	17	0.7	SAI		TEH +3.3	CE Sleeve
21	17	0.5	SAI		TEH +2.6 to +3.5	BW Sleeve
25	17	0.8	SAI		TEH +3.9	BW Sleeve
10	18	0.4		80	TEH +7.2	CE Sleeve
		1.6	MAI		TEH +8.7	
29	18	3.6	SRI		TEH +2.1	BW Sleeve

Table 4-A



## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
14	19	1.7	SAI		TEH +5.0	CE Sleeve
16	19	0.9	SAI		TEH +3.3	CE Sleeve
24	19	3.0	SRI		TEH +2.3	BW Sleeve
12	20	0.5	NQI		TEH +3.2	BW Sleeve
15	20	0.8	SAI		TEH +2.8	CE Sleeve
1	21	25.5 10.6 3.8	SBI SBI SRI		TEH +0.3 TEH +0.3 TEH +2.7	CE Plug
14	21	4.1 3.3	ADI ADI		TEH +4.6 TEH +10.7	BW Sleeve
17	21	2.6	CRI		TEH +1.8	CE Sleeve
22	21	1.8 0.8 0.6 0.8	CRI CRI MAI SAI		TEH +2.3 TEH +2.3 TEH +5.0 TEH +8.6	CE Sleeve
24	21	0.9	SAI		TEH +4.1	BW Sleeve
17	22	1.6	CRI		TEH +2.2	BW Sleeve
18	22	1.4 1.7 2.2	SAI SAI ADI		TEH +2.7 TEH +3.8 TEH +6.4	CE Sleeve
39	24	2.5	SRI		TEH +2.9	CE Plug
39	25	5.7	MRI		TEH +2.8	BW Sleeve
9	26	2.8	SRI		TEH +2.7	CE Sleeve
25	27	0.5	MAI		TEH +3.9	CE Sleeve
6	28	0.4 0.4	SAI SAI		TEH +4.1 TEH +4.6	CE Sleeve
13	28	0.8	SRI		TEH +2.6	CE Sleeve
26	28	0.4	SAI		TEH +3.9	CE Sleeve

Table 4-A

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
34	28	0.3	SRI		TEH +2.5	BW Sleeve
28	30	0.5	MRI		TEH +2.6	CE Sleeve
24	31	0.5	MAI		TEH +3.3	BW Sleeve
25	31	0.8	SAI		TEH +3.0	BW Sleeve
27	31	0.4	SAI		TEH +3.0	CE Sleeve
39	31	1.1	MRI		TEH +2.8	BW Sleeve
14	32	3.0	ADI		TEH +17.3	CE Sleeve
24	32	0.5	SRI		TEH +2.6	CE Sleeve
8	33	0.4	SRI		TEH +2.5	CE Sleeve
14	33	1.0 5.4	MAI ADI		TEH +2.5 TEH +3.9 to +5.3	CE Sleeve
19	33	3.0 2.5	ADI ADI		TEH +3.5 TEH +15.7	BW Sleeve
7	34	0.5	SRI		TEH +2.5	CE Sleeve
16	34	0.7		56	TEH +5.2	CE Sleeve
35	35	3.2	SRI		TEH +2.7	BW Sleeve
36	35	0.4	SAI		TEH +3.8	BW Sleeve
21	36	1.1	SRI		TEH +2.7	BW Sleeve
17	37	4.3 2.9		78 79	TEH +7.6 TEH +9.1	BW Sleeve
24	37	2.1	MRI		TEH +2.5	BW Sleeve
34	37	1.6	SRI		TEH +2.3	BW Sleeve
34	39	0.8	SAI		TEH +5.5	BW Sleeve
6	40	1.6	SRI		TEH +2.3	CE Sleeve
15	40	1.0	CRI		TEH +2.2	CE Sleeve

Table 4-A



## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location		Repair
2	41	0.9	SRI		TEH	+2.3	BW Sleeve
11	41	0.9	SRI		TEH	+2.4	CE Sleeve
2	42	2.3	SRI		TEH	+2.3	BW Sleeve
23	42	1.3	CRI		TEH	+2.3	BW Sleeve
		1.3	CRI		TEH	+2.3	
31	42	0.8		71	TEH	+2.7	CE Sleeve
		0.6		64	TEH	+4.6	
32	42	1.0	SRI		TEH	+2.3	CE Sleeve
1	43	0.9	SAI		TEH	+5.0	CE Plug
4	43	4.5	SRI		TEH	+2.7	CE Sleeve
16	43	1.3	CRI		TEH	+2.3	BW Sleeve
		1.3	CRI		TEH	+2.3	
24	43	0.4	SRI		TEH	+2.3	CE Sleeve
28	44	0.7	SRI		TEH	+2.3	BW Sleeve
31	44	4.4	CRI		TEH	+2.3	CE Sleeve
32	44	0.7	SAI		TEH	+2.9	CE Sleeve
30	45	6.7	MRI		TEH	+2.7	CE Sleeve
17	46	2.1	CRI		TEH	+2.3	BW Sleeve
33	48	0.7	SAI		TEH	+4.4	CE Sleeve
17	50	2.7	MAI		TEH	+17.7 to +19.3	CE Plug
23	50	1.7	CRI		TEH	+2.3	BW Sleeve
25	50	0.7	SAI		TEH	+3.0	BW Sleeve
		0.9	NQI		TEH	+3.0	
32	50	1.4	SAI		TEH	+5.0	CE Sleeve
		0.9	SAI		TEH	+12.6	
		0.7	SAI		TEH	+13.4	

Table 4-A

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
25	51	3.9	ADI		TEH +4.3	BW Sleeve
18	52	2.5	ADI		TEH +19.2	CE Plug
2	53	0.8	CRI		TEH +2.2	BW Sleeve
13	53	1.4	CRI		TEH +2.2	BW Sleeve
23	53	1.3 0.5	CRI SAI		TEH +2.3 TEH +4.1	CE Sleeve
28	53	0.6		97	TEH +4.5	CE Sleeve
26	54	3.8	CRI		TEH +2.3	BW Sleeve
26	56	1.2 6.9	SAI PTF		TEH +16.0 TEH +19.6	BW Exp.Plug
26	58	3.0	CRI		TEH +2.2	BW Sleeve
38	58	2.1	SRI		TEH +2.4	BW Sleeve
18	62	3.5	MRI		TEH +6.2 to +15.3	BW Sleeve
31	63	1.9	MRI		TEH +2.4	BW Sleeve
1	64	0.5	SRI		TEH +3.0	CE Plug
16	64	0.7	SRI		TEH +2.5	BW Sleeve
24	67	1.0	SRI		TEH +2.3	CE Sleeve
26	67	0.5	SRI		TEH +2.2	CE Sleeve
35	67	1.0	SRI		TEH +2.3	BW Sleeve
38	67	1.4	SRI		TEH +2.3	BW Sleeve
3	68	1.3	SRI		TEH +2.6	CE Sleeve
27	68	0.9	SRI		TEH +2.1	CE Sleeve
2	69	0.6	SRI		TEH +2.3	BW Sleeve
3	69	0.9	SRI		TEH +3.2	CE Sleeve

Table 4-A

R. G. &amp; E.

SG/A 93MAR

Ginna Station

## REPAIRABLE INDICATIONS

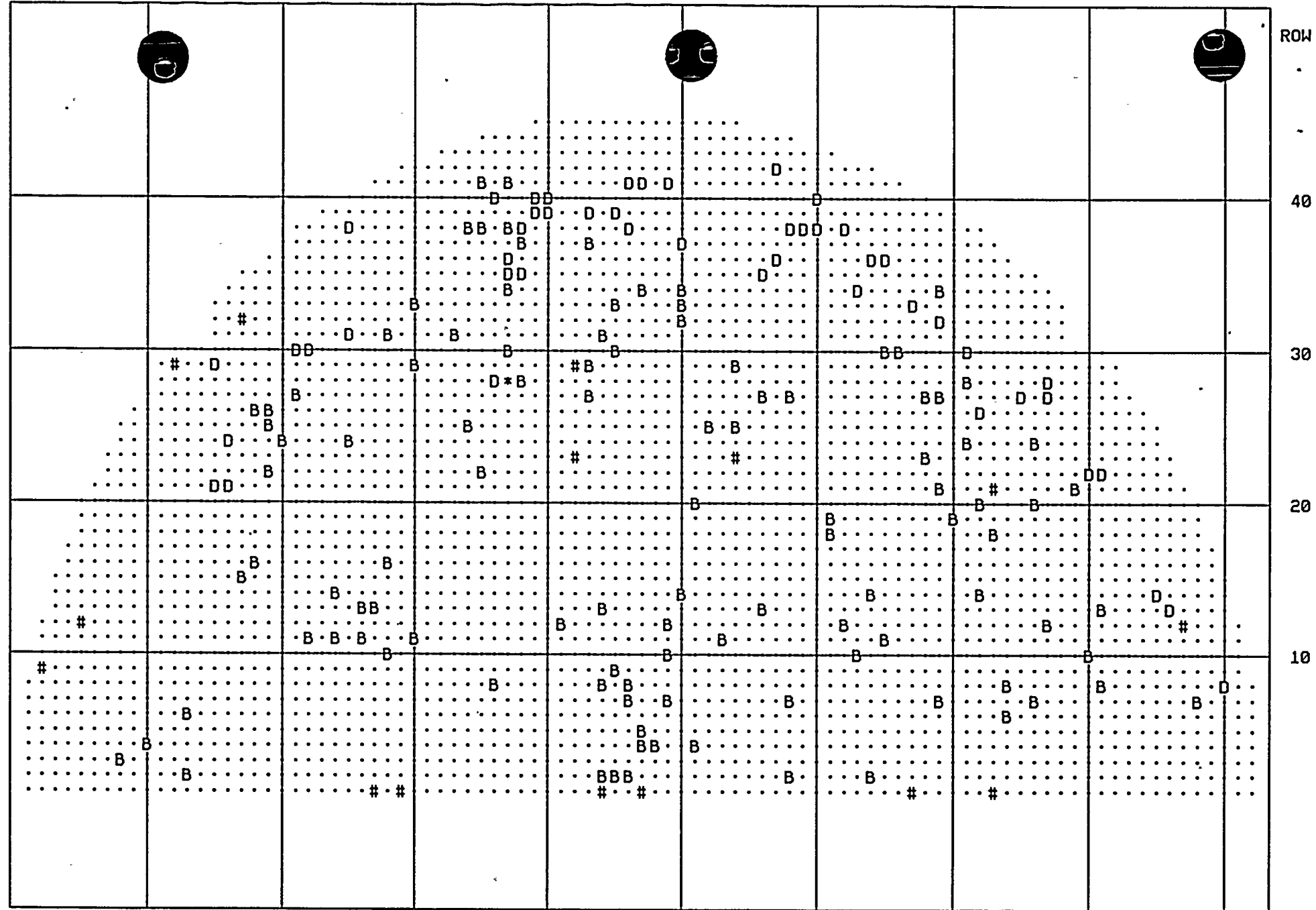
Row	Col	Volts	Ind. Desc	%TWD	Indication Location		Repair
16	69	1.3	SRI		TEH	+2.5	BW Sleeve
27	69	1.4	SRI		TEH	+2.2	CE Sleeve
31	69	0.5	SRI		TEH	+2.3	BW Sleeve
38	69	0.8	SRI		TEH	+2.3	BW Sleeve
21	70	0.2		56	TEH	+3.5	CE Sleeve
		1.9	ADI		TEH	+4.6	
17	72	3.8	CRI		TEH	+2.5	CE Sleeve
		0.4	NQI		TEH	+3.9	
13	73	1.2	SRI		TEH	+2.8	CE Sleeve
7	75	3.5	SRI		TEH	+2.5	CE Sleeve
5	78	1.1	SRI		TEH	+2.6	CE Sleeve
8	78	0.7	SRI		TEH	+2.4	CE Sleeve
12	78	0.6	SAI		TEH	+2.8	CE Sleeve
9	80	1.0	SRI		TEH	+2.3	CE Sleeve
11	80	0.7	SAI		TEH	+2.7	BW Sleeve
		0.7	SAI		TEH	+2.8	
20	80	3.4	ADI		TEH	+4.0	BW Sleeve
14	82	1.4	SRI		TEH	+2.4	BW Sleeve
7	83	5.6	SRI		TEH	+2.4	BW Sleeve
12	84	5.4	MRI		TEH	+1.8	BW Sleeve

Number of Tubes: 121

Number of Indications: 149

Table 4-A





COL 10 20 30 40 50 60 70 80 90

#: 15: Installed in 1993: CE Plugs  
 C: 0: CE Sleeves  
 B: 107: B&W Sleeves  
 \*: 1: CE Welded Slv.Plug  
 D: 48: Deplugged Tubes (2 plugs, 46 sleeves)

Rochester Gas & Electric Corp.  
 Ginna Nuclear Power Station  
 S/G - B 04/08/93  
 Inlet

FIGURE 3

ACRI ISIS Tubes

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
9	2	1.0	SRI		TEH +2.7	CE Plug
12	5	2.0 2.7	MBI ADI		TEH +0.6 TEH +4.8	CE Plug
3	8	1.3	SAI		TEH +4.5	BW Sleeve
4	10	0.6 1.2	SAI SAI		TEH +4.1 TEH +5.1	BW Sleeve
29	12	1.3	SRI		TEH +3.1	CE Plug
2	13	0.3 1.9	MAI ADI		TEH +3.5 to +5.3 TEH +4.9	BW Sleeve
6	13	0.5	SAI		TEH +8.0	BW Sleeve
21	15		DPT			BW Sleeve
29	15		DPT			BW Sleeve
21	16		DPT			BW Sleeve
24	16		DPT			BW Sleeve
15	17	0.5	SAI		TEH +3.3	BW Sleeve
32	17	0.7	SRI		TEH +2.5	CE Plug
16	18	0.9	MAI		TEH +3.7 to +5.0	BW Sleeve
26	18	2.0	SRI		TEH +2.2	BW Sleeve
22	19	2.0	SRI		TEH +2.3	BW Sleeve
25	19	1.0	MRI		TEH +1.9	BW Sleeve
26	19	1.1	MRI		TEH +2.2	BW Sleeve
24	20	0.4		72	TEH +5.1	BW Sleeve
27	21	2.0	CRI		TEH +2.5	BW Sleeve
30	21		DPT			BW Sleeve
11	22	0.6	MAI		TEH +4.6	BW Sleeve

Table 4-B



## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
30	22		DPT			BW Sleeve
11	24	0.8	SAI		TEH +2.8	BW Sleeve
14	24	0.5		87	TEH +4.3	BW Sleeve
24	25	0.8	ADI		TEH +4.7	BW Sleeve
31	25		DPT			BW Sleeve
38	25		DPT			BW Sleeve
11	26	1.2	SRI		TEH +2.2	BW Sleeve
13	26	1.6	SAI		TEH +11.8	BW Sleeve
1	27	3.2	SAI		TEH +3.2	CE Plug
13	27	1.1	MAI		TEH +4.8	BW Sleeve
10	28	1.3	ADI		TEH +6.4	BW Sleeve
16	28	3.5	SRI		TEH +2.6	BW Sleeve
31	28	2.1	SRI		TEH +2.6	BW Sleeve
1	29	4.9 0.8	MAI	75	TEH +3.2 TEH +3.3	CE Plug
11	30	0.9	ADI		TEH +5.5	BW Sleeve
29	30	2.3	SRI		TEH +2.5	BW Sleeve
33	30	1.3 0.3	SAI	86	TEH +3.4 TEH +4.5	BW Sleeve
31	33	1.5	SRI		TEH +2.7	BW Sleeve
25	34	0.6 0.9	SAI SAI		TEH +6.9 TEH +13.4	BW Sleeve
38	34	1.7	SRI		TEH +2.7	BW Sleeve
22	35	1.6	SRI		TEH +2.6	BW Sleeve

Table 4-B

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location		Repair
38	35	1.7 3.0	SAI	81	TEH +3.2 TEH +3.6		BW Sleeve
41	35	1.0	SRI		TEH +2.7		BW Sleeve
8	36	1.1	MAI		TEH +3.4 to +7.5		BW Sleeve
28	36		DPT				BW Sleeve
40	36		DPT				BW Sleeve
28	37	0.2 3.2	PTF	83	TEH +5.0 TEH +17.6		CE Plug
30	37	0.2	NQI		TEH +16.6		BW Sleeve
34	37	2.2 0.7	MAI ADI		TEH +3.1 TEH +4.0		BW Sleeve
35	37		DPT				BW Sleeve
36	37		DPT				BW Sleeve
38	37	0.8	SRI		TEH +2.7		BW Sleeve
41	37	0.8	SAI		TEH +3.4		BW Sleeve
28	38	0.3	ADI		TEH +4.7		BW Sleeve
35	38		DPT				BW Sleeve
37	38	1.9	MAI		TEH +3.0 to +3.9		BW Sleeve
38	38		DPT				BW Sleeve
39	39		DPT				BW Sleeve
40	39		DPT				BW Sleeve
39	40		DPT				BW Sleeve
40	40		DPT				BW Sleeve
12	41	1.0	MAI		TEH +3.5		BW Sleeve
23	42	0.7 0.7	SAI SAI		TEH +4.9 to +6.3 TEH +16.6 to +18.0		CE Plug.

Table 4-B

R. G. &amp; E.

sg/B 93MAR

GINNA STATION

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
29	42	0.7	MAI		TEH +8.2 to +17.2	CE Plug
27	43	0.3	NQI		TEH +6.1	BW Sleeve
29	43	0.7	SAI		TEH +5.6	BW Sleeve
		1.4	SAI		TEH +7.2 to +8.1	
		1.9	SAI		TEH +9.2 to +11.8	
37	43	0.5	MAI		TEH +5.6	BW Sleeve
39	43		DPT			BW Sleeve
1	44	0.9	ADI		TEH +11.6	CE Plug
2	44	0.5	MAI		TEH +3.0 to +7.3	BW Sleeve
8	44	1.0	MAI		TEH +3.3 to +9.3	BW Sleeve
		1.0	MAI		TEH +3.3 to +9.3	
13	44	4.1	ADI		TEH +7.5	BW Sleeve
		1.8	ADI		TEH +9.2	
31	44	1.1	SAI		TEH +3.9	BW Sleeve
2	45	1.4	MAI		TEH +3.6 to +7.8	BW Sleeve
9	45	0.9	SAI		TEH +6.4	BW Sleeve
30	45	0.7	MAI		TEH +3.0 to +4.8	BW Sleeve
33	45	1.0	MAI		TEH +3.2	BW Sleeve
39	45		DPT			BW Sleeve
2	46	1.1	MAI		TEH +2.9 to +7.4	BW Sleeve
7	46	1.1	ADI		TEH +10.4	BW Sleeve
8	46	0.2	MAI		TEH +5.5 to +8.8	BW Sleeve
		0.5	ADI		TEH +9.0	
38	46		DPT			BW Sleeve
41	46		DPT			BW Sleeve
1	47	1.2	SAI		TEH +3.2	CE Plug

Table 4-B

R. G. &amp; E.

sg/B 93MAR

GINNA STATION

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location		Repair
4	47	1.8	SAI		TEH	+9.0	BW Sleeve
5	47	1.0 0.3	SAI	47	TEH TEH	+5.1 +5.1	BW Sleeve
34	47	0.4	SAI		TEH	+3.2	BW Sleeve
41	47		DPT				BW Sleeve
4	48	1.1	MAI		TEH	+7.4 to +5.9	BW Sleeve
7	49	1.1	SAI		TEH	+2.8	BW Sleeve
10	49	0.2	MAI		TEH	+4.4	BW Sleeve
12	49	0.4	MAI		TEH	+4.7 to +5.8	BW Sleeve
41	49		DPT				BW Sleeve
14	50	0.4	MAI		TEH	+3.8	BW Sleeve
32	50	0.6	MAI		TEH	+4.4	BW Sleeve
33	50	0.6	MAI		TEH	+3.8	BW Sleeve
34	50	0.6 1.8 0.9	MAI ADI ADI		TEH TEH TEH	+3.6 to +4.6 +5.3 +7.9	BW Sleeve
37	50		DPT				BW Sleeve
		0.9 2.0		70 70	TSH TSH	-15.4 -13.9	
4	51	0.5	SAI		TEH	+3.2	BW Sleeve
20	51	0.9	SAI		TEH	+3.6	BW Sleeve
25	52	0.6	MAI		TEH	+3.2	BW Sleeve
11	53	0.5	SAI		TEH	+6.9 to +8.5	BW Sleeve
23	54	0.5	MAI		TEH	+18.4 to +19.5	CE Plug
25	54	0.4		90	TEH	+7.9	BW Sleeve
29	54	1.9	ADI		TEH	+6.4	BW Sleeve

Table 4-B

R. G. &amp; E.

sg/B 93MAR

GINNA STATION

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
13	56	0.6	SAI		TEH +5.7	BW Sleeve
27	56	1.0	SRI		TEH +2.6	BW Sleeve
35	56		DPT			BW Sleeve
36	57		DPT			BW Sleeve
42	57		DPT			BW Sleeve
2	58	0.5	SAI		TEH +5.1	BW Sleeve
7	58	1.0	ADI		TEH +7.8	BW Sleeve
27	58	0.7	SAI		TEH +8.4	BW Sleeve
38	58		DPT			BW Sleeve
38	59		DPT			BW Sleeve
38	60		DPT			BW Sleeve
40	60		DPT			BW Sleeve
18	61	0.7	MAI		TEH +12.5	BW Sleeve
19	61	0.9	MAI		TEH +9.7	BW Sleeve
12	62	2.5	ADI		TEH +7.6	BW Sleeve
38	62		DPT			BW Sleeve
10	63	1.0	SAI		TEH +6.0	BW Sleeve
34	63		DPT			BW Sleeve
2	64	0.3	MAI		TEH +4.7	BW Sleeve
		0.6	MAI		TEH +9.1 to +9.9	
14	64	0.4	SAI		TEH +5.2	BW Sleeve
36	64		DPT			BW Sleeve
11	65	0.6	MAI		TEH +5.2 to +5.7	BW Sleeve
30	65	1.2	CRI		TEH +2.4	BW Sleeve

Table 4-B



## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location		Repair
36	65		DPT				BW Sleeve
30	66	0.9	SAI		TEH	+9.6	BW Sleeve
1	67	2.3	ADI		TEH	+4.1	CE Plug
33	67		DPT				BW Sleeve
23	68	0.7	SAI		TEH	+4.3	BW Sleeve
27	68	0.4	SRI		TEH	+3.2	BW Sleeve
7	69	0.6	MAI		TEH	+5.4	BW Sleeve
21	69	0.4	SAI		TEH	+14.6	BW Sleeve
27	69	0.4 0.3		77 86	TEH TEH	+3.8 +4.6	BW Sleeve
32	69		DPT				BW Sleeve
34	69	1.0 4.2	SAI ADI		TEH TEH	+2.7 +3.4	BW Sleeve
19	70	0.8	MAI		TEH	+3.2	BW Sleeve
24	71	0.8 0.4	MAI	83	TEH TEH	+3.6 +4.6	BW Sleeve
28	71	0.4	SAI		TEH	+4.4	BW Sleeve
30	71		DPT				BW Sleeve
14	72	1.4	ADI		TEH	+4.5	BW Sleeve
20	72	1.6	ADI		TEH	+12.2	BW Sleeve
26	72		DPT				BW Sleeve
1	73	0.4		92	TEH	+3.9	CE Plug
18	73	0.3	NQI		TEH	+4.8	BW Sleeve
21	73	0.9	ADI		TEH	+18.4	CE Plug
6	74	1.9	ADI		TEH	+4.4	BW Sleeve

Table 4-B

R. G. &amp; E.

sg/B 93MAR

GINNA STATION

## REPAIRABLE INDICATIONS

Row	Col	Volts	Ind. Desc	%TWD	Indication Location	Repair
8	74	2.9	ADI		TEH +5.7	BW Sleeve
27	75		DPT			BW Sleeve
7	76	0.3	SAI		TEH +2.9	BW Sleeve
20	76	0.3	SAI		TEH +3.7	BW Sleeve
24	76	0.2	SAI		TEH +2.8	BW Sleeve
12	77	0.2	SAI		TEH +4.0	BW Sleeve
27	77		DPT			BW Sleeve
28	77		DPT			BW Sleeve
21	79	0.3	SAI		TEH +3.2	BW Sleeve
10	80	0.8	MAI		TEH +4.8	BW Sleeve
22	80		DPT			BW Sleeve
8	81	0.5	SAI		TEH +3.5	BW Sleeve
13	81	0.3	SAI		TEH +2.8	BW Sleeve
22	81		DPT			CE Plug
14	85		DPT			BW Sleeve
13	86		DPT			BW Sleeve
12	87	13.5	MBI		TEH +0.3	CE Plug
		0.9	SAI		TEH +3.0	
7	88	0.8		75	TEH +3.0	BW Sleeve
		2.4	MAI		TEH +3.4	
		1.5		94	TEH +3.8	
8	90		DPT			CE Plug
		1.0	NQI		TSH -7.3	

Number of Tubes: 171

Number of Indications: 199

Table 4-B

GINNA STATION  
STEAM GENERATOR TUBE INSPECTION  
AND CORRECTIVE ACTION HISTORY

DATE	NO. TUBES INSPECTED				TOTAL TUBES REQUIRING CORRECTIVE ACTION		TYPE OF DEGRADATION	>40% REQUIRED REPAIRS		NO. TUBES PLUGGED		NO. TUBES SLEEVED		NO. PLUGGED RETURNED TO SERVICE		NO. SLEEVES PLUGGED		NO. PULLED TUBES		TOTAL (NET) PLUGGED		TOTAL (NET) SLEEVED		COMMENTS					
					A	B		A	B	A	B	A	B	A	B	A	B	A	B										
	HOT	COLD	HOT	COLD																A	B	A	B		A	B	A	B	A
IN FACTORY															1	0	1	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							
MAR 1974	3259	516	1098	516	19	0	WASTAGE	19	0	19	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	2	0	0	0						
MAR 1975	2174	442	1931	442	46	11	CRACKING/WASTAGE	46	11	46	11	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	2	0	0						
FEB 1976	3192	3192	3247	3247	39	2	WASTAGE	39	2	39	2	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	15	0	0						
APR 1977	2003	268	1525	268	13	2	WASTAGE	13	1	13	1	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	5	0	0	0						
JAN 1978					0	8	CRACKING/WASTAGE	0	8	0	8	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	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	6	0	0						
DEC 1979					0	13	IGA/WASTAGE	0	13	0	13	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	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	5	2					
MAY 1981	3138	325	3141	400	0	4	IGA/WASTAGE	0	6	0	4	0	16	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	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	1	33	0	0						
APR 1983	3137	633	3096	832	4	4	IGA/SCC	0	23	0	3	4	74	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	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	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	24	6	33	7					
FEB 1987	3128	0	2884	0	34	73	IGA/SCC	17	78	10	72	24	80	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	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	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	17	82	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	5	1	2	0	24	-8	51	190	12					
APR 1991	2945	1093	2359	1092	116	117	IGA/SCC/PWSCC/WAS	27	52	12	7	81	93	22	15	1	2	1	0	-10	-9	102	107	13					
APR 1992	2748	757	1998	706	244	218	IGA/SCC/PWSCC/WAS	5	16	14	20	214	173	16	29	0	7	0	0	-2	-10	230	195	14					
MAR 1993	2520	894	1813	723	122	123	IGA/SCC/PWSCC	7	14	9	18	114	154	0	46	1	1	0	0	9	-29	113	199	15					
					912	1439				243	478	633	1170	55	203	12	23	7	9	194	284	668	1333						

\* Returned to Service  
without Sleeve

A=8 B=18

TABLE 5

M. J. Davison  
19-APR-93

Rev. 1

**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 C45 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 misplugged 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 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)

(14) A total of 244 tubes, including 16 deplugged tubes, in "A" steam generator were repaired in 1992 as follows:

36	CE 27" welded sleeves (straight)
194	B&W explosively welded tubesheet sleeves
14	Tube and/or sleeve plugs (including two tubes stabilized R12-C11 and R13-C11)

A total of 218 tubes, including 30 deplugged tubes, in "B" steam generator were repaired as follows:

186	CE 27" welded sleeves (straight and periphery)
9	CE 30" welded sleeves (straight)
23	Tube and/or sleeve plugs (includes two tubes stabilized R11-C46 and R13-C89, deplugged tube R33-C75 and 3 B&W Explosive plug repairs)

(15)

A total of 122 tubes in "A" steam generator were repaired in 1993 as follows:

51	CE 27" welded sleeves (straight)
62	B&W explosively welded tubesheet sleeves
6	CE mechanical tube plugs
1	B&W explosively welded sleeve plug
2	CE welded tube plugs

A total of 171 tube, including 48 deplugged tubes, in "B" syeam generator were repaired as follows:

153	B&W explosively welded tubesheet sleeves (includes 46 de-plugged tubes)
1	CE welded sleeve plug
17	CE mechanical tube plug (include 2 de-plugged tubes)



