

CALVERT CLIFFS
UNIT II
EDDY CURRENT INSPECTION OF
STEAM GENERATORS 21 AND 22

Final Report
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Evaluation Performed By
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Prepared For
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TYPES OF ABBREVIATIONS USED

S/G	-	STEM GENERATOR
INLET/OUTLET	-	SIDE FROM WHICH INSPECTION WAS PERFORMED
REEL	-	DATA REEL NUMBER AS IDENTIFIED ON MAGNETIC TAPE AND/OR CHART PAPER
SIDE	-	SIDE #1 OR #2 IF APPLICABLE, OTHERWISE BLANK
TUBE ID	-	TUBE IDENTIFICATION LINE # ROW # AID QUADRANT #
FROM	-	THE SIGNAL SOURCE FROM WHICH THE EVALUATION WAS MADE
		(BLANK) INDICATES THAT THE PRIMARY TEST FREQUENCY WAS USED
		"U" " " " " UPPER MIXER SIGNAL " "
		"L" " " " " LOWER MIXER SIGNAL " "
VOLTS P-P	-	PEAK TO PEAK VOLTAGE OF THE INDICATION SIGNAL
CURRENT	-	THE CURRENT PERCENT THROUGH WALL INDICATION AS EVALUATED
ORIGIN	-	THE ORIGIN OF THE REPORTED SIGNAL
		"OD" INDICATES THE SIGNAL ORIGIN TO BE FROM THE OUTSIDE DIAMETER
		"ID" " " " " " " " " " " INSIDE DIAMETER
LOCATION	-	THE AXIAL LOCATION OF THE INDICATION
INDEX	-	THE TAPE INDEX OF THE REPORTED INDICATION
PAGE OF	-	PAGE NUMBER OF EDDY CURRENT TEST RESULTS
		EACH REEL OF DATA SHOULD BEGIN WITH PAGE #1
EVALUATOR	-	SIGNATURE OF DATA EVALUATOR
IDE LEVEL	-	CERTIFICATION LEVEL OF DATA EVALUATOR
	-	WHEN USED IN THE "CURRENT" COLUMN, THIS DENOTES THAT NO
		DETECTABLE INDICATIONS WERE FOUND
FM	-	PERMEABILITY VARIATION, NOT A REPORTABLE INDICATION
CU	-	COPPER LIKE DEPOSITION, NOT A REPORTABLE INDICATION
DTS	-	DISTORTED TUBE SHEET SIGNAL
EP	-	EXPLOSIVE PLUG (AS REPORTED ON MAGNETIC TAPE OR CHART PAPER)
MP	-	MECHANICAL PLUG " " " " " " " "
WP	-	WELDED PLUG " " " " " " " "
ATE	-	ABOVE TUBE END
TTS	-	TOP OF TUBE SHEET
ATS	-	ABOVE TUBESHEET
TSP	-	TUBE SUPPORT PLATE
BW	-	BAG WING SUPPORT
E/C	-	EGG CRATE
AVB	-	ANTI VIBRATION BAR
V/p-p	-	PEAK TO PEAK VOLTAGE
TS	-	TUBESHEET
HL	-	HOT LEG
CL	-	COLD LEG
HG	-	HIGH GAIN
LG	-	LOW GAIN
RT#	-	RETESTED ON REEL #

I. INTRODUCTION

Zetec, Inc. was contracted in November 1982 by Baltimore Gas and Electric to provide four people to assist BGE personnel with the eddy current examination of the Calvert Cliffs Unit II steam generators in Lusby, Maryland. In addition, Zetec, Inc. provided a Level IIA Data Interpreter to evaluate the test results.

II. DISCUSSION

The MIZ-12 Eddy Current System was used to inspect the Calvert Cliffs Unit II Steam Generators 21 and 22. The MIZ-12 uses eddy currents as the probing media to measure variations in effective conductivity and/or permeability of the tube being tested.

An alternating voltage is impressed across the test coil. The magnetic field developed by current flow in the test coil causes eddy currents to flow in the tube wall. The corresponding magnetic field caused by eddy current flow in the tube wall is out of phase with the field developed by the current in the test coil. Since these fields tend to cancel one another, the coil voltage is decreased in proportion to the magnitude of eddy current flow in the test piece. The magnitude of eddy currents in the test piece, thus the coil voltage, is dependent on the electrical properties of the tube being tested. The electrical properties which affect the flow of eddy currents are permeability and conductivity. In non-magnetic materials, such as Inconel and 300 series stainless steel, conductivity is usually the only significant variable. When the effective conductivity decreases due to a discontinuity in the tube wall, the coil voltage increases in direct relationship with the effective conductivity change. Thus, the amount of increase in coil voltage is related to the size of the discontinuity. The coil voltage is sinusoidal and can be described with a single vector having magnitude and phase.

The MIZ-12 is a four-frequency system with signal mixing and manipulation capabilities. This allows simultaneous investigation of a part with up to four frequencies on a single scan of the test probe. In addition, data can be manipulated via a mixer module to reduce or eliminate unwanted signals such as surface noise, fill factor variation, lift off, tube support, tube sheet and other similar signals. With this capability, the system can be considered more multi-parameter since it provides more qualitative and quantitative information than was available in previous systems.

A differential test coil probe having a diameter of .560" was used to inspect Calvert Cliffs Unit II Steam Generators 21 and 22. Channel one of the MIZ-12 tester was set at 400 KHz differential. This is the optimum frequency for defect information. Channel two of the tester was set at 100 KHz differential. Channel three was set at 400 KHz low gain differential for dent magnitude evaluation. For tubes in rows 89 and less, channel three was set at 25 KHz for sludge height measurements. Channel four was set at 100 KHz absolute.

Channel one (400 KHz DIFF) was mixed with channel two (100 KHz DIFF) to suppress unwanted signals originating on the outside of the tube such as supports and tube sheet influences. Channel three, when run at 400 KHz-low gain, was used to evaluate the voltage amplitude of dents observed that were large enough to saturate channel one (400 KHz-high gain).

The eddy current testing performed exceeded the requirements of Calvert Cliffs Unit II Technical Specifications. Two (2) tubes were found to be defective, one in each steam generator. These tubes exceeded the plugging limit of 40% loss of nominal wall thickness. The tube numbers are Line 15 Row 136 Quadrant 3 in Steam Generator 21 and Line 46 Row 29 Quadrant 2 in Steam Generator 22 and show tube wall loss of 44% and 39% respectively. Records show that these tubes have not been inspected by eddy current techniques in the area of the flaws prior to this inspection. Both flaws were small volume, small area flaws. A small pit on the outside diameter of the tube would produce this type of indication. The flaws were not located in the sludge pile area of the steam generators nor were they in the area of a tube support.

In addition to the two defective tubes, four (4) degraded tubes were discovered. A degraded tube contains imperfection/s greater than or equal to 20% of the nominal tube wall thickness. Two (2) degraded tubes were found in each steam generator. These indications were also small in volume and area. One degraded tube discovered during this inspection was inspected previously in February 1981. The previous inspection data was reviewed for that tube and no indications were detected.

More detailed results can be found in the appendices as outlined below.

- Appendix I Contains test results for Steam Generator 21
- Appendix II Contains test results for Steam Generator 22
- Appendix III Contains a listing for all tubes inspected in Steam Generator 21
- Appendix IV Contains a listing for all tubes inspected in Steam Generator 22
- Appendix V Contains a specific calibration sheet, data reduction curves, and equipment certifications.
- Appendix VI Contains Zetec, Inc. personnel certifications

APPENDIX I

EDDY CURRENT TEST INDICATIONS

STEAM GENERATOR 21

- I. DENT INDICATIONS
- II. OTHER INDICATIONS
- III. SLUDGE WEIGHT LEVELS

STEAM GENERATOR No 21
EDDY CURRENT TEST RESULTS

I. DENT INDICATIONS

LINE	ROW	QUAD	VOLTS P-P		LOCATION	REEL
			400 HG	400 LG		
25	132	2	10		#9 TSP HL	3
21	118	2	8		#10 TSP HL	3
41	8	2	10		5" ABOVE #6 EC CL	8
45	12	2	8		15" ABOVE #6 EC CL	8
52	11	2	8		6" ABOVE #6 EC CL	8
59	12	2	10		5" ABOVE #6 EC HL	8
78	49	2	10		12" ABOVE #6 EC HL	9
78	49	2	10		13" ABOVE #6 EC HL	9
19	92	3		2.2	#9 TSP HL	10
19	94	3		4.1	#9 TSP HL	10
19	96	3		3.0	#9 TSP HL	10
19	98	3		1.0	#9 TSP HL	10
17	102	3		2.0	#9 TSP HL	10
17	94	3		5.0	#9 TSP HL	10
17	92	3		3.0	#9 TSP HL	10
15	92	3		1.4	#9 TSP HL	10
15	94	3		1.2	#9 TSP HL	10
15	100	3		2.4	#9 TSP HL	10
15	102	3		5.0	#9 TSP HL	10
15	104	3		1.4	#9 TSP HL	10
15	114	3		0.5	#9 TSP HL	10
15	126	3		1.4	5" ABOVE #10 TSP HL	10

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>VOLTS P-P</u>		<u>LOCATION</u>	<u>REEL</u>
			<u>400 HG</u>	<u>400 LG</u>		
13	104	3		0.2	#9 TSP HL	11
13	96	3		0.2	#9 TSP HL	11
13	94	3		1.4	#9 TSP HL	11
13	92	3		1.4	#9 TSP HL	11
11	128	3	10		#7 EC CL	11
3	124	3		1.0	10" ABOVE #9 TSP HL	13
68	1	2	10+		3" ABOVE #6 EC HL	14

II. OTHER INDICATIONS

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>VOLTS P-P</u>	<u>TYPE/ % WALL</u>	<u>LOCATION</u>	<u>REEL</u>	<u>INDEX</u>
39	92	2	1.0	<20% OD	8" ABOVE TS CL	1	888
39	94	2		FV	TOP TS TO #4 EC HL	1	
58	101	2		FV	BTWN #8 EC & #9 TSP	1	
58	95	2	0.8	<20% OD	2" ABOVE TS CL	2	050
59	100	2		FV	THROUGHOUT TUBE	2	
25	130	2	0.8	<20% OD	12" ABOVE #2 SW	3	276
23	130	2	0.5	<20% OD	20" ABOVE #4 SW	3	470
1	132	2	2.0	35% OD	#2 EC CL	4	1257
			1.4	28% OD	4" ABOVE #3 EC CL	4	1257
1	126	2	0.8	<20% OD	24" ABOVE #2 EC CL	4	1315
2	125	2	0.6	25% OD	32" ABOVE #1 EC CL	4	1393

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>VOLTS P-P</u>	<u>TYPE/ % WALL</u>	<u>LOCATION</u>	<u>REEL</u>	<u>INDEX</u>
21	128	2		PV	3" ABOVE #9 TSP CL	5	
1	66	2		PV	16" ABOVE #4 EC HL	5	
9	58	2		PV	BTWN #3 & 4 EC HL	5	
40	49	2		PV	#3 EC HL	8	
47	12	2	1.9	<20% OD	2" ABOVE #2 EC HL	8	1190
59	10	2		PV	TOP TS TO 12" ABOVE TS CL	8	
15	126	3	0.3	<20% OD	4" ABOVE TS HL	10	1610
15	136	3	1.6	44% OD	10" ABOVE TS HL	11	178
13	94	3		PV	BTWN #2 & 8 EC HL	11	
11	98	3		PV	BTWN #7 EC & #9 TSP HL	11	
9	104	3		PV	3" ABOVE #7 EC HL	12	
7	130	3		PV	1" ABOVE #9 TSP HL	12	
5	122	3		PV	8" ABOVE #7 EC HL	12	
3	108	3		PV	#9 TSP HL	12	
3	134	3		PV	20" ABOVE #10 TSP HL	13	
46	73	2		PV	3" ABOVE #4 EC CL	13	
46	35	2		PV	37" ABOVE #1 EC HL	13	
46	29	2	0.4	<20% OD	7" ABOVE #2 EC CL	13	1108

III. SLUDGE LEVELS

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>		<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>	
			<u>INLET</u>	<u>OUTLET</u>				<u>INLET</u>	<u>OUTLET</u>
58	11	2	2	2½	60	9	2	1	2½
58	9	2	2	2	60	7	2	0	2
59	3	2	½-1	2½	60	5	2	0	0-½
59	10	2	1½	NT	60	3	2	0	0-½
59	12	2	2	3	60	1	2	0	0-½
60	11	2	2	2½	61	2	2	0	0-½

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
62	1	2	0- $\frac{1}{2}$	NT	81	38	2	$\frac{1}{2}$	$\frac{1}{2}$
64	1	2	$\frac{1}{2}$	$\frac{1}{2}$	80	39	2	$\frac{1}{2}$	$\frac{1}{2}$
65	2	2	$\frac{1}{2}$	1	80	41	2	$\frac{1}{2}$	$\frac{1}{2}$
66	1	2	1	NT	80	43	2	$\frac{1}{2}$	$\frac{1}{2}$
67	2	2	1	NT	79	46	2	$\frac{1}{2}$	$\frac{1}{2}$
68	1	2	1	NT	79	48	2	$\frac{1}{2}$	$\frac{1}{2}$
84	3	2	1	1	78	49	2	$\frac{1}{2}$	$\frac{1}{2}$
84	5	2	$\frac{1}{2}$	NT	78	51	2	$\frac{1}{2}$	$\frac{1}{2}$
84	7	2	$\frac{1}{2}$	$\frac{1}{2}$	78	53	2	$\frac{1}{2}$	$\frac{1}{2}$
84	9	2	1	$\frac{1}{2}$	77	54	2	$\frac{1}{2}$	$\frac{1}{2}$
84	11	2	1	1	77	56	2	$\frac{1}{2}$	$\frac{1}{2}$
84	11	2	1	1	76	57	2	$\frac{1}{2}$	$\frac{1}{2}$
84	13	2	$\frac{1}{2}$ -1	1	76	59	2	$\frac{1}{2}$	$\frac{1}{2}$
84	15	2	$\frac{1}{2}$	1	75	60	2	$\frac{1}{2}$	$\frac{1}{2}$
83	16	2	$\frac{1}{2}$	1	75	62	2	$\frac{1}{2}$	$\frac{1}{2}$
83	18	2	$\frac{1}{2}$	$\frac{1}{2}$	74	63	2	$\frac{1}{2}$	$\frac{1}{2}$
83	20	2	1	$\frac{1}{2}$	74	65	2	$\frac{1}{2}$	$\frac{1}{2}$
83	22	2	$\frac{1}{2}$	$\frac{1}{2}$	74	67	2	$\frac{1}{2}$	$\frac{1}{2}$
83	24	2	$\frac{1}{2}$	$\frac{1}{2}$	73	68	2	$\frac{1}{2}$	$\frac{1}{2}$
82	25	2	$\frac{1}{2}$	$\frac{1}{2}$	72	69	2	$\frac{1}{2}$	$\frac{1}{2}$
82	27	2	$\frac{1}{2}$	$\frac{1}{2}$	72	71	2	$\frac{1}{2}$	$\frac{1}{2}$
82	29	2	$\frac{1}{2}$	$\frac{1}{2}$	72	73	2	$\frac{1}{2}$	$\frac{1}{2}$
82	31	2	$\frac{1}{2}$	$\frac{1}{2}$	70	75	2	$\frac{1}{2}$	$\frac{1}{2}$
81	32	2	$\frac{1}{2}$	$\frac{1}{2}$	70	77	2	$\frac{1}{2}$	$\frac{1}{2}$
81	34	2	0- $\frac{1}{2}$	$\frac{1}{2}$	69	78	2	$\frac{1}{2}$	$\frac{1}{2}$
81	36	2	$\frac{1}{2}$	$\frac{1}{2}$	69	80	2	$\frac{1}{2}$	$\frac{1}{2}$

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
69	81	2	$\frac{1}{2}$	$\frac{1}{2}$	22	55	2	2-2 $\frac{1}{2}$	1
68	83	2	$\frac{1}{2}$	$\frac{1}{2}$	22	53	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$
66	87	2	$\frac{1}{2}$	$\frac{1}{2}$	22	51	2	1	2
65	88	2	$\frac{1}{2}$	$\frac{1}{2}$	22	49	2	$\frac{1}{2}$	2
19	76	3	1 $\frac{1}{2}$	3	22	47	2	$\frac{1}{2}$	2 $\frac{1}{2}$
19	78	3	1 $\frac{1}{2}$	3	22	45	2	TRACE	2
19	80	3	2	3	22	43	2	0	2 $\frac{1}{2}$
19	84	3	1 $\frac{1}{2}$	3	24	43	2	0	2 $\frac{1}{2}$ -3
19	86	3	2	4	26	43	2	$\frac{1}{2}$	2 $\frac{1}{2}$
19	88	3	2	3 $\frac{1}{2}$	29	44	2	2	
19	90	3	2	2 $\frac{1}{2}$ -3	30	43	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$
15	78	2	2	2 $\frac{1}{2}$ -3	32	43	2	3 $\frac{1}{2}$	2-3
17	78	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	34	43	2	3 $\frac{1}{2}$	3
19	78	2	1	1 $\frac{1}{2}$	36	43	2	2 $\frac{1}{2}$	
21	78	2	1	1	38	43	2	2	2 $\frac{1}{2}$
22	77	2	1	1	40	43	2	2	3
22	75	2	1	1	40	45	2	2	3
22	73	2	1	1-2	40	47	2	2	3
22	71	2	1		40	49	2	2	
22	69	2	1	1 $\frac{1}{2}$	40	51	2	1 $\frac{1}{2}$	3
22	67	2	1 $\frac{1}{2}$	2	40	53	2	1 $\frac{1}{2}$	3
22	65	2	1 $\frac{1}{2}$	1	40	55	2	1 $\frac{1}{2}$	
22	63	2	2	1	40	61	2	1 $\frac{1}{2}$	
22	61	2	2 $\frac{1}{2}$	1-1 $\frac{1}{2}$	40	33	2	2	
22	59	2	2 $\frac{1}{2}$	1	40	37	2	2	
22	57	2	2 $\frac{1}{2}$	0-1	40	35	2	1 $\frac{1}{2}$	

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
40	33	2	$1\frac{1}{2}$	3	42	9	2	$\frac{1}{2}$	0
40	31	2	$1\frac{1}{2}$	3	43	8	2	$\frac{1}{2}$	0
40	29	2	$1\frac{1}{2}$	$2\frac{1}{2}$ -3	43	10	2	$\frac{1}{2}$	0
40	27	2	$1\frac{1}{2}$	2	43	12	2	$\frac{1}{2}$	0
40	25	2	$1\frac{1}{2}$	2	44	11	2	$\frac{1}{2}$	0
40	23	2	$1\frac{1}{2}$	2	44	9	2	$\frac{1}{2}$	$0-\frac{1}{2}$
40	21	2	1	$1\frac{1}{2}$ -2	45	8	2	$\frac{1}{2}$	$\frac{1}{2}$
40	19	2	$\frac{1}{2}$	$1\frac{1}{2}$	45	10	2	$\frac{1}{2}$	0
40	17	2	$\frac{1}{2}$	1	45	12	2	$\frac{1}{2}$	1
40	15	2	$\frac{1}{2}$	1	46	11	2	$\frac{1}{2}$	
40	13	2	$\frac{1}{2}$	$\frac{1}{2}$ -1	46	9	2	$\frac{1}{2}$	0
40	11	2	$\frac{1}{2}$	$\frac{1}{2}$	45	8	2	$0-\frac{1}{2}$	
40	9	2	$\frac{1}{2}$	$\frac{1}{2}$	47	8	2	$0-\frac{1}{2}$	0
41	8	2	$\frac{1}{2}$	$\frac{1}{2}$	47	10	2	$0-\frac{1}{2}$	1
41	10	2	$\frac{1}{2}$	$\frac{1}{2}$	47	12	2	$0-\frac{1}{2}$	1
41	12	2	$\frac{1}{2}$	$0-\frac{1}{2}$	48	11	2	$0-\frac{1}{2}$	
41	14	2	$\frac{1}{2}$	$\frac{1}{2}$	48	9	2	$\frac{1}{2}$	$\frac{1}{2}$
41	16	2	$\frac{1}{2}$	$\frac{1}{2}$	49	8	2	$0-\frac{1}{2}$	$\frac{1}{2}$
41	18	2	$\frac{1}{2}$	1	49	10	2	$0-\frac{1}{2}$	$\frac{1}{2}$
41	20	2	1	$1\frac{1}{2}$	49	12	2	$0-\frac{1}{2}$	$\frac{1}{2}$
42	19	2	1	$1\frac{1}{2}$	50	11	2	$0-\frac{1}{2}$	$0-\frac{1}{2}$
42	17	2	$\frac{1}{2}$	$1\frac{1}{2}$	50	9	2	0	1
42	15	2	$\frac{1}{2}$	$1\frac{1}{2}$	51	8	2	$0-\frac{1}{2}$	1
42	13	2	$\frac{1}{2}$		51	10	2	$0-\frac{1}{2}$	1
42	11	2	$\frac{1}{2}$	0	51	12	2	1	$1-\frac{1}{2}$

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
52	11	2	1	1 $\frac{1}{2}$	46	67	2	2 $\frac{1}{2}$	3 $\frac{1}{2}$
52	9	2	0- $\frac{1}{2}$	2	46	65	2	2 $\frac{1}{2}$	4
53	8	2	0- $\frac{1}{2}$	1-2	46	63	2	2 $\frac{1}{2}$	4
53	10	2	$\frac{1}{2}$	1-2	46	61	2	2 $\frac{1}{2}$	4 $\frac{1}{2}$
53	12	2	1 $\frac{1}{2}$	2	46	59	2	2 $\frac{1}{2}$	4
54	11	2	2 $\frac{1}{2}$	2	46	57	2	2 $\frac{1}{2}$	4 $\frac{1}{2}$
54	9	2	1	2	46	55	2	2 $\frac{1}{2}$	4 $\frac{1}{2}$
55	8	2	0- $\frac{1}{2}$	1 $\frac{1}{2}$	46	53	2	2 $\frac{1}{2}$	4 $\frac{1}{2}$
55	10	2	2	2	46	51	2	2 $\frac{1}{2}$	4 $\frac{1}{2}$
55	12	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	46	49	2	2	4 $\frac{1}{2}$
56	11	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	46	47	2	2 $\frac{1}{2}$	5
56	9	2	1 $\frac{1}{2}$	2 $\frac{1}{2}$	46	45	2	2	5
57	8	2	1	2	46	43	2	2	5
57	10	2	2	2	46	41	2	2	5
57	12	2	2 $\frac{1}{2}$	2 $\frac{1}{2}$	46	39	2	2	4 $\frac{1}{2}$
46	89	2	0	0	46	37	2	1 $\frac{1}{2}$	4 $\frac{1}{2}$
46	87	2	$\frac{1}{2}$	$\frac{1}{2}$	46	35	2	1 $\frac{1}{2}$	4
46	85	2	1 $\frac{1}{2}$	1	46	33	2	1 $\frac{1}{2}$	4
46	83	2	1 $\frac{1}{2}$	1	46	31	2	2	4 $\frac{1}{2}$
46	81	2	1 $\frac{1}{2}$	1 $\frac{1}{2}$	46	29	2	2	4 $\frac{1}{2}$
46	79	2	2		46	27	2	2	4
46	77	2	2	2	46	25	2	1 $\frac{1}{2}$	3 $\frac{1}{2}$
46	75	2	2	2	46	23	2	1 $\frac{1}{2}$	4
46	73	2	2	2 $\frac{1}{2}$	46	21	2	1 $\frac{1}{2}$	3 $\frac{1}{2}$
46	71	2	2 $\frac{1}{2}$	3	46	19	2	1	3 $\frac{1}{2}$
46	69	2	2 $\frac{1}{2}$	3	46	17	2	1 $\frac{1}{2}$	4

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
46	15	2	$\frac{1}{2}$	3	60	37	2	$1\frac{1}{2}$	2
46	13	2	$0-\frac{1}{2}$	$2\frac{1}{2}$	60	39	2	2	2
47	14	2	1	3	60	41	2	2	2
48	13	2	$0-\frac{1}{2}$	3	60	43	2	$1\frac{1}{2}$	2
49	14	2	1	$3\frac{1}{2}$	60	45	2	$1\frac{1}{2}$	$1\frac{1}{2}$
50	13	2	1	$3\frac{1}{2}$	60	47	2	$1\frac{1}{2}$	2
51	14	2	2	3	60	49	2	$1\frac{1}{2}$	2
52	13	2	2	3	60	51	2	1	$1\frac{1}{2}$
53	14	2	$2\frac{1}{2}$	3	60	53	2	1	$1\frac{1}{2}$
54	13	2	3	3	60	55	2	1	$0-\frac{1}{2}$
55	14	2	3	$3\frac{1}{2}$	1	88	2		2.0
56	13	2	$2\frac{1}{2}$	3	1	86	2		2.0
57	14	2	$2\frac{1}{2}$	3	1	84	2		$1\frac{1}{2}$
58	13	2	2	3	1	82	2		2
59	14	2	$2\frac{1}{2}$	3	1	80	2		1-2
60	13	2	2	$2\frac{1}{2}$	1	78	2		$2\frac{1}{2}$
60	17	2	3	3	1	76	2		2
60	19	2	$2\frac{1}{2}$	3	1	74	2		$2\frac{1}{2}$
60	21	2	2	$2\frac{1}{2}$	1	72	2		$2\frac{1}{2}$
60	23	2	$1\frac{1}{2}$	$2\frac{1}{2}$	1	70	2		2
60	27	2	2	$2\frac{1}{2}$	1	68	2		$2\frac{1}{2}$
60	29	2	2	$2\frac{1}{2}$					
60	31	2	$1\frac{1}{2}$	$2\frac{1}{2}$	1	62	2		2-3
60	33	2	2	$2\frac{1}{2}$	1	60	2		$2\frac{1}{2}$
60	35	2	$1\frac{1}{2}$	2	1	58	2		2

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>		<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>	
			<u>INLET</u>	<u>OUTLET</u>				<u>INLET</u>	<u>OUTLET</u>
3	58	2		3					
5	58	2		3					
7	58	2		2½					
9	58	2		2½					
11	60	2		2½					
11	62	2		2					
11	64	2		1½					
11	66	2		2½					
11	68	2		2½					
11	70	2		2½-3					
11	72	2		2½					
11	74	2		2					
11	76	2		2-3					
13	78	2		3					

APPENDIX II

EDDY CURRENT TEST INDICATIONS

STEAM GENERATOR 22

- I. DENT INDICATIONS
- II. OTHER INDICATIONS
- III. SLUDGE HEIGHT LEVELS

STEAM GENERATOR No 22
EDDY CURRENT TEST RESULTS

I. DENT INDICATIONS

LINE	ROW	QUAD	VOLTS P-P		LOCATION	REEL
			400 HG	400 LG		
32	91	2	8		#9 TSP HL	1
35	92	2		1.0	#9 TSP CL	1
			7		#9 TSP HL	1
				0.3	12" ABOVE #8 EC HL	1
35	100	2		2.3	#9 TSP HL	1
36	99	2		3.3	#9 TSP HL	1
36	95	2		0.3	#9 TSP CL (3SM.DENTS)	1
36	93	2	4-8		4 DENTS BTWN #8 EC & #9 TSP CL	1
37	96	2	9		#8 EC CL	1
37	100	2		2.0	#9 TSP HL	1
38	95	2		0.4	12" ABOVE #8 EC CL	1
38	91	2	8		#9 TSP HL	1
39	92	2		0.8	#8 EC CL	1
				1.0	#9 TSP CL	1
				0.6	#9 TSP HL	1
41	92	2		1.2	#9 TSP HL	1
46	91	2		.2-.4	3 DENTS 12"-14" ABOVE #8 EC HL	1
47	92	2		.2-.3	2 DENTS 8"-10" ABOVE #8 EC CL	1
48	91	2	8		#7 EC HL	1
50	91	2		.2-.4	2 DENTS 16" ABOVE #8 EC CL	1
57	96	2		.4-.5	2 DENTS 16" ABOVE #8 EC HL	1
				.4-.5	2 DENTS #8 EC HL	1

LINE	ROW	QUAD	VOLTS P-P		LOCATION	REEL
			400 HG	400 LG		
58	97	2		.2-.6	#9 TSP HL/12" ABOVE #8 EC HL/#8 EC HL	1
59	96	2		.8-1.0	#8 EC CL/#9 TSP CL/#9 TSP HL/12" ABOVE #8 EC HL	1
60	91	2		0.4	#9 TSP CL	1
62	93	2		.8-1.0	8" & 12" ABOVE #8 EC CL	2
62	91	2		0.4	#9 TSP CL	2
64	91	2		.6-1.4	20' A #8 EC CL/ ABOVE & BELOW #9 TSP	2
49	110	2		0.3	#2 BW	2
43	114	2		3.0	#9 TSP HL	2
35	128	2		0.5	12" ABOVE #9 TSP HL	2
26	131	2		0.6	#9 TSP HL	2
24	131	2		1.0	#9 TSP HL	3
22	133	2		1.0	#9 TSP HL	3
19	132	2		0.8	#9 TSP HL	3
18	133	2		0.4	#9 TSP HL	3
13	134	2		0.2	4 DENTS BTWN #9 TSP & #10 TSP CL/ #10 TSP HL	3
9	140	2		0.2	#10 TSP HL	4
8	139	2		0.4	#10 TSP HL	4
7	140	2		0.5	#10 TSP HL	4
6	139	2		0.5	#10 TSP HL	4
6	137	2		0.4	#10 TSP HL	4
5	136	2	10.		#10 TSP HL	4
5	138	2		0.2	#10 TSP HL	4
5	140	2		0.4	#10 TSP HL	4

LINE	ROW	QUAD	VOLTS P-P		LOCATION	REEL
			400 HG	400 LG		
4	139	2		0.2	#10 TSP HL	4
4	137	2		0.2	#10 TSP HL	4
3	138	2		0.2	#10 TSP HL	4
3	140	2		0.2	#10 TSP HL	4
2	139	2	10		#10 TSP HL	4
1	140	2	10		#10 TSP HL	4
1	138	2	10		#10 TSP HL	4
1	136	2	10		#10 TSP HL	4
2	135	2	10		#10 TSP HL	4
2	131	2		.2	# 9 TSP HL	4
1	130	2		.2	# 9 TSP HL	4
1	118	2		.6	# 9 TSP HL	4
3	118	2		.3	# 9 TSP HL	4
6	117	2		.2	#10 TSP HL	4
7	118	2	10		#10 TSP HL	4
2	99	2		2.5	# 9 TSP HL	5
1	98	2		2.0	# 9 TSP HL	5
2	97	2		2.1	# 9 TSP HL	5
1	96	2		0.4	# 9 TSP HL	5
2	95	2		0.4	# 9 TSP HL	5
40	39	2	9		5" ABOVE TS CL	6
42	9	2	10+		6" ABOVE #6 EC CL	6
43	8	2	6		6" ABOVE #6 EC HL	6
45	3	2	10		6" ABOVE #6 EC CL	7
34	15	2	10+		6" ABOVE #6 EC CL	7

LINE	ROW	QUAD	VOLTS P-P		LOCATION	REEL
			400 HG	400 LG		
19	104	3		2.0	#9 TSP HL	8
19	106	3		2.0	#9 TSP HL	8
19	120	3		0.8	#10 TSP CL	8
			4-7		4 DENTS BTWN #9 & 10 TSP HL	
19	124	3	4-6		3 DENTS BTWN #9 & 10 TSP CL	8
17	136	3	5		2 DENTS #3 BW	8
17	120	3	8		14" ABOVE #9 TSP HL	8
17	116	3	8		#9 TSP HL	8
15	100	3		3.2	#9 TSP HL	8
15	102	3		1.0	#9 TSP HL	8
15	116	3	5		12" ABOVE TS HL	9
15	124	3		.2	#9 TSP HL	9
11	116	3	8		#9 TSP HL	9
11	122	3	10		6" ABOVE #9 TSP CL	9
				0.2	15" ABOVE #9 TSP HL	9
			8-10		4"-6" ABOVE #9 TSP HL	9
11	132	3		0.2	#9 TSP HL	9
9	140	3	6		#10 TSP HL	9
9	110	3		0.6	#9 TSP HL	10
9	96	3		0.8	#9 TSP HL	10
7	116	3		0.2	#9 TSP HL	10
7	118	3		0.6	#9 TSP HL	10
7	134	3	10		#9 TSP HL	10
5	136	3		0.3	#10 TSP HL	10
5	134	3	8		#9 TSP HL	10

LINE	ROW	QUAD	VOLTS P-P		LOCATION	REEL
			400 HG	400 LG		
5	116	3		1.2	#9 TSP HL	10
5	114	3		0.6	#9 TSP HL	10
3	96	3		0.4	#9 TSP HL	10
3	102	3		2.0	#9 TSP HL	10
3	110	3		0.4	#9 TSP HL	10
3	112	3	4		#9 TSP HL	10
3	118	3		0.6	#9 TSP HL	11
3	120	3		0.8	#9 TSP HL	11
3	136	3	8		#10 TSP HL	11
3	138	3	10		#10 TSP HL	11
3	140	3	10		#10 TSP HL	11
2	139	3		0.4	#10 TSP HL	11
46	63	2	6		30" ABOVE #1 EC CL	11
46	15	2	10+		#6 EC CL/22" ABOVE #6 EC CL	11

II. OTHER INDICATIONS

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>VOLTS P-P</u>	<u>TYPE/ % WALL</u>	<u>LOCATION</u>	<u>REEL</u>	<u>INDEX</u>
30	91	2	1.0	30% OD	7" ABOVE #2 EC HL	1	243
39	94	2		PV	BTWN # 2 & 6 EC CL	1	
52	91	2		PV	24" ABOVE #5 EC HL	1	
64	91	2		DISTORTED	DISTORTED #9 TSP CL	2	
44	117	2	0.6	< 20% OD	30" ABOVE #4 EC CL	2	1030
44	115	2		PV	BTWN TOP TS & #2 EC CL	2	
41	122	2	1.0	20% OD	11" ABOVE #7 EC CL	2	
24	133	2	1.4	< 20% OD	3" ABOVE #3 EC HL	3	221
24	131	2	0.6	< 20% OD	24" ABOVE #1 BW	3	
13	138	2		PV	BTWN #6 EC & #10 TSP HL	3	
8	139	2	0.8	< 20% OD	6" ABOVE #4 EC HL	4	
1	134	2		PV	6" ABOVE #1 BW	4	
1	72	2		PV	THROUGHOUT HL	5	
1	58	2		PV	12" ABOVE #3 EC HL	5	
11	62	2		PV	25" ABOVE #3 EC HL	5	
22	61	2		PV	10" ABOVE #3 EC HL	5	
40	9	2		PV	20" ABOVE #2 EC HL	6	
80	41	2		PV	2" ABOVE #2 EC CL	7	
77	56	2		PV	BTWN #6 EC & #2 BW HL	7	
76	57	2		PV	7" ABOVE #1 EC CL	7	
65	88	2		PV	BTWN #6 EC HL & #6 EC CL	7	
19	132	3		PV	BTWN #2 & 3 EC HL	8	
19	136	3		DISTORTED	DISTORTED #2 EC CL	8	
17	98	3		PV	THROUGHOUT TUBE	8	

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>VOLTS P-P</u>	<u>TYPE/ % WALL</u>	<u>LOCATION</u>	<u>REEL</u>	<u>INDEX</u>
13	134	3	0.6	◀◀ 20% OD	4" ABOVE #2 BW	9	622
13	122	3	1.0	◀ 20% OD	20" ABOVE #5 EC HL	9	
13	98	3		PV	THROUGHOUT TUBE	9	
11	94	3	0.8	◀ 20% OD	26" ABOVE #3 EC CL	9	
11	132	3	0.4	◀ 20% OD	1" ABOVE #9 TSP HL	9	1418
11	134	3	0.5	◀ 20% OD	3" ABOVE #2 BW	9	1433
9	128	3		PV	30"-34" ABOVE #1 EC HL	9	
7	92	3		PV	1" ABOVE #7 EC HL	10	
7	138	3		PV	5" ABOVE TS CL	10	
5	138	3	0.4	10% OD	34" ABOVE #2 EC CL	10	1128
5	128	3		PV	THROUGHOUT HL AND BEND	10	
46	87	2	0.4	◀ 20% OD	8" ABOVE TS HL	11	
46	87	2		PV	BTWN #6 & 8 EC HL	11	
46	29	2	1.6	59% OD	26" ABOVE #4 EC CL	11	1000

III. SLUDGE LEVELS

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>		<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>	
			<u>INLET</u>	<u>OUTLET</u>				<u>INLET</u>	<u>OUTLET</u>
1	88	2	2	5	1	76	2	3	4½
1	86	2	2	5	1	74	2	3½	4½
1	84	2	2½	5	1	72	2	3½	5
1	82	2	2½	5	1	70	2	3	4½
1	80	2	2½	4½	1	68	2	3	4½
1	78	2	2½	5	1	66	2	2	3½

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
1	62	2	1	4	22	71	2	2	4 $\frac{1}{2}$
1	60	2	$\frac{1}{2}$	4	22	69	2	2 $\frac{1}{2}$	4
1	58	2	$\frac{1}{2}$	4	22	67	2	2	4
5	58	2	$\frac{1}{2}$	4	22	65	2	2 $\frac{1}{2}$	4
7	58	2	$\frac{1}{2}$ -1	4	22	63	2	2 $\frac{1}{2}$	4
9	58	2	$\frac{1}{2}$ -1	4	22	61	2	3	3 $\frac{1}{2}$
11	58	2	1	4	22	59	2	2 $\frac{1}{2}$	4
11	60	2	1	3 $\frac{1}{2}$	22	57	2	3	4
11	62	2	1 $\frac{1}{2}$	3	22	55	2	2 $\frac{1}{2}$	4
11	64	2	2	3 $\frac{1}{2}$	22	53	2	2	4 $\frac{1}{2}$
11	66	2	3	4	22	51	2	2	4
11	68	2	3 $\frac{1}{2}$	4 $\frac{1}{2}$	22	49	2	2	4
11	70	2	3 $\frac{1}{2}$	4 $\frac{1}{2}$	22	47	2	2	4
11	72	2	3 $\frac{1}{2}$	3 $\frac{1}{2}$	22	45	2	1 $\frac{1}{2}$	4
11	74	2	3	4	22	43	2	1 $\frac{1}{2}$	4
11	76	2	3 $\frac{1}{2}$	4 $\frac{1}{2}$	24	43	2	1 $\frac{1}{2}$	4
11	78	2	3	5	26	43	2	1 $\frac{1}{2}$ -2	4
13	78	2	2 $\frac{1}{2}$	5	30	43	2	2 $\frac{1}{2}$	4
15	78	2	2 $\frac{1}{2}$	5	32	43	2	3	4
17	78	2	2 $\frac{1}{2}$	5	34	43	2	3	3 $\frac{1}{2}$
19	78	2	2	5	36	43	2	3	4
21	78	2	2	4 $\frac{1}{2}$	38	43	2	2 $\frac{1}{2}$	3 $\frac{1}{2}$
22	77	2	2	5	40	43	2	2 $\frac{1}{2}$	4 $\frac{1}{2}$
22	75	2	2	4	40	45	2	2	4
22	73	2	2 $\frac{1}{2}$	3 $\frac{1}{2}$	40	47	2	2	4 $\frac{1}{2}$

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET				INLET	OUTLET
40	49	2	2	4	41	18	2	$\frac{1}{2}$	$2\frac{1}{2}$
40	51	2	2	4	41	20	2	$\frac{1}{2}$	$3\frac{1}{2}$
40	53	2	2	4	42	19	2	1	$3\frac{1}{2}$
40	55	2	2	4	42	17	2	$\frac{1}{2}$ -1	3
40	41	2	2	4	42	15	2	$\frac{1}{2}$	2
40	39	2	$2\frac{1}{2}$	$4\frac{1}{2}$	42	13	2	$\frac{1}{2}$	$1\frac{1}{2}$
40	37	2	$2\frac{1}{2}$	4	42	11	2	$\frac{1}{2}$	1
40	35	2	$2\frac{1}{2}$	4	42	9	2	$\frac{1}{2}$	$\frac{1}{2}$
40	33	2	$2\frac{1}{2}$	$4\frac{1}{2}$	43	3	2	$\frac{1}{2}$	$0-\frac{1}{2}$
40	31	2	2	4	43	10	2	$0-\frac{1}{2}$	$0-\frac{1}{2}$
40	29	2	$1\frac{1}{2}$	$4\frac{1}{2}$	43	12	2	$\frac{1}{2}$	1
40	27	2	$1\frac{1}{2}$	4	44	11	2	$\frac{1}{2}$ -1	$\frac{1}{2}$
40	25	2	1	$4\frac{1}{2}$	44	9	2	$\frac{1}{2}$	$\frac{1}{2}$
40	23	2	1	$4\frac{1}{2}$	45	3	2	$\frac{1}{2}$	$\frac{1}{2}$
40	21	2	$\frac{1}{2}$ -1	4	45	10	2	$\frac{1}{2}$	0
40	19	2	$0-\frac{1}{2}$	3	45	12	2	$\frac{1}{2}$	$\frac{1}{2}$
40	17	2	$0-\frac{1}{2}$	$2\frac{1}{2}$	46	11	2	$\frac{1}{2}$	0
40	15	2	$0-\frac{1}{2}$	2	46	9	2	$\frac{1}{2}$	0
40	13	2	$\frac{1}{2}$	$1\frac{1}{2}$	47	3	2	0	0
40	11	2	$\frac{1}{2}$	$0-\frac{1}{2}$	47	10	2	$\frac{1}{2}$	$\frac{1}{2}$
40	9	2	$\frac{1}{2}$	$0-\frac{1}{2}$	47	12	2	$\frac{1}{2}$	1
41	8	2	$0-\frac{1}{2}$	NT.	48	11	2	1	$\frac{1}{2}$
41	10	2	$0-\frac{1}{2}$	$0-\frac{1}{2}$	48	9	2	$\frac{1}{2}$	0
41	12	2	$0-\frac{1}{2}$	$0-\frac{1}{2}$	49	3	2	$\frac{1}{2}$	$\frac{1}{2}$
41	14	2	$\frac{1}{2}$	1	51	15	2	$\frac{1}{2}$	0
41	16	2	$\frac{1}{2}$	$1\frac{1}{2}$	53	16	2	$\frac{1}{2}$	$\frac{1}{2}$

LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET
83	18	2	$\frac{1}{2}$	$\frac{1}{2}$
83	20	2	$\frac{1}{2}$	$\frac{1}{2}$
83	22	2	$\frac{1}{2}$	$\frac{1}{2}$
83	24	2	$\frac{1}{2}$	0
82	25	2	$\frac{1}{2}$	0
82	27	2	$\frac{1}{2}$	$\frac{1}{2}$
82	29	2	$\frac{1}{2}$	$\frac{1}{2}$
82	31	2	$\frac{1}{2}$	$\frac{1}{2}$
81	32	2	$\frac{1}{2}$	$\frac{1}{2}$
81	34	2	$\frac{1}{2}$	0
81	36	2	$\frac{1}{2}$	$\frac{1}{2}$
81	38	2	$\frac{1}{2}$	$\frac{1}{2}$
80	39	2	$\frac{1}{2}$	$\frac{1}{2}$
80	41	2	$\frac{1}{2}$	NT
80	43	2	$\frac{1}{2}$	0
79	46	2	$\frac{1}{2}$	NT
79	48	2	$\frac{1}{2}$	NT
78	49	2	$\frac{1}{2}$	0
78	51	2	0	$\frac{1}{2}$
78	53	2	$\frac{1}{2}$	$\frac{1}{2}$
77	54	2	0	0
77	56	2	$\frac{1}{2}$	$\frac{1}{2}$
76	57	2	$\frac{1}{2}$	0
76	59	2	$\frac{1}{2}$	$\frac{1}{2}$

LINE	ROW	QUAD	HEIGHT "	
			INLET	OUTLET
75	60	2	$\frac{1}{2}$	$\frac{1}{2}$
75	62	2	$\frac{1}{2}$	$\frac{1}{2}$
74	63	2	$\frac{1}{2}$	$\frac{1}{2}$
74	65	2	$\frac{1}{2}$	$\frac{1}{2}$
74	67	2	$\frac{1}{2}$	0
73	68	2	0	0
72	69	2	$\frac{1}{2}$	0
72	71	2	$\frac{1}{2}$	$\frac{1}{2}$
72	73	2	$\frac{1}{2}$	$\frac{1}{2}$
70	75	2	$\frac{1}{2}$	$\frac{1}{2}$
70	77	2	$\frac{1}{2}$	0
69	78	2	$\frac{1}{2}$	$\frac{1}{2}$
69	80	2	$\frac{1}{2}$	$\frac{1}{2}$
68	81	2	$\frac{1}{2}$	$\frac{1}{2}$
68	83	2	$\frac{1}{2}$	0
67	84	2	0	0
66	87	2	0	0
65	88	2	0	0
64	89	2	$\frac{1}{2}$	$\frac{1}{2}$
49	9	2	0	$\frac{1}{2}$
49	10	2	$\frac{1}{2}$	$\frac{1}{2}$
49	12	2	$\frac{1}{2}$	0
30	11	2	$\frac{1}{2}$	$\frac{1}{2}$
30	9	2	$\frac{1}{2}$	$\frac{1}{2}$

LINE	ROW	QUAD	HEIGHT "		LINE	ROW	QUAD	HEIGHT "		OUTLET
			INLET	OUTLET				INLET	OUTLET	
51	8	2	$\frac{1}{2}$	$\frac{1}{2}$	60	7	2	0	0	$4\frac{1}{2}$
51	10	2	NT	$1\frac{1}{2}$	60	5	2	$\frac{1}{2}$	$\frac{1}{2}$	$4\frac{1}{2}$
51	12	2	$\frac{1}{2}$	2	60	3	2	$\frac{1}{2}$	$\frac{1}{2}$	5
52	11	2	$\frac{1}{2}$	2	60	1	2	$\frac{1}{2}$	NT	$4\frac{1}{2}$
52	9	2	$\frac{1}{2}$	$1\frac{1}{2}$	61	2	2	$\frac{1}{2}$	NT	$4\frac{1}{2}$
53	8	2	$\frac{1}{2}$	$\frac{1}{2}$	62	1	2	$\frac{1}{2}$	NT	$4\frac{1}{2}$
53	10	2	$\frac{1}{2}$	$1\frac{1}{2}$	63	2	2	$\frac{1}{2}$	NT	$3\frac{1}{2}$
53	12	2	$\frac{1}{2}$	$2\frac{1}{2}$	64	1	2	$\frac{1}{2}$	NT	$2\frac{1}{2}$
54	11	2	$\frac{1}{2}$	2	65	2	2	$\frac{1}{2}$	NT	$1\frac{1}{2}$
54	9	2	$\frac{1}{2}$	1	66	1	2	$\frac{1}{2}$	NT	2
55	8	2	$\frac{1}{2}$	$\frac{1}{2}$	67	2	2	0	NT	3
55	10	2	$\frac{1}{2}$	$1\frac{1}{2}$	68	1	2	0	NT	2
55	12	2	$\frac{1}{2}$	$2\frac{1}{2}$	84	3	2	0	NT	3
56	11	2	$\frac{1}{2}$	$1\frac{1}{2}$	84	5	2	$\frac{1}{2}$	$\frac{1}{2}$	3
56	9	2	$\frac{1}{2}$	1	84	7	2	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{2}$
57	8	2	$\frac{1}{2}$	$\frac{1}{2}$	84	9	2	$\frac{1}{2}$	$\frac{1}{2}$	3
57	10	2	$\frac{1}{2}$	1	84	11	2	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{2}$
57	12	2	$\frac{1}{2}$	2	84	13	2	NT	NT	$3\frac{1}{2}$
58	11	2	$\frac{1}{2}$	$1\frac{1}{2}$	46	89	2	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{2}$
5	9	2	$\frac{1}{2}$	1	46	87	2	0	0	$2\frac{1}{2}$
59	8	2	$\frac{1}{2}$	$\frac{1}{2}$	46	85	2	0	0	$2\frac{1}{2}$
59	10	2	$\frac{1}{2}$	1	46	83	2	1	$\frac{1}{2}$	$2\frac{1}{2}$
59	12	2	$\frac{1}{2}$	$1\frac{1}{2}$	46	81	2	$1\frac{1}{2}$	1	$2\frac{1}{2}$
60	11	2	$\frac{1}{2}$	$1\frac{1}{2}$	46	79	2	1	1	$2\frac{1}{2}$
60	9	2	$\frac{1}{2}$	$\frac{1}{2}$	46	77	2	1	$1\frac{1}{2}$	$2\frac{1}{2}$

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>		<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>	
			<u>INLET</u>	<u>OUTLET</u>				<u>INLET</u>	<u>OUTLET</u>
46	75	2	1	1½	46	27	2	2½	4½
46	73	2	1	2	46	25	2	2	4½
46	71	2	1	2	46	23	2	2	5
46	69	2	1½	2½	46	21	2	1½	4½
46	67	2	1	2½	46	19	2	1	4½
46	65	2	1	2½	46	17	2	1	3½
46	63	2	1½	3½	46	15	2	1	2½
46	61	2	1½	4	46	13	2	1	1½
46	59	2	1½	4	47	14	2	1	2
46	57	2	1½	3	48	15	2	1	3
46	55	2	2	4	48	13	2	1	2
46	53	2	2	4	49	14	2	1	3
46	51	2	2	4½	50	13	2	1	3
46	49	2	2	4	51	14	2	1	2½
46	47	2	2	4	52	13	2	1	3
46	45	2	1½	4	53	14	2	2	3½
46	43	2	2	4	54	13	2	1	3½
46	41	2	2	4	55	14	2	1½	2½
46	39	2	2	4	56	13	2	1	2½
46	37	2	2	4	57	14	2	1	2½
46	35	2	2½	4	58	13	2	1	2½
46	33	2	2½	4½	59	14	2	1	2½
46	31	2	2½	5	60	13	2	1	2½
46	29	2	2½	4½	60	15	2	1	2½

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>		<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>HEIGHT "</u>	
			<u>INLET</u>	<u>OUTLET</u>				<u>INLET</u>	<u>OUTLET</u>
60	17	2	1	3					
60	19	2	$1\frac{1}{2}$	3					
60	21	2	1	3					
60	23	2	1	$3\frac{1}{2}$					
60	27	2	$\frac{1}{2}$	3					
60	29	2	0	3					
60	31	2	$\frac{1}{2}$	$2\frac{1}{2}$					
60	33	2	$\frac{1}{2}$	$2\frac{1}{2}$					
60	35	2	$\frac{1}{2}$	2					
60	37	2	$\frac{1}{2}$	$1\frac{1}{2}$					
60	39	2	$\frac{1}{2}$	$1\frac{1}{2}$					
60	41	2	$\frac{1}{2}$	$1\frac{1}{2}$					
60	43	2	$\frac{1}{2}$	$1\frac{1}{2}$					
60	45	2	$\frac{1}{2}$	1					
60	47	2	0	$\frac{1}{2}$					
60	49	2	0	0					
60	51	2	$\frac{1}{2}$	0					
60	53	2	$\frac{1}{2}$	$\frac{1}{2}$					
60	55	2	0	0					
76	57	2	$\frac{1}{2}$	$\frac{1}{2}$					
42	121	2	0	0					

APPENDIX III

TUBES TESTED IN STEAM GENERATOR

No 21 BY REEL NUMBER

III-1

STEAM GENERATOR No 21
TOTAL TUBES INSPECTED BY REEL No 1

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
28	91	2	1	38	95	2	1
29	92	2	1	38	93	2	1
30	91	2	1	38	91	2	1
31	92	2	1	39	92	2	1
32	91	2	1	39	94	2	1
33	92	2	1	39	96	2	1
35	92	2	1	39	98	2	1
35	94	2	1	39	100	2	1
35	96	2	1	40	99	2	1
35	98	2	1	40	97	2	1
35	100	2	1	40	95	2	1
36	99	2	1	40	93	2	1
36	95	2	1	40	91	2	1
36	93	2	1	41	92	2	1
36	91	2	1	42	91	2	1
37	90	2	1	44	91	2	1
37	94	2	1	45	92	2	1
37	96	2	1	46	91	2	1
37	98	2	1	47	92	2	1
37	100	2	1	48	91	2	1
38	99	2	1	49	92	2	1
39	97	2	1	50	91	2	1

RT4

LINE	ROW	QUAD	REEL	LINE	ROW	QUAD	REEL
51	92	2	1	60	97	2	2
52	91	2	1	60	95	2	2
53	92	2	1	60	93	2	2
54	91	2	1	60	91	2	2
55	92	2	1	61	92	2	2
56	91	2	1	61	94	2	2
57	92	2	1	61	96	2	2
57	94	2	1	62	95	2	2
57	96	2	1	62	93	2	2
57	98	2	1	62	91	2	2
57	100	2	1	63	92	2	2
57	102	2	1	64	91	2	2
58	101	2	1	57	104	2	2
58	99	2	1	56	105	2	2
58	97	2	1	55	106	2	2
58	95	2	2	54	107	2	2
58	93	2	2	53	108	2	2
58	91	2	2	52	109	2	2
59	92	2	2	51	110	2	2
59	94	2	2	51	112	2	2
59	96	2	2	50	113	2	2
59	98	2	2	50	111	2	2
59	100	2	2	49	110	2	2
50	99	2	2	49	112	2	2

REEL 2

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
49	114	2	2	43	116	2	2
48	115	2	2	43	118	2	2
48	111	2	2	43	120	2	2 RT4
47	110	2	2	42	119	2	2
47	112	2	2	42	121	2	2
47	114	2	2	41	120	2	2
47	116	2	2	41	122	2	2
46	117	2	2	40	121	2	2
46	115	2	2	40	123	2	2
46	113	2	2	39	122	2	2
46	111	2	2	38	123	2	2
45	110	2	2	38	125	2	2
45	112	2	2	37	126	2	2
45	114	2	2	36	125	2	2
45	116	2	2	36	127	2	2
45	118	2	2	35	126	2	2 RT4
44	119	2	2	35	128	2	2
44	117	2	2	34	127	2	2
44	115	2	2	34	129	2	2
44	113	2	2	33	128	2	2
44	111	2	2	33	130	2	2
43	110	2	2	32	129	2	2
43	112	2	2	31	130	2	2 RT4
43	114	2	2	30	131	2	2 RT4

	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	
REEL 3	29	132	2	3	22	117	2	3	
	28	133	2	3	22	115	2	3	
	27	134	2	3	22	113	2	3	
	26	133	2	3	22	111	2	3	
	26	131	2	3	22	109	2	3	
	26	129	2	3	22	107	2	3	
	25	130	2	3	22	105	2	3	
	25	132	2	3	22	103	2	3	
	25	134	2	3	21	102	2	3	
	24	135	2	3	21	104	2	3	
	24	133	2	3	21	106	2	3	
	24	131	2	3	21	108	2	3	
	24	129	2	3	21	110	2	3	
	23	130	2	3	21	112	2	3	
	23	132	2	3	21	114	2	3	RT5
	23	134	2	3	21	116	2	3	
	23	136	2	3	21	118	2	3	
	22	135	2	3	21	120	2	3	RT5
	22	133	2	3	21	122	2	3	
	22	131	2	3	21	124	2	3	RT5
	22	129	2	3	21	126	2	3	RT5
	22	127	2	3	21	128	2	3	RT5
	22	125	2	3	21	130	2	3	RT5
	22	123	2	3	21	132	2	3	
	22	121	2	3	21	134	2	3	RT5
	22	119	2	3	21	136	2	3	RT5

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
20	137	2	3 RT5	11	136	2	4 RT9
20	135	2	3	11	138	2	4 RT9
20	131	2	3 RT5	10	139	2	4 RT9
19	132	2	3 RT5	10	137	2	4 RT9
19	134	2	3	10	135	2	4 RT9
19	136	2	3	10	133	2	4 RT9
18	137	2	3	9	134	2	4 RT9
18	135	2	3	9	136	2	4 RT9
18	133	2	3 RT5	9	138	2	4 RT9
17	134	2	3	9	140	2	4 RT9
17	136	2	3	8	139	2	4 RT9
17	138	2	3 RT5	8	137	2	4 RT9
16	137	2	3 RT5	8	135	2	4 RT9
16	135	2	3 RT5	7	136	2	4 RT9
15	136	2	3	7	138	2	4 RT9
15	138	2	3 RT5	7	140	2	4 RT9
14	137	2	3	6	139	2	4 RT9
14	135	2	3	6	137	2	4 RT9
13	134	2	3	6	135	2	4 RT9
13	136	2	3	5	134	2	4
13	138	2	3	5	136	2	4
12	139	2	3	5	138	2	4
REEL 4	12	137	2 4 RT9	5	140	2	4
	12	135	2 4 RT9	4	139	2	4
	11	134	2 4 RT9	4	137	2	4

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
4	135	2	4	30	131	2	4
4	133	2	4	31	130	2	4
3	132	2	4	35	126	2	4
3	134	2	4	39	124	2	4 RT9
3	136	2	4	43	120	2	4 RT9
3	138	2	4	39	92	2	4
3	140	2	4	2	121	2	4
2	139	2	4	1	120	2	4
1	140	2	4	2	119	2	4
1	138	2	4	1	118	2	4
1	136	2	4	2	117	2	4
2	135	2	4	3	118	2	4
1	134	2	4	4	117	2	4
2	133	2	4	5	118	2	4
1	132	2	4 RT14	6	117	2	4
2	131	2	4	7	118	2	4
1	130	2	4	9	118	2	4
2	129	2	4	10	117	2	4
1	128	2	4	11	118	2	4
2	127	2	4	12	117	2	4
1	126	2	4	13	118	2	4
2	125	2	4	21	114	2	5 REEL 5
1	124	2	4	21	120	2	5
2	123	2	4	21	124	2	5
1	122	2	4	21	126	2	5

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
21	128	2	5	1	102	2	5
21	130	2	5	2	101	2	5
21	134	2	5	1	100	2	5
21	136	2	5	2	99	2	5
20	137	2	5	1	98	2	5
19	132	2	5	2	97	2	5
20	131	2	5	1	96	2	5
18	133	2	5	2	95	2	5
17	138	2	5	1	94	2	5
16	137	2	5	2	93	2	5
16	135	2	5	2	91	2	5
15	138	2	5	1	90	2	5
1	116	2	5	1	88	2	5
2	115	2	5	1	86	2	5
1	114	2	5	1	84	2	5
2	113	2	5	1	82	2	5
1	112	2	5	1	80	2	5
2	111	2	5	1	78	2	5
1	110	2	5	1	76	2	5
2	109	2	5	1	74	2	5
1	108	2	5	1	72	2	5
1	106	2	5	1	70	2	5
2	105	2	5	1	68	2	5
1	104	2	5	1	66	2	5
2	103	2	5	1	62	2	5

LINE	ROW	QUAD	PEEL	LINE	ROW	QUAD	PEEL
1	60	2	5	22	73	2	RTB
1	58	2	5	22	71	2	RTB
3	58	2	5	22	69	2	RTB
5	58	2	5	22	67	2	RTB
7	58	2	5	22	65	2	RTB
9	58	2	5	22	63	2	RTB
11	58	2	5	22	61	2	RTB
11	60	2	5	22	59	2	RTB
11	62	2	5	22	57	2	RTB
11	64	2	5	22	55	2	RTB
11	66	2	5	22	53	2	RTB
11	68	2	5	22	51	2	RTB
11	70	2	5	22	49	2	RTB
11	72	2	5	22	47	2	RTB
11	74	2	5	22	45	2	RTB
11	76	2	5	22	43	2	RTB
11	78	2	5	24	43	2	RTB
13	78	2	5	26	43	2	RTB
15	78	2	6	30	43	2	RTB
17	78	2	6	32	43	2	RTB
19	78	2	6	34	43	2	RTB
21	78	2	6	36	43	2	RTB
22	77	2	6	38	43	2	RTB
22	75	2	6	40	43	2	RTB

REEL 6

LINE	ROW	QUAD	REEL	LINE	ROW	QUAD	REEL
40	45	2	6 RT8	22	59	2	8
40	47	2	6 RT8	22	57	2	8
40	49	2	6 RT8	22	55	2	8
40	51	2	6 RT8	22	53	2	8
40	53	2	6 RT8	22	51	2	8
40	55	2	6 RT8	22	49	2	8
40	41	2	6 RT8	22	47	2	8
40	39	2	6 RT8	22	45	2	8
40	37	2	6 RT8	22	43	2	8
40	35	2	6 RT8	24	43	2	8
40	33	2	6 RT8	26	43	2	8
REMAINING PORTION OF REEL 6				29	44	2	8
AND ENTIRE REEL 7 RETESTED				30	43	2	8
DUE TO INCORRECT PHASE SPREAD				32	43	2	8
15	78	2	8	34	43	2	8
17	78	2	8	36	43	2	8
19	78	2	8	38	43	2	8
21	78	2	8	40	43	2	8
22	77	2	8	40	45	2	8
22	75	2	8	40	47	2	8
22	73	2	8	40	49	2	8
22	71	2	8	40	51	2	8
22	69	2	8	40	53	2	8
22	67	2	8	40	55	2	8
22	65	2	8	40	41	2	8
22	63	2	8	40	39	2	8
22	61	2	8				

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
40	37	2	8	42	11	2	8
40	35	2	8	42	9	2	8
40	33	2	8	43	8	2	8
40	31	2	8	43	10	2	8
40	29	2	8	43	12	2	8
40	27	2	8	44	11	2	8
40	25	2	8	44	9	2	8
40	23	2	8	45	8	2	8
40	21	2	8	45	10	2	8
40	19	2	8	45	12	2	8
40	17	2	8	46	11	2	8
40	15	2	8	46	9	2	8
40	13	2	8	45	8	2	8
40	11	2	8	47	8	2	8
40	9	2	8	47	10	2	8
41	8	2	8	47	12	2	8
41	10	2	8	48	11	2	8
41	12	2	8	48	9	2	8
41	14	2	8	49	8	2	8
41	16	2	8	49	10	2	8
41	18	2	8	49	12	2	8
41	20	2	8	50	11	2	8
42	19	2	8	48	11	2	8
42	17	2	8	50	9	2	8
42	15	2	8	51	8	2	8
42	13	2	8	51	10	2	8

R18

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
51	12	2	8	60	3	2	8
52	11	2	8	60	1	2	8 RT14
52	9	2	8	61	2	2	8 RT14
53	8	2	8	62	1	2	8 RT14
53	10	2	8	63	2	2	8 RT14
53	12	2	8	64	1	2	8 RT14
54	11	2	8	65	2	2	8 RT14
54	9	2	8	66	1	2	8 RT14
55	8	2	8	67	2	2	8
55	10	2	8	68	1	2	8 RT14
55	12	2	8	84	3	2	8
56	11	2	8	84	5	2	9
56	9	2	8	84	7	2	9
57	8	2	8	84	9	2	9
57	10	2	8	84	11	2	9
57	12	2	8	84	13	2	9
58	11	2	8	84	15	2	9
58	9	2	8	83	16	2	9
59	8	2	8	83	18	2	9
59	10	2	8	83	20	2	9
59	12	2	8	83	22	2	9
60	11	2	8	83	24	2	9
60	9	2	8	82	25	2	9
60	7	2	8	82	27	2	9
60	5	2	8	82	29	2	9

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>PEEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
82	31	2	9	72	71	2	9
81	32	2	9	72	73	2	9
81	34	2	9	70	75	2	9
81	36	2	9	70	77	2	9
81	38	2	9	69	78	2	9
80	39	2	9	69	80	2	9
80	41	2	9	68	83	2	9
80	43	2	9	68	81	2	9
79	46	2	9	67	84	2	9
79	48	2	9	65	88	2	9
78	49	2	9	64	89	2	9
78	51	2	9	43	120	2	9
78	53	2	9	39	124	2	9
77	54	2	9	12	137	2	9
77	56	2	9	12	135	2	9
76	57	2	9	11	134	2	9
76	59	2	9	11	136	2	9
75	60	2	9	11	138	2	9
75	62	2	9	10	139	2	9
74	63	2	9	10	137	2	9
74	65	2	9	10	135	2	9
74	67	2	9	10	133	2	9
73	68	2	9	9	134	2	9
72	69	2	9	9	136	2	9

8114

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
9	138	2	9	19	118	3	10
9	140	2	9	19	120	3	10
8	139	2	9	19	122	3	10
8	137	2	9	19	124	3	10
8	135	2	9	19	126	3	10
7	136	2	9	19	128	3	10
7	138	2	9	19	130	3	10
7	140	2	9	19	132	3	10
6	139	2	9	19	134	3	10
6	137	2	9	19	136	3	10
6	135	2	9	18	137	3	10
END QUAD II				17	138	3	10
19	92	3	10	17	136	3	10
19	94	3	10	17	134	3	10
19	96	3	10	17	132	3	10
19	98	3	10	17	130	3	10
19	100	3	10	17	128	3	10
19	102	3	10	17	126	3	10
19	104	3	10	17	124	3	10
19	106	3	10	17	122	3	10
19	108	3	10	17	120	3	10
19	110	3	10	17	118	3	10
19	112	3	10	17	116	3	10
19	114	3	10	17	114	3	10

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
17	112	3	10	15	120	3	10 RT10
17	108	3	10	15	122	3	10 RT10
17	106	3	10	17	102	3	10
17	104	3	10	17	100	3	10
17	102	3	10 RT10	17	98	3	10
17	100	3	10 RT10	17	96	3	10
17	98	3	10 RT10	17	94	3	10
17	96	3	10 RT10	17	92	3	10
17	94	3	10 RT10	15	92	3	10
17	92	3	10 RT10	15	94	3	10
15	92	3	10 RT10	15	96	3	10
15	94	3	10 RT10	15	98	3	10
15	96	3	10 RT10	15	100	3	10
15	98	3	10 RT10	15	102	3	10
15	100	3	10 RT10	15	104	3	10
15	102	3	10 RT10	15	106	3	10
15	104	3	10 RT10	15	108	3	10
15	106	3	10 RT10	15	110	3	10
15	108	3	10 RT10	15	112	3	10 RT11
15	110	3	10 RT10	15	114	3	10
15	112	3	10 RT10	15	116	3	10
15	114	3	10 RT10	15	118	3	10
15	116	3	10 RT10	15	120	3	10
15	118	3	10 RT10	15	122	3	10

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>		<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
15	124	3	10		13	106	3	11
15	126	3	10		13	104	3	11
15	128	3	10		13	102	3	11
15	130	3	10		13	100	3	11
15	132	3	10		13	98	3	11
15	134	3	11		13	96	3	11
15	136	3	11	Still	13	94	3	11
15	138	3	11		13	92	3	11
14	137	3	11		11	92	3	11
13	138	3	11		11	94	3	11
13	136	3	11		11	96	3	11
13	134	3	11		11	98	3	11
13	132	3	11		11	100	3	11
13	130	3	11		11	102	3	11
13	128	3	11		11	104	3	11
13	126	3	11		11	106	3	11
13	124	3	11		11	108	3	11
13	122	3	11		11	110	3	11
13	120	3	11		11	112	3	11
13	118	3	11		11	114	3	11
13	116	3	11		11	116	3	11
13	114	3	11		11	118	3	11
13	112	3	11		11	120	3	11
13	110	3	11		11	122	3	11
13	108	3	11		11	124	3	11

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
11	126	3	11	9	104	3	12
11	128	3	11	9	102	3	1
11	130	3	11	9	100	3	12
11	132	3	11	9	98	3	12
11	134	3	11	9	96	3	12
11	136	3	11	9	94	3	12
11	138	3	11	9	92	3	12
10	139	3	11	7	92	3	12
9	140	3	11	7	94	3	12
9	138	3	11	7	96	3	12
9	136	3	11	7	98	3	12
9	134	3	11	7	100	3	12
9	132	3	11	7	102	3	12
9	130	3	11	7	104	3	12
9	128	3	11	7	106	3	12
9	126	3	11	7	108	3	12
9	124	3	11	7	110	3	12
9	122	3	12	7	114	3	12
9	120	3	12	7	116	3	12
9	118	3	12	7	118	3	12
9	116	3	12	7	120	3	12
9	114	3	12	7	122	3	12
9	112	3	12				
9	110	3	12				
9	108	3	12				
9	106	3	12				

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
7	124	3	12	5	108	3	12
7	126	3	12	5	106	3	12
7	128	3	12	5	104	3	12
7	130	3	12	5	102	3	12
7	132	3	12	5	100	3	12
7	134	3	12	5	98	3	12
7	136	3	12	5	96	3	12
7	138	3	12	5	94	3	12
7	140	3	12	5	92	3	12
6	139	3	12	3	92	3	12
5	140	3	12	3	94	3	12
5	138	3	12	3	96	3	12
5	136	3	12	3	98	3	12
5	134	3	12	3	100	3	12
5	132	3	12	3	102	3	12
5	130	3	12	3	104	3	12
5	128	3	12	3	106	3	12
5	126	3	12	3	108	3	12
5	124	3	12	3	110	3	12
5	122	3	12	3	112	3	13
5	120	3	12	3	114	3	13
5	118	3	12	3	116	3	13
5	116	3	12	3	118	3	13
5	114	3	12	3	120	3	13
3	112	3	12	3	122	3	13
5	110	3	12	3	124	3	13

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
3	126	3	13	46	53	2	13
3	128	3	13	46	51	2	13
3	130	3	13	46	49	2	13
3	132	3	13	46	47	2	13
3	134	3	13	46	45	2	13
3	136	3	13	46	43	2	13
3	138	3	13	46	41	2	13
3	140	3	13	46	39	2	13
2	139	3	13	46	37	2	13
46	89	2	13	46	35	2	13
46	87	2	13	46	33	2	13
46	85	2	13	46	31	2	13
46	83	2	13	46	29	2	13
46	81	2	13	46	27	2	13
46	79	2	13	46	25	2	13
46	77	2	13	46	23	2	13
46	75	2	13	46	21	2	13
46	73	2	13	46	19	2	13
46	71	2	13	46	17	2	13
46	69	2	13	46	15	2	13
46	67	2	13	46	13	2	13
46	65	2	13	47	14	2	13
46	63	2	13	48	13	2	13
46	61	2	13	49	14	2	13
46	59	2	13	50	13	2	13
46	57	2	13	51	14	2	13
46	55	2	13	52	13	2	13

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
53	14	2	13	60	53	2	13
54	13	2	13	60	55	2	13
55	14	2	13	1	132	2	14
56	13	2	13	1	66	2	14
57	14	2	13	15	112	3	14
58	13	2	13	10	133	2	14
59	14	2	13	60	1	2	14
60	13	2	13	61	2	2	14
60	15	2	13	63	2	2	14
60	17	2	13	64	1	2	14
60	19	2	13	65	2	2	14
60	21	2	13	62	1	2	14
60	23	2	13	66	1	2	14
60	27	2	13	68	1	2	14 RT14
60	29	2	13	15	136	3	14
60	31	2	13	68	1	2	14
60	33	2	13				
60	35	2	13				
60	37	2	13				
60	39	2	13				
60	41	2	13				
60	43	2	13				
60	45	2	13				
60	47	2	13				
60	49	2	13				
60	51	2	13				

APPENDIX IV

TUBES TESTED IN STEAM GENERATOR

No 22 BY REEL NUMBER

IV-1

STEAM GENERATOR No 22
TOTAL TUBES INSPECTED BY REEL No 1

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
28	91	2	1	38	91	2	1
29	92	2	1	39	92	2	1
30	91	2	1	39	94	2	1
31	92	2	1	39	96	2	1
32	91	2	1	39	98	2	1
33	92	2	1	39	100	2	1
35	92	2	1	40	99	2	1
35	94	2	1	40	97	2	1
35	96	2	1	40	95	2	1
35	98	2	1	40	93	2	1
35	100	2	1	40	91	2	1
36	99	2	1	41	92	2	1
36	95	2	1	42	91	2	1
36	93	2	1	44	91	2	1
36	91	2	1	45	92	2	1
37	90	2	1	46	91	2	1
37	94	2	1	47	92	2	1
37	96	2	1	48	91	2	1
37	98	2	1	49	92	2	1
37	100	2	1	50	91	2	1
38	99	2	1	51	92	2	1
38	97	2	1	52	91	2	1
38	95	2	1	53	92	2	1
38	93	2	1	54	91	2	1

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
55	92	2	1	61	92	2	1
56	91	2	1	61	94	2	1
57	92	2	1	61	96	2	2
57	94	2	1	62	95	2	2
57	96	2	1	62	93	2	2
57	98	2	1	62	91	2	2
57	100	2	1	63	92	2	2
57	102	2	1	64	91	2	2
58	101	2	1	57	104	2	2
58	99	2	1	56	105	2	2
58	97	2	1	55	106	2	2
58	95	2	1	54	107	2	2
58	93	2	1	53	108	2	2
58	91	2	1	52	109	2	2
59	92	2	1	51	110	2	2
59	94	2	1	51	112	2	2
59	96	2	1	50	113	2	2
59	98	2	1	50	111	2	2
59	100	2	1	49	110	2	2
60	99	2	1	49	112	2	2
60	97	2	1	49	114	2	2
60	95	2	1	48	115	2	2
60	93	2	1	48	111	2	2
60	91	2	1	47	110	2	2

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
47	112	2	2	40	121	2	2
47	114	2	2	40	123	2	2
47	116	2	2	39	122	2	2
46	117	2	2	39	124	2	2
46	115	2	2	38	123	2	2
46	113	2	2	38	125	2	2
46	111	2	2	37	126	2	2
45	110	2	2	36	125	2	2
45	112	2	2	36	127	2	2
45	114	2	2	35	126	2	2
45	116	2	2	35	128	2	2
45	118	2	2	34	127	2	2
44	119	2	2	34	129	2	2
44	117	2	2	33	128	2	2
44	115	2	2	33	130	2	2
44	113	2	2	32	129	2	2
44	111	2	2	31	130	2	2
43	110	2	2	30	131	2	2
43	112	2	2	29	132	2	2
43	114	2	2	28	133	2	2
43	116	2	2	27	134	2	2
43	118	2	2	26	133	2	2
43	120	2	2	26	131	2	2
42	119	2	2	25	129	2	2
42	121	2	2	25	130	2	3
41	120	2	2	25	132	2	3
41	122	2	2	25	134	2	3

IV-4

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
24	135	2	3	21	102	2	3
24	133	2	3	21	104	2	3
24	131	2	3	21	106	2	3
24	129	2	3	21	108	2	3
23	130	2	3	21	110	2	3
23	132	2	3	21	112	2	3
23	134	2	3	21	114	2	3
23	136	2	3	21	116	2	3
22	135	2	3	21	118	2	3
22	133	2	3	21	120	2	3
22	131	2	3	21	122	2	3
22	129	2	3	21	124	2	3
22	127	2	3	21	126	2	3
22	125	2	3	21	128	2	3
22	123	2	3	21	130	2	3
22	121	2	3	21	132	2	3
22	119	2	3	21	134	2	3
22	117	2	3	21	136	2	3
22	115	2	3	20	137	2	3
22	113	2	3	20	135	2	3
22	111	2	3	20	131	2	3
22	109	2	3	19	132	2	3
22	107	2	3	19	134	2	3
22	105	2	3	19	136	2	3
22	103	2	3	18	137	2	3

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
18	135	2	3	9	136	2	4
18	133	2	3	9	138	2	4
17	134	2	3	9	140	2	4
17	136	2	3	8	139	2	4
17	138	2	3	8	137	2	4
16	137	2	3	8	135	2	4
16	135	2	3	7	136	2	4
15	136	2	3	7	138	2	4
15	138	2	3	7	140	2	4
14	137	2	3	6	139	2	4
14	135	2	3	6	137	2	4
13	134	2	3	6	135	2	4
13	136	2	3	5	134	2	4
13	138	2	3	5	136	2	4
12	139	2	3	5	138	2	4
12	137	2	3	5	140	2	4
12	135	2	3	4	139	2	4
11	134	2	3	4	137	2	4
11	136	2	3	4	135	2	4
11	138	2	4	4	133	2	4
10	139	2	4	3	132	2	4
10	137	2	4	3	134	2	4
10	135	2	4	3	136	2	4
10	133	2	4	3	138	2	4
9	134	2	4	3	140	2	4

IV-6

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
2	139	2	4	9	118	2	4
1	140	2	4	10	117	2	4
1	138	2	4	11	118	2	4
1	136	2	4	12	117	2	4
2	135	2	4	13	118	2	4
1	134	2	4	1	116	2	4
2	133	2	4	2	115	2	4
1	132	2	4	1	114	2	4
2	131	2	4	2	113	2	4
1	130	2	4	1	112	2	4
2	129	2	4	2	111	2	4
1	128	2	4	1	110	2	5
2	127	2	4	2	109	2	5
1	126	2	4	1	108	2	5
2	125	2	4	1	106	2	5
1	124	2	4	2	105	2	5
2	123	2	4	1	104	2	5
1	122	2	4	2	103	2	5
2	121	2	4	1	102	2	5
1	120	2	4	2	101	2	5
2	119	2	4	1	100	2	5
1	118	2	4	2	99	2	5
2	117	2	4	1	98	2	5
3	116	2	4	2	97	2	5
4	117	2	4	1	96	2	5
5	118	2	4	2	95	2	5
6	117	2	4	1	94	2	5
7	118	2	4	2	93	2	5

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
2	91	2	5
1	90	2	5
1	88	2	5
1	86	2	5
1	84	2	5
1	82	2	5
1	80	2	5
1	78	2	5
1	76	2	5
1	74	2	5
1	72	2	5
1	70	2	5
1	68	2	5
1	66	2	5
1	62	2	5
1	60	2	5
1	58	2	5
3	58	2	5
5	58	2	5
7	58	2	5
9	58	2	5
11	58	2	5

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
11	60	2	5
11	62	2	5
11	64	2	5
11	66	2	5
11	68	2	5
11	70	2	5
11	72	2	5
11	74	2	5
11	76	2	5
11	78	2	5
13	78	2	5
15	78	2	5

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
17	78	2	5	30	43	2	5
19	78	2	5	32	43	2	5
21	78	2	5	34	43	2	5
22	77	2	5	36	43	2	5
22	75	2	5	38	43	2	5
22	73	2	5	40	43	2	6
22	71	2	5	40	45	2	6
22	69	2	5	40	47	2	6
22	67	2	5	40	49	2	6
22	65	2	5	40	51	2	6
22	63	2	5	40	53	2	6
22	61	2	5	40	55	2	6
22	59	2	5	40	41	2	6
22	57	2	5	40	39	2	6
22	55	2	5	40	37	2	6
22	53	2	5	40	35	2	6
22	51	2	5	40	33	2	6
22	49		5	40	31	2	6
22	47	2	5	40	29	2	6
22	45	2	5	40	27	2	6
22	43	2	5	40	25	2	6
24	43	2	5	40	23	2	6
26	43	2	5	40	21	2	6

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
40	19	2	6	45	10	2	7
40	17	2	6	45	12	2	7
40	15	2	6	46	11	2	7
40	13	2	6	46	9	2	7
40	11	2	6	47	8	2	7
40	9	2	6	47	10	2	7
41	8	2	6	47	12	2	7
41	10	2	6	RT11 48	11	2	7
41	12	2	6	48	9	2	7
41	14	2	6	49	8	2	7
41	16	2	6	84	15	2	7
41	18	2	6	83	16	2	7
41	20	2	6	83	10	2	7
42	19	2	6	83	20	2	7
42	17	2	6	83	22	2	7
42	15	2	6	83	24	2	7
42	13	2	6	82	25	2	7
42	11	2	6	82	27	2	7
42	9	2	6	82	29	2	7
43	8	2	6	82	31	2	7
43	10	2	6	81	32	2	7
44	12	2	7	81	34	2	7
44	11	2	7	81	36	2	7
44	9	2	7	81	38	2	7
45	8	2	7	80	39	2	7

RT7

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
80	41	2	7	68	83	2	7
80	43	2	7	67	84	2	7
79	46	2	7	66	87	2	7
79	48	2	7	65	88	2	7
78	49	2	7	64	89	2	7
78	51	2	7	49	8	2	7
78	53	2	7	49	10	2	7
77	54	2	7	49	12	2	7
77	56	2	7	50	11	2	7
76	57	2	7 RT11	50	9	2	7
76	59	2	7	51	8	2	7
75	60	2	7	51	10	2	7
75	62	2	7	51	12	2	7
74	63	2	7	52	11	2	7
74	65	2	7	54	9	2	7
74	67	2	7	53	8	2	7
73	68	2	7	53	10	2	7
72	69	2	7	53	12	2	7
72	71	2	7	54	11	2	7
72	73	2	7	54	9	2	7
70	75	2	7	55	8	2	7
70	77	2	7	55	10	2	7
69	78	2	7	55	12	2	7
69	80	2	7	56	11	2	7
68	81	2	7	56	9	2	7

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
57	8	2	7	84	9	2	8
57	10	2	7	84	11	2	8
57	12	2	7	84	13	2	8
58	11	2	7	19	76	3	8
58	9	2	7	19	78	3	8
59	8	2	7	19	80	3	8
59	10	2	7	19	84	3	8
59	12	2	7	19	86	3	8
60	11	2	7	19	88	3	8
60	9	2	7	19	90	3	8
60	7	2	7	19	92	3	8
60	5	2	8	19	94	3	8
60	3	2	8	19	96	3	8
60	1	2	8 RT12	19	98	3	8
61	2	2	8 RT12	19	100	3	8
62	1	2	8 RT12	19	102	3	8
63	2	2	8 RT12	19	104	3	8
64	1	2	8 RT12	19	106	3	8
65	2	2	8 RT12	19	108	3	8
66	1	2	8 RT12	19	110	3	8
67	2	2	8 RT12				
68	1	2	8 RT12	19	114	3	8
84	3	2	8	19	116	3	8
84	5	2	8	19	118	3	8
84	7	2	8	19	120	3	8

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
19	122	3	8	17	112	3	8
19	124	3	8				
19	126	3	8	17	108	3	8
19	128	3	8	17	106	3	8
19	130	3	8	17	104	3	8
19	132	3	8	17	102	3	8
19	134	3	8	17	100	3	8
19	136	3	8	17	98	3	8
18	137	3	8	17	96	3	8
17	138	3	8	17	94	3	8
17	136	3	8	17	92	3	8
17	134	3	8	15	92	3	8
17	132	3	8	15	94	3	8
17	130	3	8	15	96	3	8
17	128	3	8	15	98	3	8
17	126	3	8	15	100	3	8
17	124	3	8	15	102	3	8
17	122	3	8	15	104	3	8
17	120	3	8	15	106	3	8
17	118	3	8	15	108	3	8
17	116	3	8	15	110	3	8
17	114	3	8	15	112	3	8

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
15	114	3	9	13	118	3	9
15	116	3	9	13	116	3	9
15	118	3	9	13	114	3	9
15	120	3	9	13	112	3	9
15	122	3	9	13	110	3	9
15	124	3	9	13	108	3	9
15	126	3	9	13	106	3	9
15	128	3	9	13	104	3	9
15	130	3	9	13	102	3	9
15	132	3	9	13	100	3	9
15	134	3	9	13	98	3	9
15	136	3	9	13	96	3	9
15	138	3	9	13	94	3	9
14	137	3	9	13	92	3	9
13	138	3	9	11	92	3	9
13	136	3	9	11	94	3	9
13	134	3	9	11	96	3	9
13	132	3	9	11	98	3	9
13	130	3	9	11	100	3	9
13	128	3	9	11	102	3	9
13	126	3	9	11	104	3	9
13	124	3	9	11	106	3	9
13	122	3	9	11	108	3	9
13	120	3	9	11	110	3	9

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
11	112	3	9	9	122	3	10
11	114	3	9	9	120	3	10
11	116	3	9	9	118	3	10
11	118	3	9	9	116	3	10
11	120	3	9	9	114	3	10
11	122	3	9	9	112	3	10
11	124	3	9	9	110	3	10
11	126	3	9	9	108	3	10
11	128	3	9	9	106	3	10
11	130	3	9	9	104	3	10
11	132	3	9	9	102	3	10
11	134	3	9	9	100	3	10
11	136	3	9	9	98	3	10
11	138	3	9	9	96	3	10
10	139	3	9	9	94	3	10
9	140	3	9	9	92	3	10
9	138	3	9	7	94	3	10
9	136	3	9	7	96	3	10
9	134	3	9	7	98	3	10
9	132	3	9	7	100	3	10
9	130	3	9	7	102	3	10
9	128	3	9	7	104	3	10
9	126	3	9	7	106	3	10
9	124	3	9	7	108	3	10

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
7	110	3	10	5	124	3	10
7	114	3	10	5	122	3	10
7	116	3	10	5	120	3	10
				5	118	3	10
7	118	3	10	5	116	3	10
7	120	3	10	5	114	3	10
7	122	3	10	5	112	3	10
7	124	3	10	5	110	3	10
7	126	3	10	5	108	3	10
7	128	3	10	5	106	3	10
7	130	3	10	5	104	3	10
7	132	3	10	5	102	3	10
7	134	3	10	5	100	3	10
7	136	3	10	5	98	3	10
7	138	3	10	5	96	3	10
7	140	3	10	5	94	3	10
5	139	3	10	5	92	3	10
5	140	3	10	3	92	3	10
5	138	3	10	3	94	3	10
5	136	3	10	3	96	3	10
5	134	3	10	3	98	3	10
5	132	3	10	3	100	3	10
5	130	3	10	3	102	3	10
5	128	3	10	3	104	3	10
5	126	3	10	3	106	3	10

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
3	108	3	10	46	79	2	11
3	110	3	10	46	77	2	11
3	112	3	10	46	75	2	11
3	114	3	11	46	73	2	11
3	116	3	11	46	71	2	11
3	118	3	11	46	69	2	11
3	120	3	11	46	67	2	11
3	122	3	11	46	65	2	11
3	124	3	11	46	63	2	11
3	126	3	11	46	61	2	11
3	128	3	11	46	59	2	11
3	130	3	11	46	57	2	11
3	132	3	11	46	55	2	11
3	134	3	11	46	53	2	11
3	136	3	11	46	51	2	11
3	138	3	11	46	49	2	11
3	140	3	11	46	47	2	11
2	139	3	11	46	45	2	11
46	89	2	11	46	43	2	11
46	85	2	11	46	41	2	11
46	87	2	11	46	39	2	11
46	83	2	11	46	37	2	11
46	81	2	11	46	35	2	11

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>	<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
46	33	2	11	60	15	2	11
46	31	2	11	60	17	2	11
46	29	2	11	60	19	2	11
46	27	2	11	60	21	2	11
46	25	2	11	60	23	2	11
46	23	2	11				
46	21	2	11	60	27	2	11
46	19	2	11	60	29	2	11
46	17	2	11	60	31	2	11
46	15	2	11	60	33	2	11
46	13	2	11	60	35	2	11
47	14	2	11	60	37	2	11
48	15	2	11	60	39	2	11
48	13	2	11	60	41	2	11
49	14	2	11	60	43	2	11
50	13	2	11	60	45	2	11
51	14	2	11	60	47	2	11
52	13	2	11	60	49	2	11
53	14	2	11	60	51	2	11
54	13	2	11	60	53	2	11
55	14	2	11	60	55	2	11
56	13	2	11	76	57	2	11
57	14	2	11	42	121	2	11
58	13	2	11	41	10	2	11
59	14	2	11	60	1	2	12
60	13	2	11	61	2	2	12

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
62	1	2	12
63	2	2	12
64	1	2	12
65	2	2	12
66	1	2	12
67	2	2	12
68	1	2	12

<u>LINE</u>	<u>ROW</u>	<u>QUAD</u>	<u>REEL</u>
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APPENDIX V

CALIBRATION DATA

/ZETEC INC.

TEST FREQUENCIES

CALIBRATION LOG FORM
MIXER SETTINGS

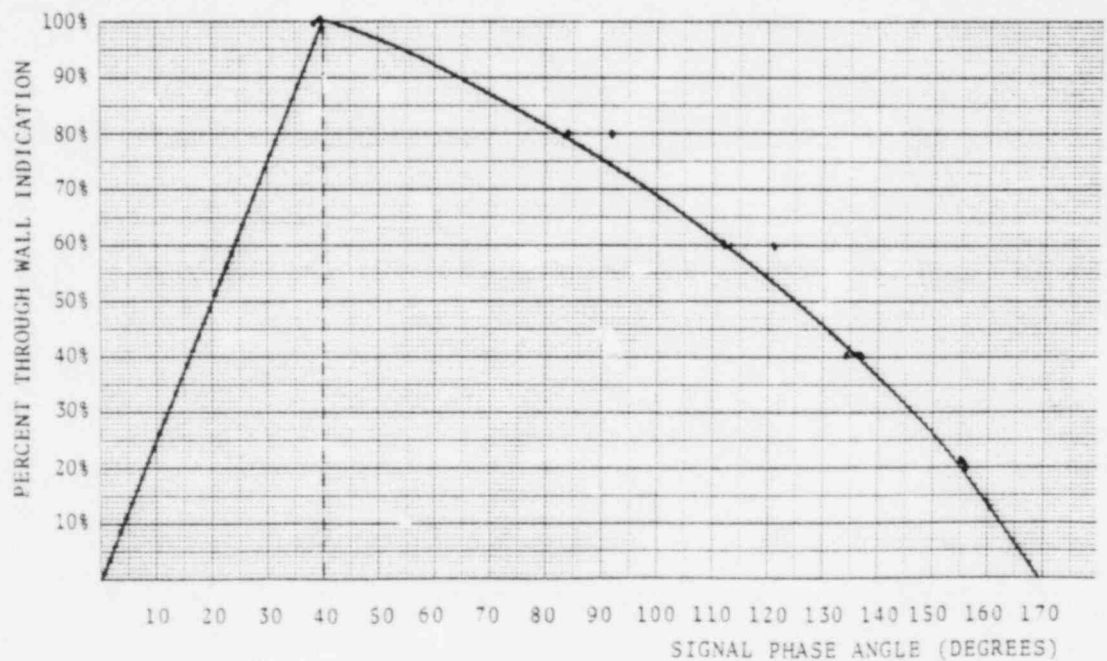
DATA IDENTIFICATION

CH#1 400 KHZ DIFF/ABS
CH#2 100 KHZ DIFF/ABS
CH#3 400.6 KHZ DIFF/ABS
CH#4 100 KHZ DIFF/ABS

LOWER UPPER
N/A 260
278
8.20 3.0
107
S1 9-10
S2 7-8

PLANT: CCNPP
UNIT: 2
S/G: 21 INLET/OUTLET
DATE: 11-6-82
REEL# 1 SIDE# 1
TO
REEL# SIDE#
CALIBRATION STD: 924
TUBE: 3/4 OD 49 WALL
MATERIAL: 1NC 600
PROBE: A.540SF

	100%	80%	60%	40%	20%	
ACTUAL	<u>100</u> %	<u>80</u> %	<u>60</u> %	<u>40</u> %	<u>20</u> %	% THROUGH WALL (4.1)
<u>400</u> KHZ	<u>38</u> °	<u>84</u> °	<u>112</u> °	<u>134</u> °	<u>156</u> °	DEGREES
• UPPER MIX	<u>39</u> °	<u>92</u> °	<u>121</u> °	<u>136</u> °	<u>155</u> °	DEGREES
LOWER MIX	<u> </u> °	<u> </u> °	<u> </u> °	<u> </u> °	<u> </u> °	DEGREES



ZETEC INC.

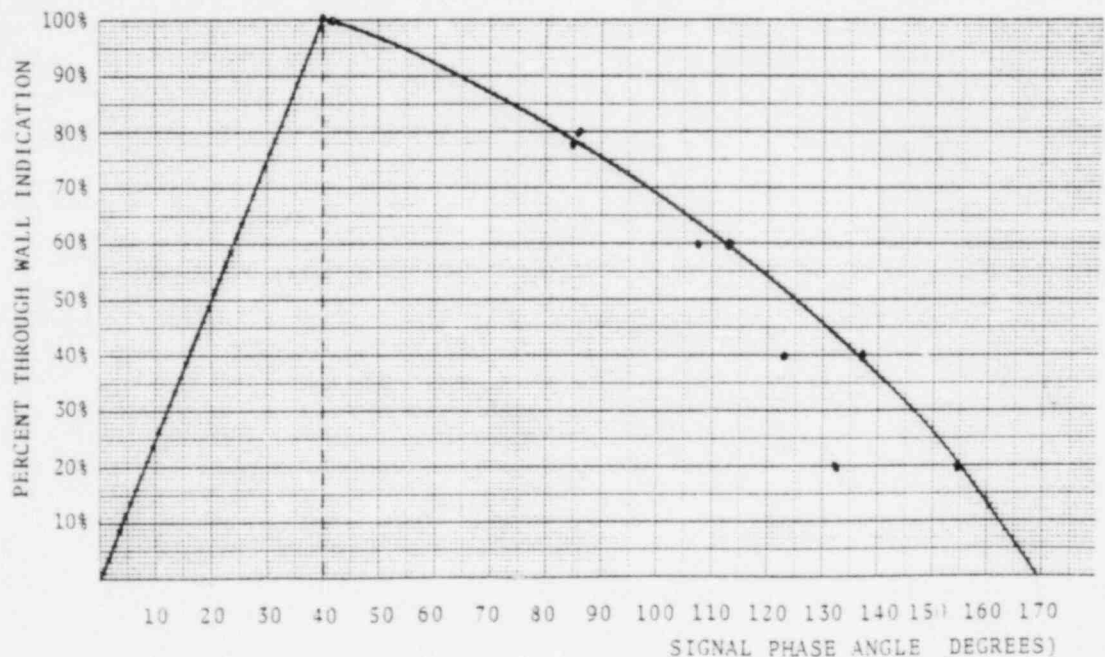
CALIBRATION LOG FORM
MIXER SETTINGS

TEST FREQUENCIES

DATA IDENTIFICATION

CH#1 <u>400</u> KHZ <u>DIFF/ABS</u>	LOWER	UPPER	PLANT: <u>CCNPP</u>
CH#2 <u>100</u> KHZ <u>DIFF/ABS</u>	<u>N/A</u>	<u>250</u>	UNIT: <u>TL</u>
CH#3 <u>400^{LG}</u> KHZ <u>DIFF/ABS</u>		<u>255</u>	S/G: <u>22 INLET/OUTLET</u>
CH#4 <u>100</u> KHZ <u>DIFF/ABS</u>		<u>6.85 3.40</u>	DATE: <u>11-12-82</u>
		<u>112</u>	REEL# <u>1</u> SIDE# <u>1</u>
S1		<u>9-10</u>	TO
S2		<u>7-8</u>	REEL# _____ SIDE# _____
			CALIBRATION STD: _____
			TUBE: <u>74" OD 049 WALL</u>
			MATERIAL: <u>INC 600</u>
			PROBE: <u>A. 5603F</u>

	100%	80%	60%	40%	20%	
ACTUAL	°	°	°	°	°	% THROUGH WALL (4.1)
<u>400 KHZ</u>	<u>42</u>	<u>91</u>	<u>113</u>	<u>137</u>	<u>154</u>	DEGREES
• UPPER MIX	<u>40</u>	<u>85</u>	<u>107</u>	<u>123</u>	<u>132</u>	DEGREES
LOWER MIX						DEGREES



ATTACHMENT NO. 7

MULTI-FREQUENCY EDDY CURRENT CALIBRATION SHEET

Nondestructive Testing Report No. #2186Date 11/5/82Applicable Code UNIT 2 TECH SPEC ASME CODE SECT II 1974-S75

- I. Material to be Examined:
- A. Material INCONEL
 - B. Alloy No. 600
 - C. Wall Thickness .048 mm
 - D. Outside Diameter 1.750

II. Eddy Current Instrument

A. Manufacturer ZETEC, INC.

B. Equipment

1. Miz 12 Display S/N B134082 - O'SCOPE DEARY S/N 111
2. Miz 12 Test Module TIMER/DISPLAY 069 Diff. ABS
 - a. Channel #1 S/N 194F Freq. 400 P Phase 044 Gain 51
 - b. Channel #2 S/N 195F Freq. 100 P Phase 328 Gain 29
 - c. Channel #3 S/N 329F Freq. 400 P Phase 064 Gain 06
 - d. Channel #4 S/N 325F Freq. 100 P Phase 304 Gain 38 X
 - e. Upper Mix S/N 208 V Phase 250 H Phase 255 Out Phase 120
 - V Gain 682 H Gain 262 S1 18.9 S2 8.7
 - f. Lower Mix S/N V Phase H Phase Out Phase
 - V Gain H Gain S1 S2

III. Strip Chart Recorder

A. Manufacturer GOULD

Model

- B. Strip Chart Recorder/Channel
- | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------------|---|---|---|---|---|---|---|---|
| 1. S/N | | | | | | | | |
| 2. Chart Speed | | | | | | | | |
| 3. Channel #1 Sensitivity | | | | | | | | |
| 4. Channel #2 Sensitivity | | | | | | | | |
- CLC 7783 03628
5 mm/sec
200 mV/div. ALL CHANNELS

IV. Magnetic Tape Recorder

A. Manufacturer ZETEC, INC.Model HP 3968AZB. S/N Z1050 A01534Operational Speed 3 3/4 I.P.S.

V. Eddy Current Probe Manipulator

A. Manufacturer ZETEC INCModel SH-4S/N N/AB. Scanning Speed 14 in/secC. Hand Probe N/AHand Manipulate with Probe Pusher N/AD. Remote Control Fixture SH-4Remote Control Fixture with 008Pusher AC ZETEC PROBE PUSHERE. Other

VI. Eddy Current Probe

A. Manufacturer ZETECModel A560S/FS/N B. Type of Probe: Differential XAbsolute C. Probe Coil Diameter 580Probe Body Diameter D. Probe Cable Length 100'Probe Extension Cable Length 100'

VII. System Calibration Reference Standard

A. Serial Nos.

#1 622 48 #25#2 #5 / 557#3 2-924B. Material INCONEL 600Tube Outside Diameter 1.750Tube Wall Thickness .048 mmC. Hole Size .052Slot Width D. Percent of Wall Penetration 100% 30% 60% 40% 100%

MULTI-FREQUENCY EDDY CURRENT CALIBRATION SHEET

Nondestructive Testing Report No. #2296Date 11/11/82Applicable Code UNIT 2 TECH SPEC. ASME CODE SECT II 1924-575

- I. Material to be Examined:
- A. Material INCONEL
 - B. Alloy No. 600
 - C. Wall Thickness 0.048 NOM.
 - D. Outside Diameter 0.250

II. Eddy Current Instrument

- A. Manufacturer ZETEC INC
- B. Equipment
- 1. Miz 12 Display S/N 015 OSCILLOSCOPE 3118386
 - 2. Miz 12 Test Module TIME/DIVIDER ONLY DIFF. ABS
 - a. Channel #1 S/N 041F Freq. 400 Phase 119 Gain 46
 - b. Channel #2 S/N 022F Freq. 100 Phase 339 Gain 24
 - c. Channel #3 S/N 114F Freq. 400 Phase 315 Gain 07
 - d. Channel #4 S/N 086F Freq. 100 Phase 308 Gain 38
 - e. Upper Mix S/N 033 V Phase 245 H Phase 250 Out Phase 120
V Gain 2.18 H Gain 2.35 S1 10-4 S2 8-7
 - f. Lower Mix S/N V Phase H Phase Out Phase
V Gain H Gain S1 S2

III. Strip Chart Recorder

- A. Manufacturer GOULD Model
- B. Strip Chart Recorder/Channel
- | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---------------------------|-------------------|---|---|---------------------|---|---|---|---|
| 1. S/N | <u>CLC 2243</u> | | | <u>03753</u> | | | | |
| 2. Chart Speed | <u>5 mm/sec</u> | | | | | | | |
| 3. Channel #1 Sensitivity | <u>200 mV/div</u> | | | <u>All CHANNELS</u> | | | | |
| 4. Channel #2 Sensitivity | | | | | | | | |

IV. Magnetic Tape Recorder

- A. Manufacturer ZETEC / HP Model 3968A2 FM
- B. S/N 006 Operational Speed 3 3/4 IPS

V. Eddy Current Probe Manipulator

- A. Manufacturer ZETEC INC Model SM-4 S/N N/A
- B. Scanning Speed 14 in/sec
- C. Hand Probe N/A Hand Manipulate with Probe Pusher N/A
- D. Remote Control Fixture SM-4 Remote Control Fixture with Probe Pusher AC ZETEC PROBE PUSHER
- E. Other

VI. Eddy Current Probe

- A. Manufacturer ZETEC Model A580 SF S/N
- B. Type of Probe: Differential X Absolute
- C. Probe Coil Diameter 5/8" Probe Body Diameter
- D. Probe Cable Length 100' Probe Extension Cable Length 100'

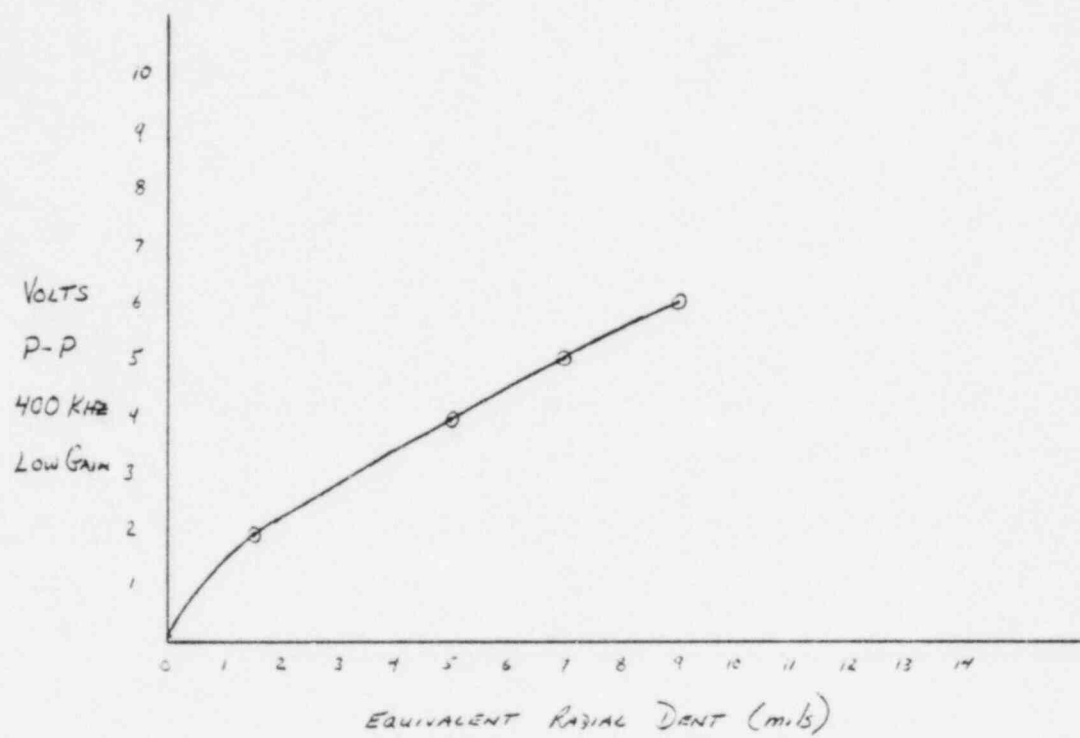
VII. System Calibration Reference Standard

- A. Serial Nos. #1 #14 #2 #5 #3 2-924
- B. Material INCONEL 600 Tube Outside Diameter 0.250 Tube Wall Thickness 0.048
- C. Hole Size 0.052 Slot Width
- D. Percent of Wall Penetration 100% 50% 40% 20% 10%

EQUIVALENT RADIAL DENT

VOLTS VS. MILS

400 KHz LOW GAIN



① O.D. DEFECTS ON 1" CENTERS

② 1 1/2" BETWEEN DENTS

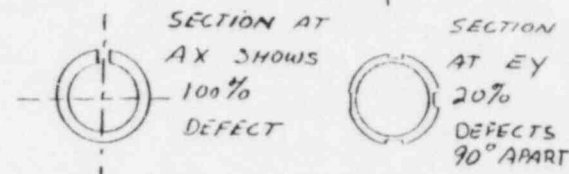
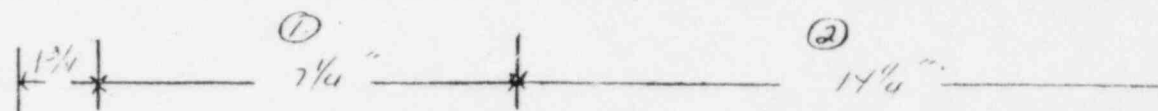
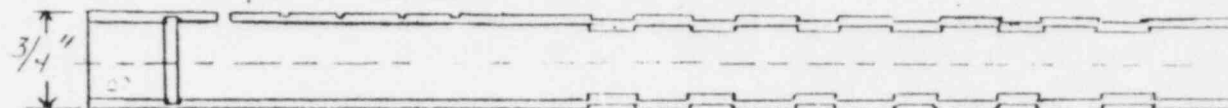
③ I.D. GROOVE 7/16" WIDE

DATE	SYM.	REVISION RECORD	AUTH.	DR.	CK.

PHYSICAL MEASURED .011" THRU .040" .050" .015" .009" .019" .014" .054" .007" .005" .0015"

E.T. PHASE 3" 382° 81° 107° 133° 150°
ANGLE

DIA. OF DEFECT ③ .052" 5/64" 7/64" 3/16" 3/16"



MATERIAL INCONEL 600
WALL THICKNESS 18 GA. (0.049")
TEST FREQ. 400 KHZ
HEAT TREAT 6557
SER. # 5

NOTE:

ALL O.D. DEFECTS ARE
FLAT BOTTOM HOLES
RECORDED ON REEL # 16

TOLERANCES (EXCEPT AS NOTED)	ZETEC, INC. ISSAQUAH, WASH.		
DECIMAL ± .003"	E.T. STANDARD	SCALE SKETCH	DRAWN BY M. P. APPROVED BY J. P.
FRACTIONAL ± 1/4"	TITLE COMBINATION DENT & O.D. DEFECT		
ANGULAR ±	DATE 1-19-78	DRAWING NUMBER V-6	

LOCATION

A B C D E F G

DATE	BY	REVISION RECORD	BY	CR

PHYSICAL

MEASURED .0095" .005" .0095" .0195" .0295" .039" THRU

H

I

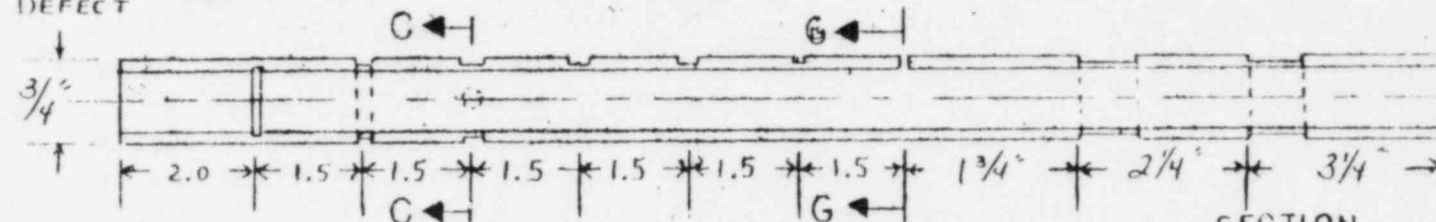
DEPTH

ET PHASE ANGLE

MEASUREMENT 2° 147° 144° 131° 106° 98° 43°

I.D. O.D.
GROOVE GROOVE
DIA. OF 1/16 WIDE 1/8 WIDE

3/16" 3/16" 7/64" 5/64" .052"

DIA. OF
DEFECT

SECTION
AT GG
SHOWS
100%
DEFECT

SECTION
AT GG
FOUR 20%
DEFECTS 90°
APART

MATERIAL INCONEL 600

NOMINAL WALL THICKNESS 18 GA.

HEAT TREAT#

TEST FREQUENCY 400 KHZ

SERIAL # Z-9

NOTE: C D E & F, AT BOTTOM HOLES TOLERANCES

H & I ARE 1/16 WIDE

RECORDED ON REEL # 20

DIMENSIONS IN INCHES
X.XXX ±.003

SCALE:

DATE:

2-12-81

ZETEC		BY
POST OFFICE BOX 100, CALHOUN, ALABAMA 35956-0100		REV
ET CALIBRATION STD-7		APPROVED BY:
DRAWING NUMBER 24-128		



7-10

Z-QA 8B

Z

OWNER

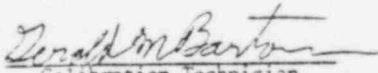
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument VECTOR ANALYZER III MODULE Serial Number 006

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed manufacturer's specifications.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	1	Oct	82		1	Apr	83
CALIBERATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATION NUMBER B 00590

V-11

Z-QA 8B

Z

OWNER

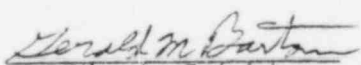
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 MIXER MODULE Serial Number 206

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed manufacturer's specifications.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	1	Oct	82		1	Apr	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATION NUMBER B 00587



V-12

Z-QA 88

Z

OWNER

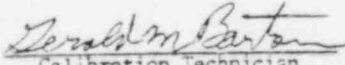
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 MIXER MODULE Serial Number 001

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed manufacturer's specifications.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	1	Oct	82		1	Apr	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATION NUMBER B 00586



V-10
Z-QA 8B

2
OWNER

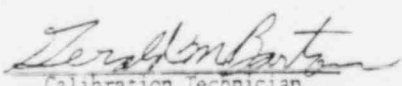
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 MIXER MODULE Serial Number 055

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed manufacturer's specifications.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	15	Sep	82		15	Mar	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATION NUMBER B 00572



V-14
Z-QA 8B

Z

OWNER

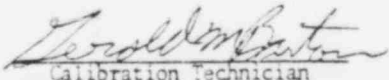
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 MIXER MODULE Serial Number 051

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed manufacturer's specifications.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	<u>25</u>						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	16	Sep	82		16	Mar	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATION NUMBER B 00573



Z-QA 8A

V-15

Z
OWNER

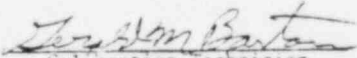
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 FREQUENCY MODULE Serial Number 091F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25	15	9						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr		
	22	SEP	82		22	MAR	83		
CALIBRATED BY	 Calibration Technician GERALD M. BARTON								

CERTIFICATE NUMBER A 01976



V-16

Z-QA 8A

2
OWNER

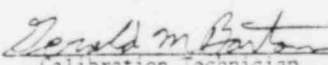
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 FREQUENCY MODULE Serial Number 072F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9	15	25				
CALIBRATION DATE	Day	No	Yr	CALIBRATION DUE	Day	No	Yr
	22	54	82		22	Mar	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01975



V-18
Z-QA 8A

Z
OWNER

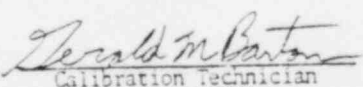
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 FREQUENCY MODULE Serial Number 006F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 3, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9/5/25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	22	Sep	82		22	Mar	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01973



V-19
Z-QA 8A

2
OWNER

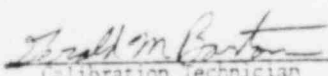
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 TIMER/DRIVER Serial Number 024

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9 1 5						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	22	Sep	82		22	May	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01972

V-20

I-QA 8A


Zetec
OWNER

Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument 3968A2 FM TAPE RECORDER Serial Number 004

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

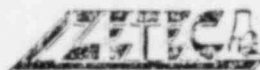
Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	01 10 21 32 33						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	12	JUL	82		12	JAN	83
CALIBRATED BY	<u>R. Breneman</u> Calibration Technician R. Breneman						

02132

CERTIFICATE NUMBER A



V-21

Z-QA 8A

ZETEC

OWNER

Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument 3968AZ FM TAPE RECORDER Serial Number 006

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	C1110 21						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	7	OCT	82		7	APR	83
CALIBRATED BY	<u>R. Breneman</u> Calibration Technician R. Breneman						

CERTIFICATE NUMBER A 02006



Z-QA 8A

V-22

2
OWNER

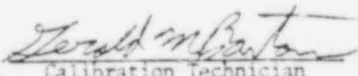
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 DISPLAY MODULE Serial Number 015

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	29	Sep	82		29	Mar	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01977



V-22

Z-QA 8A

Z
OWNER

Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 DISPLAY MODULE Serial Number 114

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED

9						
---	--	--	--	--	--	--

CALIBRATION
DATE

Day	Mo	Yr
30	Sep	82

CALIBRATION
DUE

Day	Mo	Yr
30	Mar	83

CALIBRATED BY

Gerald M. Barton
Calibration Technician
GERALD M. BARTON

CERTIFICATE NUMBER A 01979



Z-QA 8A

Z
OWNER

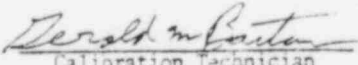
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument TEKTRONIX OSCILLOSCOPE Serial Number B118386

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9 34 35						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	8	Oct	82		8	Apr	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 02018



V-25
Z-QA 8A

2
OWNER

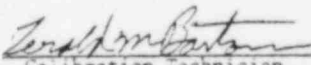
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument ELEKTRONIX OSCILLOSCOPE Serial Number 8172389

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9 34 35						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	31	Sep	82		30	Mar	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01978



V-25
Z-QA 8A

Z
OWNER


Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument GOULD STRIP CHART RECORDER Serial Number 12944

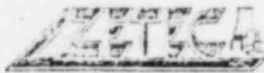
The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	13	OCT	82		13	Apr	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 02093



V-27
Z-QA 8A

86 + E
OWNER

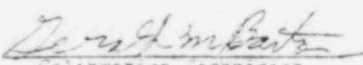
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 DISPLAY MODULE Serial Number 111

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	10	Sep	82		10	Sep	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01942



I-QA 8A

V-28

36+E

OWNER

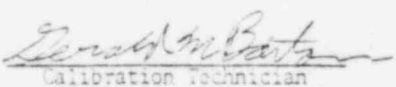
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument TEKTRONIX OSCILLOSCOPE Serial Number 0134082

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9 34 35						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	10	Sep	82		10	Sep	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01941



Z-QA 8A

V-29

B G + E
OWNER

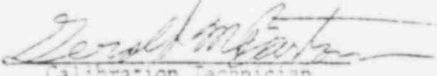
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument 3968AZ FM TAPE RECORDER Serial Number 2105 701534

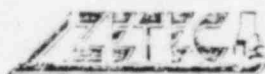
The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9	15	25	34	35		
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	10	sep	82		10	sep	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01940



Z-QA 8A

V-30

OG+E
OWNER

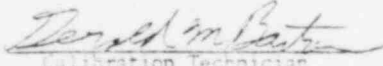
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 TIMER/DRIVERSerial Number 069

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	15						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	10	Sep	82		10	Sep	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01943



Z-48A V-31

BG+E

OWNER

Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 FREQUENCY MODULE Serial Number 194F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED

9 15 25

CALIBRATION
DATE

Day	Mo	Yr
10	Sep	82

CALIBRATION
DUE

Day	Mo	Yr
10	Sep	83

CALIBRATED BY

Gerald M. Barton

Calibration Technician

GERALD M. BARTON

CERTIFICATE NUMBER A 01944



Z-QA 8A V-32

BGE

OWNER

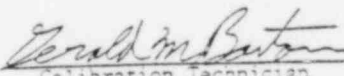
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument M17-12 FREQUENCY MODULE Serial Number 199F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9/15/29						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	10	Sep	82		10	Sep	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01945



Z-QA 8A

V-33

BGE
OWNER

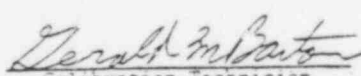
Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 FREQUENCY MODULE Serial Number 325F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	9 15 25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	10	Sep	82		10	Sep	83
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATE NUMBER A 01946



Z-QA 8A

V-24

GGE

OWNER

Zetec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 FREQUENCY MODULE Serial Number 329F

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed ASME Section XI, Appendix IV, 1980 Edition, Winter 1980 Addenda, and/or ASME Section V Article 8, Appendix I, 1977 Edition, Winter 1978 Addenda.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED

9 15 25

CALIBRATION
DATE

Day	Mo	Yr
10	Sep	82

CALIBRATION
DUE

Day	Mo	Yr
10	Sep	83

CALIBRATED BY

Gerald M. Barton
Calibration Technician
GERALD M. BARTON

CERTIFICATE NUMBER A 01947



V-35
I-QA 8B

BGE

OWNER

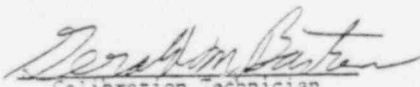
Ietec, Incorporated hereby certifies that the following instrument meets or exceeds all manufacturer's specifications.

Instrument MIZ-12 MIXER MODULE Serial Number 208

The calibration of this instrument is controlled by approved, documented procedures which meet or exceed manufacturer's specifications.

Calibration has been performed using standards whose accuracies are traceable to the National Bureau of Standards.

CERTIFICATION

STANDARDS USED	25						
CALIBRATION DATE	Day	Mo	Yr	CALIBRATION DUE	Day	Mo	Yr
	13	Sep	92		13	Sep	93
CALIBRATED BY	 Calibration Technician GERALD M. BARTON						

CERTIFICATION NUMBER B 00562

TEST REPORT

TEST INST. <i>Brush Recorder</i>			SER. NO. <i>01628</i>			
PROC. NO. <i>ITC-602</i>			MFR. <i>General</i>			
TESTED BY <i>Walter M. Hamlin</i>			DATE <i>10-25-92</i>		ACCEPTED BY <i>[Signature]</i>	
			DATE <i>10-25-92</i>			
PROC. STEP NO.	FUNCTION TESTED	NOMINAL VALUES	MEASURED VALUES-TOLERANCES			
			AS FOUND	AS FOUND TOLERANCE	AS LEFT	AS LEFT TOLERANCE IF DIFFERENT FROM AS FOUND
	<i>D.C. Volts</i>					
	<i>Brush 1</i>	<i>+ 25 DIV</i>	<i>+15.0 DIV</i>	<i>± .5 DIV</i>		
		<i>- 25 DIV</i>	<i>-25.0 DIV</i>	<i>± .5 DIV</i>		
	<i>Brush 2</i>	<i>+ 25 DIV</i>	<i>+25.0 DIV</i>	<i>± .5 DIV</i>		
		<i>- 25 DIV</i>	<i>-25.0 DIV</i>	<i>± .5 DIV</i>		
	<i>Brush 3</i>	<i>+ 25 DIV</i>	<i>+25.0 DIV</i>	<i>± .5 DIV</i>		
		<i>- 25 DIV</i>	<i>-25.0 DIV</i>	<i>± .5 DIV</i>		
	<i>Brush 4</i>	<i>+ 25 DIV</i>	<i>+25.0 DIV</i>	<i>± .5 DIV</i>		
		<i>- 25 DIV</i>	<i>-25.0 DIV</i>	<i>± .5 DIV</i>		
	<i>Brush 5</i>	<i>+ 25 DIV</i>	<i>+25.0 DIV</i>	<i>± .5 DIV</i>		
		<i>- 25 DIV</i>	<i>-25.0 DIV</i>	<i>± .5 DIV</i>		
	<i>Brush 6</i>	<i>+ 25 DIV</i>	<i>+25.0 DIV</i>	<i>± .5 DIV</i>		
		<i>- 25 DIV</i>	<i>-25.0 DIV</i>	<i>± .5 DIV</i>		
	<i>D.C. Check</i>					
	<i>Volt 10 Hz to 40 Hz</i>	<i>FULL SCALE</i>	<i>< 1 DIV</i>	<i>< 1 DIV</i>		
	<i>Oil Chamber</i>	<i>DEFLECTION</i>	<i>ALL 6 CHAMBERS</i>			
	<i>Speed Check</i>					
	<i>125 mm/sec RANGE</i>	<i>125 mm</i>	<i>124.1 mm</i>	<i>± 1 mm</i>		
	<i>for 1 sec</i>					

COMPLETE OTHER SIDE

BRUSH RECORDING 03628

LIST STANDARDS USED TRACEABLE TO NBS

TORTRONIX TG 501 Time Base 94 10170

Fluxes 57018 CALIBRATED 94 10353

HEWLETT PACKARD 3310 A FUNCTION GENERATOR 34 6060

WORK PERFORMED

CHE CHECK - SAT AFTER INITIAL SETUP

TEST REPORT

TEST INST. <u>Brush Beerside</u>			SER. NO. <u>03255</u>			
PROC. NO. <u>ITC-22</u>			MFR. <u>Gould</u>			
TESTED BY <u>W. H. [Signature]</u>			DATE <u>10-25-82</u>			
			ACCEPTED BY <u>[Signature]</u>			
			DATE <u>10-25-82</u>			
PROC. STEP NO.	FUNCTION TESTED	NOMINAL VALUES	MEASURED VALUES TOLERANCES			
			AS FOUND	AS FOUND TOLERANCE	AS LEFT	AS LEFT TOLERANCE IF DIFFERENT FROM AS FOUND
	<u>D.C. Volts</u>					
	<u>Brush 1</u>	<u>+ 25 DIV</u>	<u>+25 DIV</u>	<u>< ± .5 DIV</u>		
		<u>- 25 DIV</u>	<u>-25 DIV</u>	<u>< ± .5 DIV</u>		
	<u>Brush 2</u>	<u>+ 25 DIV</u>	<u>+25 DIV</u>	<u>< ± .5 DIV</u>		
		<u>- 25 DIV</u>	<u>-25 DIV</u>	<u>< ± .5 DIV</u>		
	<u>Brush 3</u>	<u>+ 25 DIV</u>	<u>+25 DIV</u>	<u>< ± .5 DIV</u>		
		<u>- 25 DIV</u>	<u>-25 DIV</u>	<u>< ± .5 DIV</u>		
	<u>Brush 4</u>	<u>+ 25 DIV</u>	<u>+25 DIV</u>	<u>< ± .5 DIV</u>		
		<u>- 25 DIV</u>	<u>-25 DIV</u>	<u>< ± .5 DIV</u>		
	<u>Brush 5</u>	<u>+ 25 DIV</u>	<u>+25 DIV</u>	<u>< ± .5 DIV</u>		
		<u>- 25 DIV</u>	<u>-25 DIV</u>	<u>< ± .5 DIV</u>		
	<u>Brush 6</u>	<u>+ 25 DIV</u>	<u>+25 DIV</u>	<u>< ± .5 DIV</u>		
		<u>- 25 DIV</u>	<u>-25 DIV</u>	<u>< ± .5 DIV</u>		
	<u>A.C. Check</u>					
	<u>Vari. 10 Hz to 40 Hz</u>	<u>FULL SCALE</u>	<u>< 1 DIV</u>	<u>< ± 1 DIV</u>		
	<u>Old Channels</u>	<u>DEFLECTION</u>	<u>Along Channel</u>			
	<u>Speed Check</u>					
	<u>125 mm/sec RANGE</u>	<u>125 mm</u>	<u>124.2 mm</u>	<u>± 1 mm</u>		
	<u>for 1 sec</u>					

COMPLETE OTHER SIDE

BRUSH RECORDER 03755

LIST STANDARDS USED TRACEABLE TO NBS

Hewlett Packard 3310A Function Generator Ser 10837
 Tektronix TG 501 Digital Blank Computer 9/4 10190
 Fluke 9701B Calibrator Ser 10353

WORK PERFORMED

Col Clark sent after chest set up.

APPENDIX VI

ZETEC PERSONNEL CERTIFICATIONS

TITLE: PERSONNEL CERTIFICATION
TRANSMITTAL

POST OFFICE BOX 140 · ISSAQUAH, WASHINGTON 98027 · TELEPHONE 206-392-5316

CERTIFICATE OF PERSONNEL QUALIFICATION

(Refer to Quality Assurance Plan and Program Z-QA
Procedure No. Z-QA 101)

NAME: WAYNE ARTHUR GRAY

DATE OF BIRTH: 1/17/50

SOCIAL SECURITY NUMBER: 533-48-9427

TEST METHOD: Eddy Current

HIGHEST LEVEL: Level IIA

CERTIFICATION DATE: 7/9/76 LATEST RE-CERTIFICATION DATE: 1/31/80

EXPERIENCE BACKGROUND:

March 1975-Present Zetec, Inc.; Issaquah, WA - NDT Technician

EDUCATIONAL BACKGROUND:

1973 Central Washington State College; BA

March 1975 24 hours formal training for Eddy Current Level I at Zetec, Inc.

July 1976 24 hours formal training for Eddy Current Level II at Zetec, Inc.

May 1980 40 hours formal training for Eddy Current Level IIA at Zetec, Inc.

PSYCHOLOGICAL EXAMINATION:

METHOD: Standard psychiatric examination interview and the 'MPI psychological test

DOCTOR: Daniel H. Anderson, M.D.; Bellevue, Washington

DATE: November 6, 1975



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NAME: • WAYNE A. GRAY

PHYSICAL EXAMINATION:

DATE: 12/16/81

DOCTOR: R. W. Enck, M.D., Bellevue, Washington

GENERAL HEALTH: Excellent

Based on: complete history and physical including a complete blood count, urinalysis, EKG, chest x-ray and GHS 100 (automated blood profile).

SPIROMETER: See attached

VISION:

SNELLEN

	RIGHT EYE	LEFT EYE
UNCORRECTED.....	20/-	20/-
CORRECTED	20/20	20/20

JAEGER

UNCORRECTED	J1	J1
CORRECTED	J1	J1

ISHIHARA COLOR PLATES	Normal	Normal
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TECHNICAL EXAMINATION:

LEVEL	DATE	GENERAL	SPECIFIC	PRACTICAL	COMPOSITE
I	3/7/75	90	76	100	90.8
II	3/21/80	94	91	100	95
IIA	3/21/80			88	88

COMMENTS:

To Whom It May Concern:

Wayne A. Gray has been employed by Zetec, Inc. since March 1975. In our opinion, he is normal psychologically and poses no potential subversive threat to your facility or your personnel.

CERTIFIED BY:

 A. L. LUCERO
 MANAGER OF QUALITY ASSURANCE
 LEVEL III EXAMINER

or

Clyde J. Denton

 CLYDE J. DENTON
 GENERAL MANAGER
 LEVEL III EXAMINER

VI-3

FORM NUMBER Z-QA-9

TITLE: PERSONNEL CERTIFICATION
TRANSMITTAL



POST OFFICE BOX 140 · ISSAQUAH, WASHINGTON 98027 · TELEPHONE 206-392-5316

CERTIFICATE OF PERSONNEL QUALIFICATION

(Refer to Quality Assurance Plan and Program Z-QA
Procedure No. Z-QA 101)

NAME: RAYMOND A. NISSLEY

DATE OF BIRTH: 6/25/54

SOCIAL SECURITY NUMBER: 537-64-2574

TEST METHOD: Eddy Current

HIGHEST LEVEL: II

CERTIFICATION DATE: 8/22/81 LATEST RE-CERTIFICATION DATE:

EXPERIENCE BACKGROUND:

10/80-Present	Zetec, Inc.; Issaquah, WA - NDT Technician
1978-1980	Stephen D. Freegard, Inc.; Issaquah, WA - Machinist, construction
1976-1978	T.R.M. Wood Products; Maple Valley, WA - Forklift operator, shipping and receiving
1972-1976	Morris Wood Corp./Car-Mor Hardwoods/Chelsia Hardwoods, Inc. Sawyer, forklift operator, shipping and receiving, quality control

EDUCATIONAL BACKGROUND:

1972	Issaquah High School; Issaquah, Washington
November 1980	40 hours formal training for Eddy Current Level I at Zetec, Inc.
July 1981	40 hours formal training for Eddy Current Level II at Zetec, Inc.

PSYCHOLOGICAL EXAMINATION:

METHOD:	Standard psychiatric examination interview and the MMPI psychological test
DOCTOR:	Hugh M. Castell, M.D.; Kirkland, Washington
DATE:	December 12, 1980



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NAME: RAYMOND A. NISSLEY

PHYSICAL EXAMINATION:

DATE: 2/3/82

DOCTOR: R. W. Enck, M.D., Bellevue, Washington

GENERAL HEALTH: Excellent

Based on: complete history and physical including a complete blood count, urinalysis, EKG, chest x-ray and GHS 100 (automated blood profile).

SPIROMETER: See attached.

VISION:	RIGHT EYE	LEFT EYE
SNELLEN		
UNCORRECTED.....	20/70	20/100
CORRECTED	20/25	20/20
JAEGER		
UNCORRECTED	J1	J1
CORRECTED	-	-
ISHIHARA COLOR PLATES	Normal	Normal

TECHNICAL EXAMINATION:

LEVEL	DATE	GENERAL	SPECIFIC	PRACTICAL	COMPOSITE
I	11/21/80	91%	100%	100%	98%
II	8/22/81	97%	96%	100%	98%

COMMENTS:

To Whom It May Concern:

Raymond Nissley has been employed by Zetec, Inc. since October, 1980. In our opinion, he is normal psychologically and poses no potential subversive threat to your facility or your personnel.

CERTIFIED BY:

A. L. LUCERO
MANAGER OF QUALITY ASSURANCE
LEVEL III EXAMINER

or

CLYDE J. DENTON
GENERAL MANAGER
LEVEL III EXAMINER

VI-5

FORM NUMBER Z-QA-9

TITLE: PERSONNEL CERTIFICATION
TRANSMITTAL



POST OFFICE BOX 140 · ISSAQUAH, WASHINGTON 98027 · TELEPHONE 206-392-5316

CERTIFICATE OF PERSONNEL QUALIFICATION

(Refer to Quality Assurance Plan and Program Z-QA
Procedure No. Z-QA 101)

NAME: WILLIAM MACS WILLIAMS

DATE OF BIRTH: 5/1/56

SOCIAL SECURITY NUMBER: 544-74-0287

TEST METHOD: Eddy Current

HIGHEST LEVEL: II

CERTIFICATION DATE: 10/8/82 LATEST RE-CERTIFICATION DATE:

EXPERIENCE BACKGROUND:

1981-Present	Zetec, Inc.; Issaquah, WA - NDT Technician
1979-1981	Keyerheuser Company - Process Control Technician

EDUCATIONAL BACKGROUND:

3 years	J. M. Perry Institute; Yakima, WA
January 1981	40 hours formal training for Eddy Current Level I at Zetec, Inc.
October 1982	40 hours formal training for Eddy Current Level II at Zetec, Inc.

PSYCHOLOGICAL EXAMINATION:

METHOD: Standard psychiatric examination interview and the MMPI psychological test

DOCTOR: Hugh M. Castell, M.D.; Kirkland, Washington

DATE: July 31, 1981



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NAME: WILLIAM MACS WILLIAMS

PHYSICAL EXAMINATION:

DATE: 9/3/82

DOCTOR: R. W. Enck, M.D., Bellevue, Washington

GENERAL HEALTH: Excellent

Based on: complete history and physical including a complete blood count, urinalysis, EKG, chest x-ray and GHS 100 (automated blood profile).

SPIROMETER: Normal (see attached)

VISION:

SNELLEN

UNCORRECTED..... 20/30

CORRECTED..... -

JAEGER

UNCORRECTED..... J1

CORRECTED..... -

ISHIHARA COLOR PLATES

RIGHT EYE

LEFT EYE

20/20

-

J1

-

Normal

TECHNICAL EXAMINATION:

LEVEL	DATE	GENERAL	SPECIFIC	PRACTICAL	COMPOSITE
I	1/8/82	91%	90%	100%	95%
II	10/8/82	79%	96%	100%	92%

COMMENTS:

To Whom It May Concern:

W. Macs Williams has been employed by Zetec, Inc. since July 1981. In our opinion, he is normal psychologically and poses no potential subversive threat to your facility or your personnel.

CERTIFIED BY:

A. L. LUCERO
MANAGER OF QUALITY ASSURANCE
LEVEL I EXAMINER

or

CLYDE J. DENTON
GENERAL MANAGER
LEVEL III EXAMINER



VI-7

TITLE: PERSONNEL CERTIFICATION
TRANSMITTAL

POST OFFICE BOX 140 · ISSAQUAH, WASHINGTON 98027 · TELEPHONE 206-392-5316

CERTIFICATE OF PERSONNEL QUALIFICATION

(Refer to Quality Assurance Plan and Program 2-QA
Procedure No. 2-QA 101)

NAME: LYNN D. HOVER
DATE OF BIRTH: 4/3/56
SOCIAL SECURITY NUMBER: 536-66-1274
TEST METHOD: Eddy Current
HIGHEST LEVEL: I
CERTIFICATION DATE: 6/5/82 LATEST RE-CERTIFICATION DATE:
EXPERIENCE BACKGROUND:
4/19/82-Present Zetec, Inc.; Issaquah, WA - NDT Technician
1981-1982 Bebee Brothers, Inc.; Seattle, WA - Numerical Control
Machine Operator
1978-1981 Emil's Concrete Construction Co.; Redmond, WA - Laborer

EDUCATIONAL BACKGROUND:

1972-1974 Issaquah High School; Issaquah, WA
1974-1976 Walla Walla Community College; Walla Walla, WA
1976-1978 University of Wyoming; Laramie, WY
1980 South Seattle Community College; Seattle, WA
1982 Shoreline Community College; Seattle, WA
June 1982 40 hours formal training for Eddy Current Level I at
Zetec, Inc.

PSYCHOLOGICAL EXAMINATION:

METHOD: Standard psychiatric examination interview and the MMPI
psychological test
DOCTOR: Hugh M. Castell, M.D.; Bellevue, Washington
DATE: May 13, 1982



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NAME: LYNN D. HOVER

PHYSICAL EXAMINATION:

DATE: 4/28/82

DOCTOR: R. W. Enck, M.D., Bellevue, Washington

GENERAL HEALTH: Excellent

Based on: complete history and physical including a complete blood count, urinalysis, EKG, chest x-ray and GHS 100 (automated blood profile).

SPIROMETER: See Attached

VISION:	RIGHT EYE	LEFT EYE
SNELLEN		
UNCORRECTED.....	20/30	20/25
CORRECTED	-	-
JAEGER		
UNCORRECTED	J1	J1
CORRECTED	-	-
ISHIHARA COLOR PLATES	Normal	Normal

TECHNICAL EXAMINATION:

LEVEL	DATE	GENERAL	SPECIFIC	PRACTICAL	COMPOSITE
I	6/5/82	70	74	90	81

COMMENTS:

To Whom It May Concern:

Lynn D. Hover has been employed by Zetec, Inc. since April, 1982. In our opinion, he is normal psychologically and poses no potential subversive threat to your facility or your personnel.

CERTIFIED BY:

A. L. LUCERO
MANAGER OF QUALITY ASSURANCE
LEVEL III EXAMINER

or

CLYDE J. DENTON
GENERAL MANAGER
LEVEL III EXAMINER

VI-9

FORM NUMBER Z-QA-9

TITLE: PERSONNEL CERTIFICATION
TRANSMITTAL



POST OFFICE BOX 140 · ISSAQUAH, WASHINGTON 98027 · TELEPHONE 206-392-5316

CERTIFICATE OF PERSONNEL QUALIFICATION

(Refer to Quality Assurance Plan and Program Z-QA
Procedure No. Z-QA 101)

NAME: MICHAEL G. MANLEY
DATE OF BIRTH: 6/7/53
SOCIAL SECURITY NUMBER: 532-54-0950
TEST METHOD: Eddy Current
HIGHEST LEVEL: I
CERTIFICATION DATE: 7/16/82 LATEST RE-CERTIFICATION DATE:
EXPERIENCE BACKGROUND:
1982-Present Zetec, Inc.; Issaquah, WA - NDT Technician
1976-1982 Style-Rite Glass; Richland, WA - Glazier
1975-1976 Inland Glass Co.; Pasco, WA - Glazier
1972-1974 Meadow Springs Golf Course; Richland, WA - Laborer

EDUCATIONAL BACKGROUND:

1972 Columbia High School; Richland, WA (graduated)
July 1982 40 hours formal training for Eddy Current Level I at
Zetec, Inc.

PSYCHOLOGICAL EXAMINATION:

METHOD: Standard psychiatric examination interview and the MMPI
psychological test
DOCTOR: Hugh M. Castell, M.D.; Bellevue, Washington
DATE: May 18, 1982



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NAME: MICHAEL G. MANLEY

PHYSICAL EXAMINATION:

DATE: 5/13/82

DOCTOR: R. W. Enck, M.D., Bellevue, Washington

GENERAL HEALTH: Good

Based on: complete history and physical including a complete blood count, urinalysis, EKG, chest x-ray and GHS 100 (automated blood profile).

SPIROMETER: See Attached

VISION:	RIGHT EYE	LEFT EYE
SNELLEN		
UNCORRECTED.....	20/25	20/20
CORRECTED	-	-
JAEGER		
UNCORRECTED	J1	J1
CORRECTED	-	-
ISHIHARA COLOR PLATES	Normal	Normal

TECHNICAL EXAMINATION:

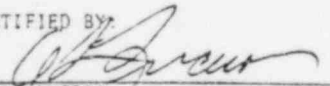
LEVEL	DATE	GENERAL	SPECIFIC	PRACTICAL	COMPOSITE
I	7/16/82	85	84	100	92

COMMENTS:

To Whom It May Concern:

Michael G. Manley has been employed by Zetec, Inc. since 5/10/82. In our opinion, he is normal psychologically and poses no potential subversive threat to your facility or your personnel.

CERTIFIED BY:


A. L. LUCERO
MANAGER OF QUALITY ASSURANCE
LEVEL III EXAMINER

or

CLYDE J. DENTON
GENERAL MANAGER
LEVEL III EXAMINER