Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #13 BATTERY COMBUSTION STACK

1990

Prepared for:

USS CLAIRTON WORKS
A DIVISION OF USX CORPORATION
CLAIRTON, PA

Prepared by:

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146

PROJECT NO. 601050-02

SEPTEMBER 1990

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ABSTRACT

On July 10, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #13 Battery Combustion Stack operated at the Clairton Coke and Coal Chemical Works. The purpose of the testing was to determine the (1) concentration and mass emissions of particulate matter, and (2) presence of visible emissions from the stack as required by the Amended Mon Valley Consent Decree, Paragraph V.A.(6) and Appendix 4.A. The results of the testing showed an average particulate matter concentration and emission rate of 0.011 gr/scfd and 2.73 lb/hr, respectively. The allowable concentration is 0.015 gr/scfd. Thus, the emissions from the stack are in compliance. No visible emissions were observed from the stack during any of the tests.

1.0 INTRODUCTION

On July 10, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #13 Battery Combustion Stack operated at the Clairton Coke and Coal Chemical Works. The purpose of the testing was to determine the (1) concentration and mass emissions of particulate matter, and (2) presence of visible emissions from the stack as required by the Amended Mon Valley Consent Decree, Paragraph V.A.(6) and Appendix 4.A.

Testing was performed by the Air Quality Engineering Division of Keystone Environmental Resources, Inc. (Keystone). The test crew was comprised of Mark Grunebach, Manager of the Monitoring Services Department, Richard Casselberry, Daniel Keller, and Thomas Morgan. Visible emissions determinations were performed by Jim McKoy of Environmental Technical Services (ETS). Keystone and ETS are sister companies under the Chester Environmental Group. All test procedures were witnessed by Phil Lawrence of the Allegheny County Health Department.

2.0 METHODOLOGIES

Particulate matter sampling was performed in accordance with EPA Stationary Source Sampling Methods 1 through 5 and Sections 139.11 and 139.12 of the Pennsylvania Department of Environmental Resources (PA DER) Source Testing Manual. The gas volume sampled for each 120 minute test was greater than 50 dry standard cubic feet.

The process exhaust exited through a 120" diameter stack. A total of 24 traverse points (12 per diameter) were sampled; the traverse points were calculated in accordance with EPA Method 1. Sampling was conducted through 4 equally spaced ports, with each traverse point sampled for 5 minutes. A schematic diagram of the stack and traverse points is presented in Figure 2-1.

A total of three test runs were performed. During each test, gas concentrations of CO_2, O_2, and N_2 (by difference) were determined with the use of a Fyrite apparatus as specified by EPA Method 3.

Clean up of the sampling train included a water and acetone rinse of both the front-half and back-half components. The water soluble and water insoluble portions of the front-half of the sampling train were determined as a total, while the water soluble and water insoluble portions of the back-half were determined separately in accordance with Section 139.12 of the PA DER Source Testing Manual. After filtration, the soluble back-half water was extracted with chloroform and ethyl ether; the extract was dried, desiccated, and weighed to a constant weight. The filtrate was then submitted for sulfate analysis via ion chromatography.

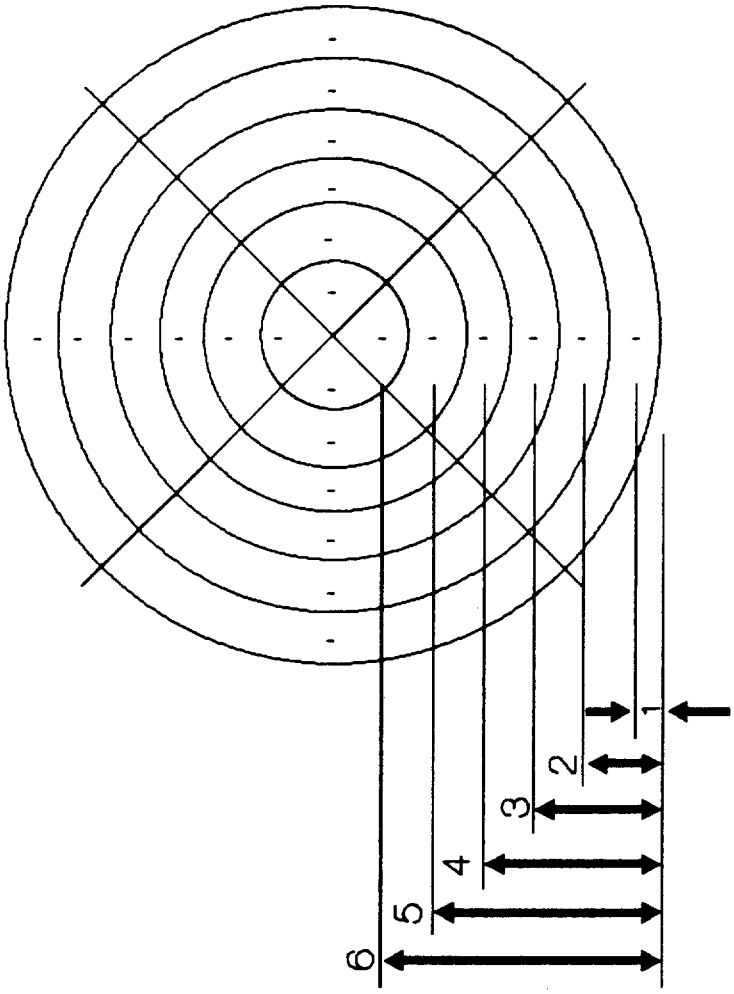
All visible emissions determinations were performed in accordance with EPA Stationary Source Sampling Method 9. Visible emissions were recorded for the duration of each particulate matter test.

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

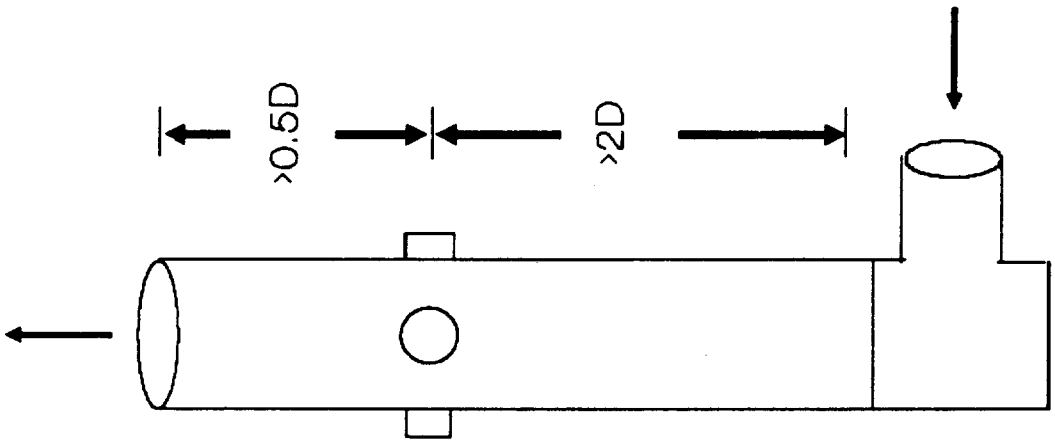
3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146

SKETCH SHEET

	NAME	DATE
DRAWN		
CHECKED		



Traverse Point	Distance (in.)
1	2.6
2	8.0
3	14.2
4	21.3
5	30.0
6	42.7



Stack Diameter (in.) = 120
D

2-1a

ACTIVITY No.

REVISION

TITLE

SCHEMATIC DIAGRAM OF THE STACK AND TRAVERSE POINTS

FIGURE 2-1

RD-187 REV. 2 #17-0453 PHOENIX TRACING CLOTH 8-73

3.0 RESULTS

All testing was performed during periods of normal plant operation. To validate this, copies of the operational data can be found in Appendix A.

The probes and sampling trains were operate in accordance with EPA Stationary Source Sampling Methods 1 through 5. Copies of the pre-test calibration results, post-test calibration results, and the results of an audit conducted with a critical orifice provided by the Allegheny County Health Department can be found in Appendix B.

Copies of the field data sheets for the particulate matter sampling can be found in Appendix C. The emissions calculations for each test can be found in Appendix D. The results have been summarized in Table 3-1. The average particulate matter concentration and emission rate are 0.011 grains per standard cubic foot dry (gr/scfd) and 2.73 pounds per hour (lb/hr), respectively.

As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the particulate matter standard for #13 Battery Combustion Stack is 0.015 gr/scfd. Thus, the emissions from the stack are in compliance.

Table 3-1 also lists other pertinent stack and sampling parameters including the stack gas flow rate in units of actual cubic feet per minute (acfm) and standard cubic feet per minute (scfm), moisture content of the stack gas, stack gas temperature, gas volume sampled for each test (scfd), and the isokinetics value for each test. The isokinetics value is equal to the ratio of the average linear gas velocity sampled through the probe nozzle to the average stack gas velocity. An isokinetics value between 90% and 110% is considered acceptable.

The analytical results of the sulfate determination of the soluble back-half water can be found in Appendix E. These results have been summarized below:

USS CLAIRTON WORKS

TABLE 3-1

PARTICULATE MATTER EMISSIONS DATA

EMISSIONS	TEST #1	TEST #2	TEST #3	AVERAGE
gr/dscf	0.012	0.012	0.010	0.011
lb/hr	2.81	2.68	2.69	2.73
STACK CONDITIONS				
Flow (acfm)	59632	58473	67397	61834
Flow (scfm)	31807	31810	36578	33398
Moisture Content (%)	17.37	15.80	16.30	16.49
Stack Temp. (^{o}F)	507	488	489	494
SAMPLING CONDITIONS				
Sampling Time (min)	120	120	120	
Sample Volume (scfd)	70.264	72.226	82.411	
Isokinetics (%)	103.78	104.68	104.49	

Test #	Sample Volume (mL)	Concentration (mg/L)	Total Sulfate (mg)
1	930	36.8	34.2
2	740	39.6	29.3
3	950	54.2	51.5

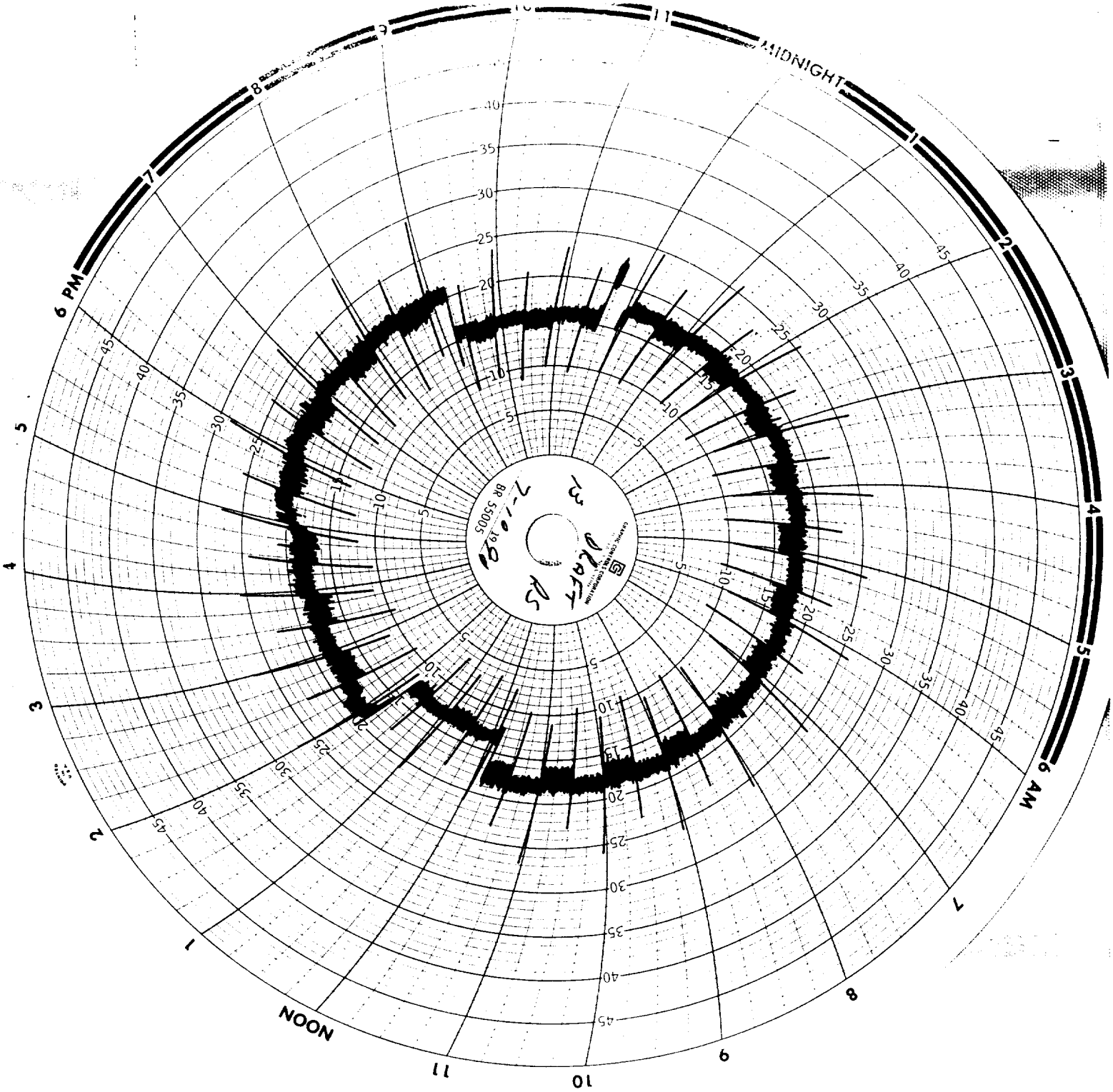
Copies of the field data sheets for the visible emissions determinations can be found in Appendix F. No visible emissions were observed during any of the three tests. As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the visible emissions shall not equal or exceed 20% opacity for a period or periods aggregating in excess of 3 minutes in any 60-minute period and shall never equal or exceed 60% opacity. Thus, the emissions are in compliance.

USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#13 BATTERY COMBUSTION STACK

APPENDIX A

OPERATIONAL RECORDS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.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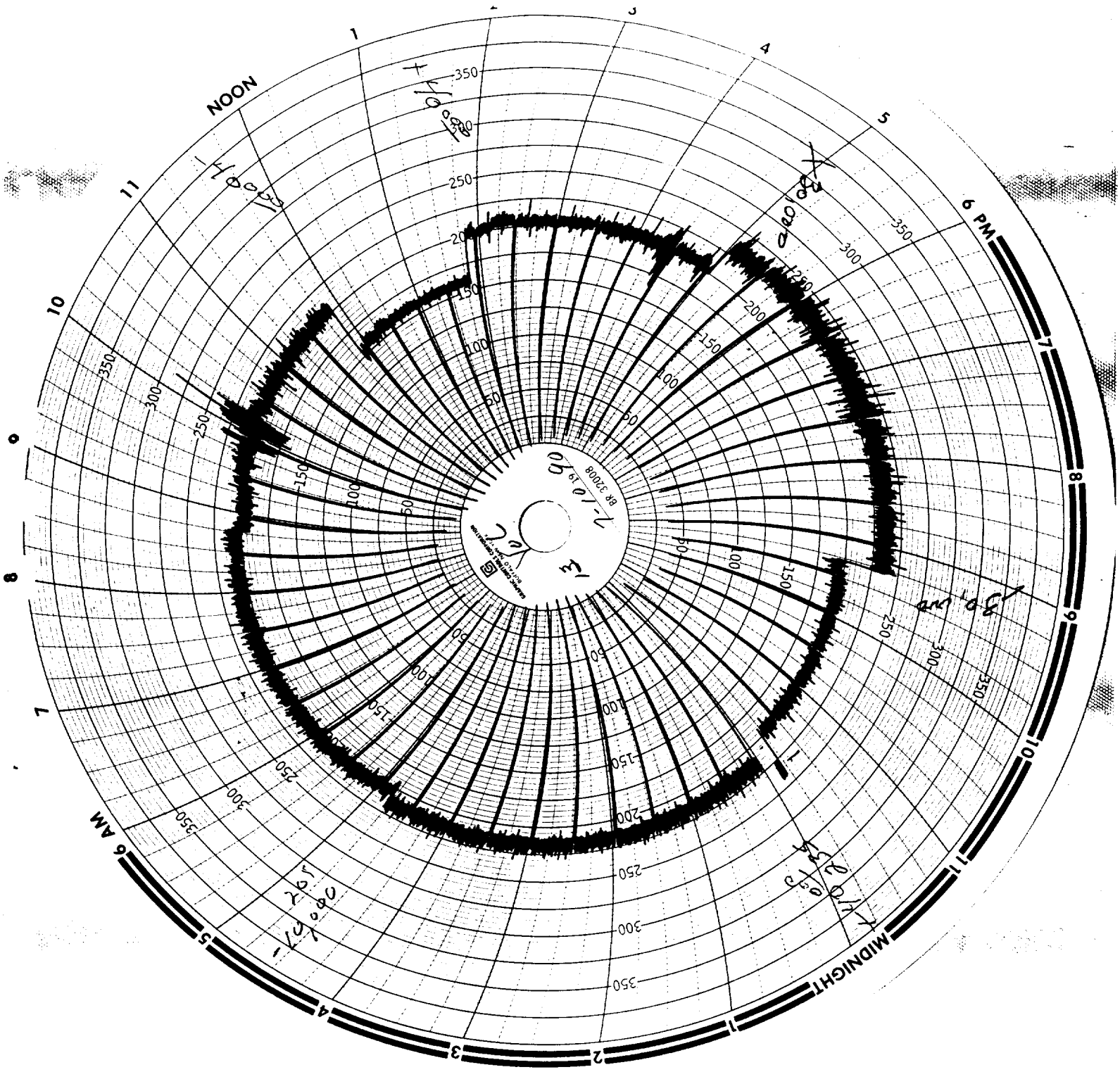
6 AM
NOON
6 PM
BR 55005
GRAPHIC CONTROLS CORPORATION
DRAFT
RS
13
7-10-90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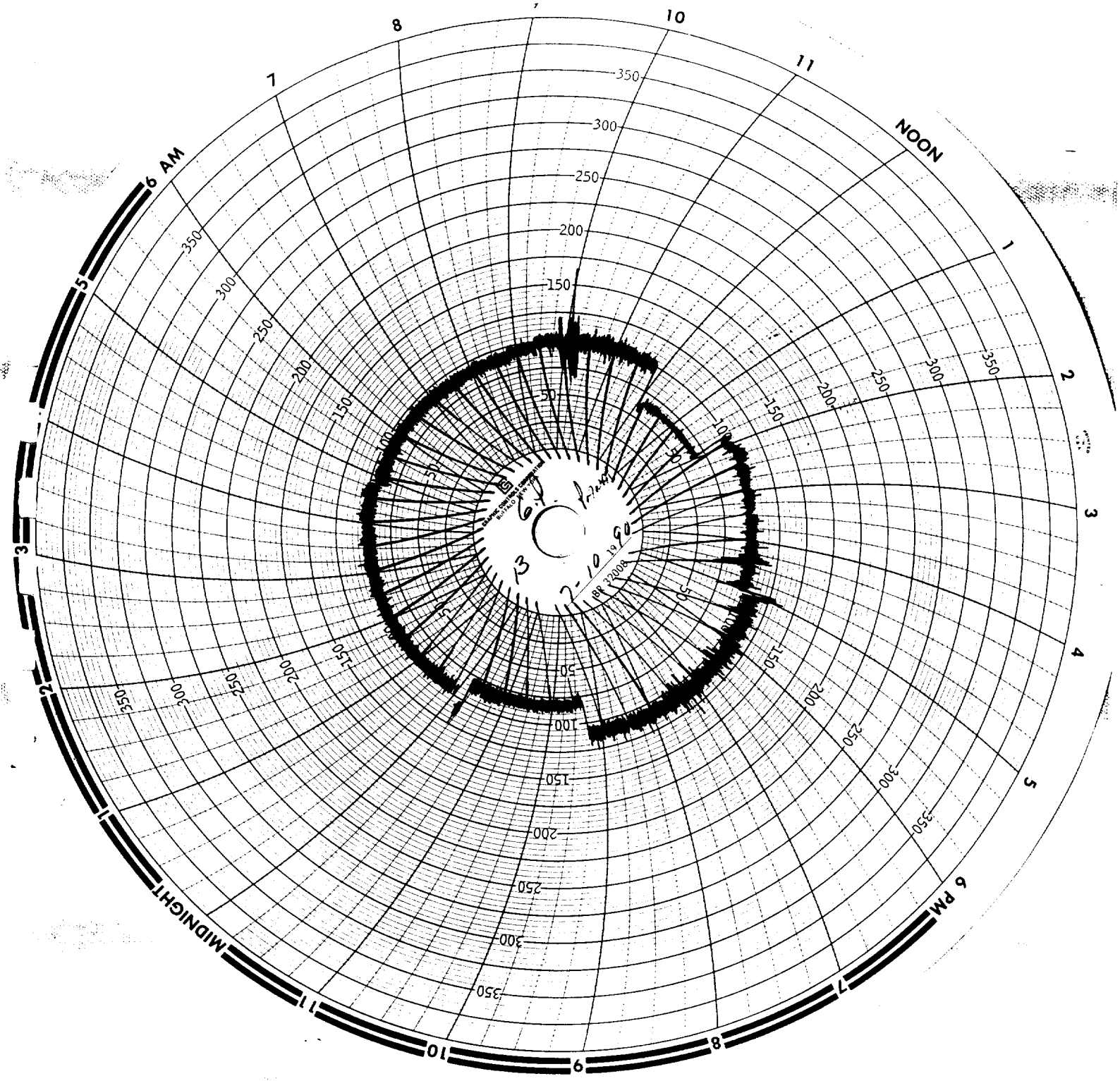
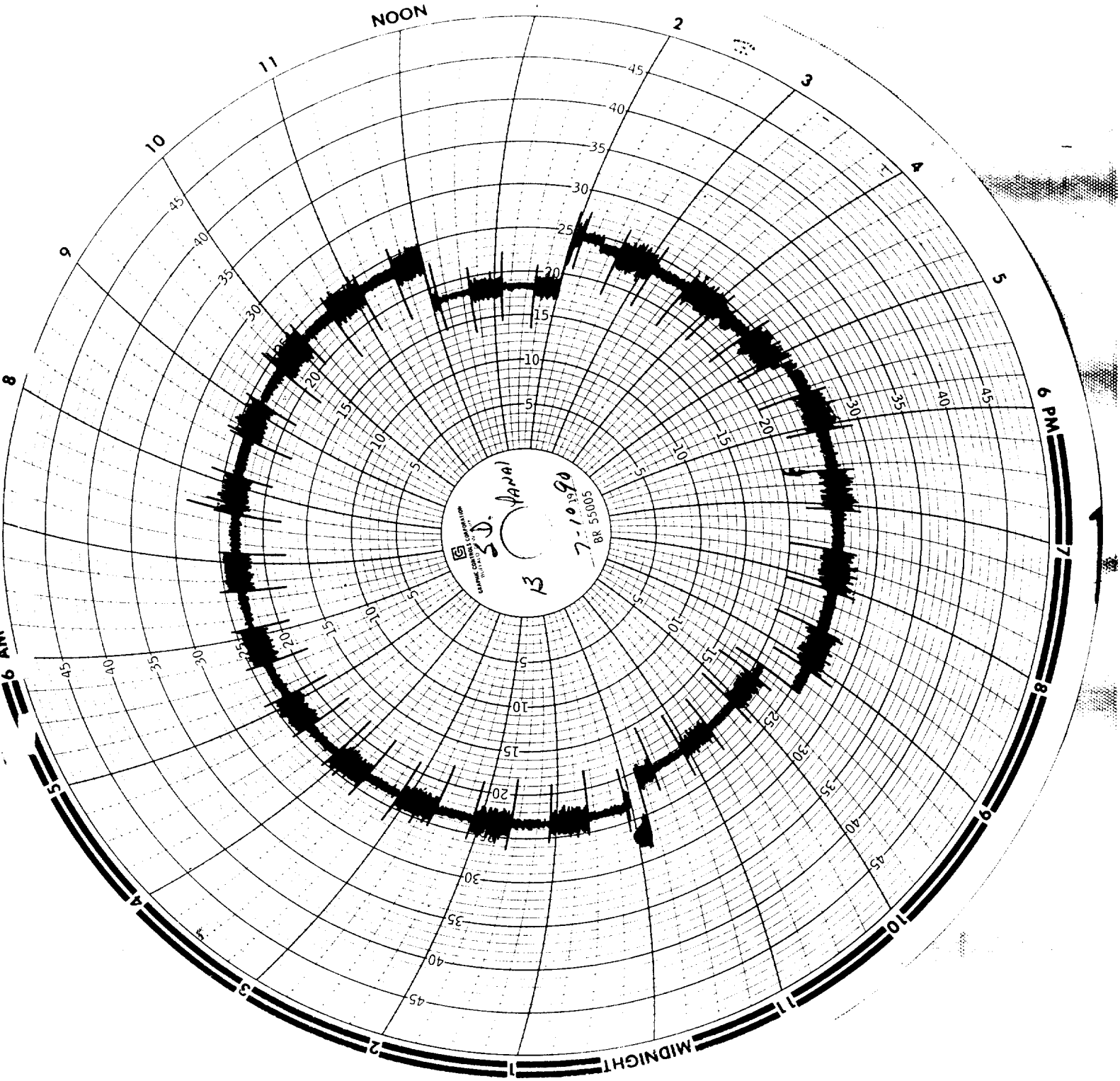
MIDNIGHT
6 AM
BR 32008


6 AM
NOON
6 PM
MIDNIGHT
7
8
10
11
1
2
3
4
5
6
7
8
9
10
11
1
2
3
5
350
300
250
200
150
100
50
BR 32008
7-10 90


NOON
1
2
3
4
5
6 PM
7
8
9
10
11
MIDNIGHT
1
2
3
4
5
6 AM
7
8
9
10
11
GRAPHIC CONTROLS CORPORATION
BUFFALO, N.Y. U.S.A.
BR 55005

PUSHING SCHEDULE FOR BATTERIES 13,14, & 15

Q #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	A14/15	A12/15		10:50	11: 0	11:15
2	B14/14	B12/14		10:56	11: 6	11:21
3	B14/15	B12/15		11: 2	11:12	11:27
4	A14/13	A12/13		11: 8	11:18	11:33
5	A14/14	A12/14		11:14	11:24	11:39
6	B14/13	B12/13		11:20	11:30	11:45
7	A16/15	A14/15		11:26	11:36	11:51
8	B16/14	B14/14		11:32	11:42	11:57
9	B16/15	B14/15		11:38	11:48	12: 3
10	A16/13	A14/13		11:44	11:54	12: 9
11	A16/14	A14/14		11:50	12: 0	12:15
12	B16/13	B14/13		11:56	12: 6	12:21
13	A18/15	A16/15		12: 2	12:12	12:27
14	B18/14	B16/14		12: 8	12:18	12:33
15	B18/15	B16/15		12:14	12:24	12:39
16	A18/13	A16/13		12:20	12:30	12:45
17	A18/14	A16/14		12:26	12:36	12:51
18	B18/13	B16/13		12:32	12:42	12:57
19	A20/15	A18/15		12:38	12:48	1: 3
20	B20/14	B18/14		12:44	12:54	1: 9
21	B20/15	B18/15		12:50	1: 0	1:15
22	A20/13	A18/13		12:56	1: 6	1:21
23	A20/14	A18/14		1: 2	1:12	1:27
24	B20/13	B18/13		1: 8	1:18	1:33
25	A22/15	A20/15		1:14	1:24	1:39
26	B22/14	B20/14		1:20	1:30	1:45
27	B22/15	B20/15		1:26	1:36	1:51
28	A22/13	A20/13		1:32	1:42	1:57
29	A22/14	A20/14		1:38	1:48	2: 3
30	B22/13	B20/13		1:44	1:54	2: 9
31	A24/15	A22/15		1:50	2: 0	2:15
32	B24/14	B22/14		1:56	2: 6	2:21
33	B24/15	B22/15		2: 2	2:12	2:27
34	A24/13	A22/13		2: 8	2:18	2:33
35	A24/14	A22/14		2:14	2:24	2:39
36	B24/13	B22/13		2:20	2:30	2:45
37	A26/15	A24/15		2:26	2:36	2:51
38	B26/14	B24/14		2:32	2:42	2:57
39	B26/15	B24/15		2:38	2:48	3: 3
40	A26/13	A24/13		2:44	2:54	3: 9
41	A26/14	A24/14		2:50	3: 0	3:15
42	B26/13	B24/13		2:56	3: 6	3:21
43	A28/15	A26/15		3: 2	3:12	3:27
44	B28/14	B26/14		3: 8	3:18	3:33
45	B28/15	B26/15		3:14	3:24	3:39
46	A28/13	A26/13		3:20	3:30	3:45
47	A28/14	A26/14		3:26	3:36	3:51
48	B28/13	B26/13		3:32	3:42	3:57
49	A30/15	A28/15		3:38	3:48	4: 3
50	B30/14	B28/14		3:44	3:54	4: 9
51	B30/15	B28/15		3:50	4: 0	4:15
52	A30/13	A28/13		3:56	4: 6	4:21
53	A30/14	A28/14		4: 2	4:12	4:27
54	B30/13	B28/13		4: 8	4:18	4:33
55	A 1/15	A30/15		4:14	4:24	4:39
56	B 1/14	B30/14		4:20	4:30	4:45
57	B 1/15	B30/15		4:26	4:36	4:51
58	A 1/13	A30/13		4:32	4:42	4:57
59	A 1/14	A30/14		4:38	4:48	5: 3
60	B 1/13	B30/13		4:44	4:54	5: 9
61	A 3/15	A 1/15		4:50	5: 0	5:15
62	B 3/14	B 1/14		4:56	5: 6	5:21
63	B 3/15	B 1/15		5: 2	5:12	5:27
64	A 3/13	A 1/13		5: 8	5:18	5:33
65	A 3/14	A 1/14		5:14	5:24	5:39
66	B 3/13	B 1/13		5:20	5:30	5:45
67	A 5/15	A 3/15		5:26	5:36	5:51
68	B 5/14	B 3/14		5:32	5:42	5:57
69	B 5/15	B 3/15		5:38	5:48	6: 3
70	A 5/13	A 3/13		5:44	5:54	6: 9
71	A 5/14	A 3/14		5:50	6: 0	6:15
72	B 5/13	B 3/13		5:56	6: 6	6:21
73	A 7/15	A 5/15		6: 2	6:12	6:27
74	B 7/14	B 5/14		6: 8	6:18	6:33
75	B 7/15	B 5/15		6:14	6:24	6:39
76	A 7/13	A 5/13		6:20	6:30	6:45
77	A 7/14	A 5/14		6:26	6:36	6:51
78	B 7/13	B 5/13		6:32	6:42	6:57
79	A 9/15	A 7/15		6:38	6:48	7: 3
80	B 9/14	B 7/14		6:44	6:54	7: 9

TUE JULY 10 1990 11X 7 TURN -B9/15

A-5

PUSHING SCHEDULE FOR BATTERIES 13,14, & 15

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	A 9/13	A 7/13		6:50	7: 0	7:15
2	A 9/14	A 7/14		6:56	7: 6	7:21
3	B 9/13	B 7/13		7: 2	7:12	7:27
4	A11/15	A 9/15		7: 8	7:18	7:33
5	B11/14	B 9/14		7:14	7:24	7:39
6	B11/15	B 9/15		7:21	7:31	7:46
7	A11/13	A 9/13		7:27	7:37	7:52
8	A11/14	A 9/14		7:33	7:43	7:58
9	B11/13	B 9/13		7:39	7:49	8: 4
10	A13/15	A11/15		7:46	7:56	8:11
11	B13/14	B11/14		7:52	8: 2	8:17
12	B13/15	B11/15		7:58	8: 8	8:23
13	A13/13	A11/13		8: 4	8:14	8:29
14	A13/14	A11/14		8:11	8:21	8:36
15	B13/13	B11/13		8:17	8:27	8:42
16	A15/15	A13/15		8:23	8:33	8:48
17	B15/14	B13/14		8:29	8:39	8:54
18	B15/15	B13/15		8:35	8:45	9: 0
19	A15/13	A13/13		8:42	8:52	9: 7
20	A15/14	A13/14		8:48	8:58	9:13
21	B15/13	B13/13		8:54	9: 4	9:19
22	A17/15	A15/15		9: 0	9:10	9:25
23	B17/14	B15/14		9: 7	9:17	9:32
24	B17/15	B15/15		9:13	9:23	9:38
25	A17/13	A15/13		9:19	9:29	9:44
26	A17/14	A15/14		9:25	9:35	9:50
27	B17/13	B15/13		9:32	9:42	9:57
28	A19/15	A17/15		9:38	9:48	10: 3
29	B19/14	B17/14		9:44	9:54	10: 9
30	B19/15	B17/15		9:50	10: 0	10:15
31	A19/13	A17/13		9:57	10: 7	10:22
32	A19/14	A17/14		10: 3	10:13	10:28
33	B19/13	B17/13		10: 9	10:19	10:34
34	A21/15	A19/15		10:15	10:25	10:40
35	B21/14	B19/14		10:21	10:31	10:46
36	B21/15	B19/15		10:28	10:38	10:53
37	A21/13	A19/13		10:34	10:44	10:59
38	A21/14	A19/14		10:40	10:50	11: 5
39	B21/13	B19/13		10:46	10:56	11:11
40	A23/15	A21/15		10:53	11: 3	11:18
41	B23/14	B21/14		10:59	11: 9	11:24
42	B23/15	B21/15		11: 5	11:15	11:30
43	A23/13	A21/13		11:11	11:21	11:36
44	A23/14	A21/14		11:18	11:28	11:43
45	B23/13	B21/13		11:24	11:34	11:49
46	A25/15	A23/15		11:30	11:40	11:55
47	B25/14	B23/14		11:36	11:46	12: 1
48	B25/15	B23/15		11:42	11:52	12: 7
49	A25/13	A23/13		11:49	11:59	12:14
50	A25/14	A23/14		11:55	12: 5	12:20
51	B25/13	B23/13		12: 1	12:11	12:26
52	A27/15	A25/15		12: 7	12:17	12:32
53	B27/14	B25/14		12:14	12:24	12:39
54	B27/15	B25/15		12:20	12:30	12:45
55	A27/13	A25/13		12:26	12:36	12:51
56	A27/14	A25/14		12:32	12:42	12:57
57	B27/13	B25/13		12:39	12:49	1: 4
58	A29/15	A27/15		12:45	12:55	1:10
59	A31/15	A29/15		12:51	1: 1	1:16
60	B29/14	B27/14		12:57	1: 7	1:22
61	B29/15	B27/15		1: 4	1:14	1:29
62	A29/13	A27/13		1:10	1:20	1:35
63	A29/14	A27/14		1:16	1:26	1:41
64	A31/13	A29/13		1:22	1:32	1:47
65	A31/14	A29/14		1:28	1:38	1:53
66	B29/13	B27/13		1:35	1:45	2: 0
67	A 2/15	A31/15		1:41	1:51	2: 6
68	B 2/14	B29/14		1:47	1:57	2:12
69	B 2/15	B29/15		1:53	2: 3	2:18
70	A 2/13	A31/13		2: 0	2:10	2:25
71	A 2/14	A31/14		2: 6	2:16	2:31
72	B 2/13	B29/13		2:12	2:22	2:37
73	A 4/15	A 2/15		2:18	2:28	2:43
74	B 4/14	B 2/14		2:25	2:35	2:50
75	B 4/15	B 2/15		2:31	2:41	2:56
76	A 4/13	A 2/13		2:37	2:47	3: 2
77	A 4/14	A 2/14		2:43	2:53	3: 8

TUE JULY 10 1990 7X 3 TURN

Pass up B9/15

FEEDING SCHEDULE FOR BATTERIES 13,14, & 15

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	A 2/13	A31/13		2:50	3: 0	3:15
2	A 2/14	A31/14		2:56	3: 6	3:21
3	B 2/13	B29/13		3: 2	3:12	3:27
4	A 4/15	A 2/15		3: 8	3:18	3:33
5	B 4/14	B 2/14		3:14	3:24	3:39
6	B 4/15	B 2/15		3:20	3:30	3:45
7	A 4/13	A 2/13		3:26	3:36	3:51
8	A 4/14	A 2/14		3:32	3:42	3:57
9	B 4/13	B 2/13		3:38	3:48	4: 3
10	A 6/15	A 4/15		3:44	3:54	4: 9
11	B 6/14	B 4/14		3:50	4: 0	4:15
12	B 6/15	B 4/15		3:56	4: 6	4:21
13	A 6/13	A 4/13		4: 2	4:12	4:27
14	A 6/14	A 4/14		4: 8	4:18	4:33
15	B 6/13	B 4/13		4:14	4:24	4:39
16	A 8/15	A 6/15		4:20	4:30	4:45
17	B 8/14	B 6/14		4:26	4:36	4:51
18	B 8/15	B 6/15		4:32	4:42	4:57
19	A 8/13	A 6/13		4:38	4:48	5: 3
20	A 8/14	A 6/14		4:44	4:54	5: 9
21	B 8/13	B 6/13		4:50	5: 0	5:15
22	A10/15	A 8/15		4:56	5: 6	5:21
23	B10/14	B 8/14		5: 2	5:12	5:27
24	B10/15	B 8/15		5: 8	5:18	5:33
25	A10/13	A 8/13		5:14	5:24	5:39
26	A10/14	A 8/14		5:20	5:30	5:45
27	B10/13	B 8/13		5:26	5:36	5:51
28	A12/15	A10/15		5:32	5:42	5:57
29	B12/14	B10/14		5:38	5:48	6: 3
30	B12/15	B10/15		5:44	5:54	6: 9
31	A12/13	A10/13		5:50	6: 0	6:15
32	A12/14	A10/14		5:56	6: 6	6:21
33	B12/13	B10/13		6: 2	6:12	6:27
34	A14/15	A12/15		6: 8	6:18	6:33
35	B14/14	B12/14		6:14	6:24	6:39
36	B14/15	B12/15		6:20	6:30	6:45
37	A14/13	A12/13		6:26	6:36	6:51
38	A14/14	A12/14		6:32	6:42	6:57
39	B14/13	B12/13		6:38	6:48	7: 3
40	A16/15	A14/15		6:44	6:54	7: 9
41	B16/14	B14/14		6:50	7: 0	7:15
42	B16/15	B14/15		6:56	7: 6	7:21
43	A16/13	A14/13		7: 2	7:12	7:27
44	A16/14	A14/14		7: 8	7:18	7:33
45	B16/13	B14/13		7:14	7:24	7:39
46	A18/15	A16/15		7:20	7:30	7:45
47	B18/14	B16/14		7:26	7:36	7:51
48	B18/15	B16/15		7:32	7:42	7:57
49	A18/13	A16/13		7:38	7:48	8: 3
50	A18/14	A16/14		7:44	7:54	8: 9
51	B18/13	B16/13		7:50	8: 0	8:15
52	A20/15	A18/15		7:56	8: 6	8:21
53	B20/14	B18/14		8: 2	8:12	8:27
54	B20/15	B18/15		8: 8	8:18	8:33
55	A20/13	A18/13		8:14	8:24	8:39
56	A20/14	A18/14		8:20	8:30	8:45
57	B20/13	B18/13		8:26	8:36	8:51
58	A22/15	A20/15		8:32	8:42	8:57
59	B22/14	B20/14		8:38	8:48	9: 3
60	B22/15	B20/15		8:44	8:54	9: 9
61	A22/13	A20/13		8:50	9: 0	9:15
62	A22/14	A20/14		8:56	9: 6	9:21
63	B22/13	B20/13		9: 2	9:12	9:27
64	A24/15	A22/15		9: 8	9:18	9:33
65	B24/14	B22/14		9:14	9:24	9:39
66	B24/15	B22/15		9:20	9:30	9:45
67	A24/13	A22/13		9:26	9:36	9:51
68	A24/14	A22/14		9:32	9:42	9:57
69	B24/13	B22/13		9:38	9:48	10: 3
70	A26/15	A24/15		9:44	9:54	10: 9
71	B26/14	B24/14		9:50	10: 0	10:15
72	B26/15	B24/15		9:56	10: 6	10:21
73	A26/13	A24/13		10: 2	10:12	10:27
74	A26/14	A24/14		10: 8	10:18	10:33
75	B26/13	B24/13		10:14	10:24	10:39
76	A28/15	A26/15		10:20	10:30	10:45
77	B28/14	B26/14		10:26	10:36	10:51
78	B28/15	B26/15		10:32	10:42	10:57
79	A28/13	A26/13		10:38	10:48	11: 3
80	A28/14	A26/14		10:44	10:54	11: 9

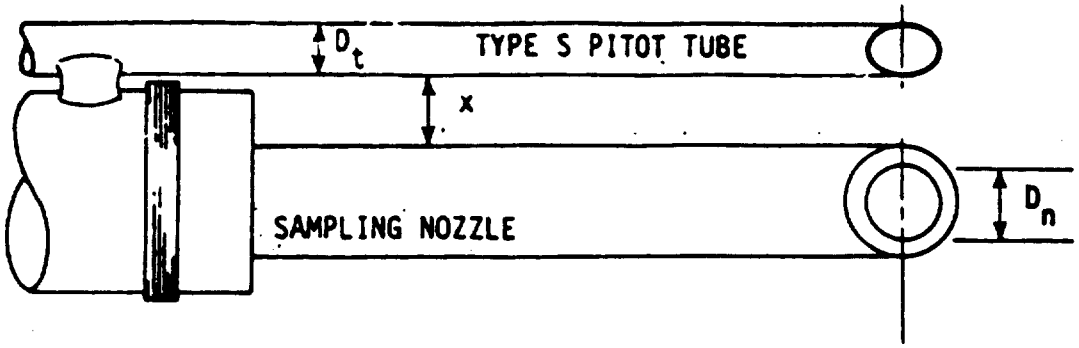
TUE JULY 10 1990 3X11 TURN

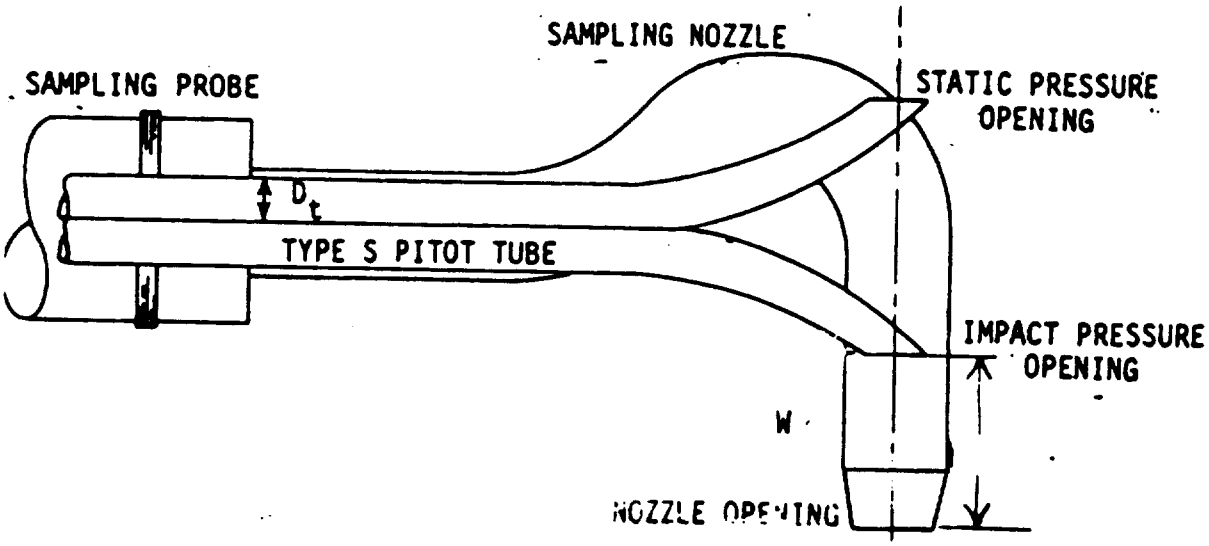
USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#13 BATTERY COMBUSTION STACK

APPENDIX B

PRE-TEST AND POST-TEST
CALIBRATION AND AUDIT RESULTS

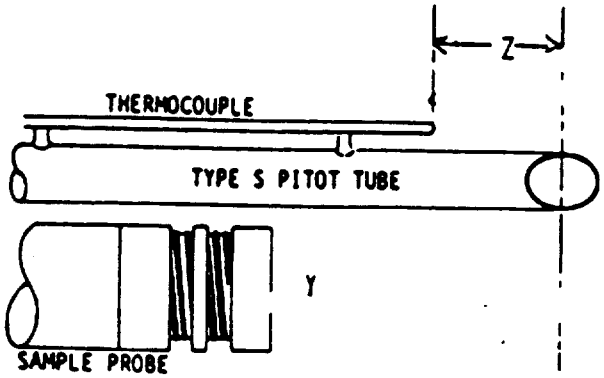
KEYSTONE
ENVIRONMENTAL RESOURCES, INC.





D_n = Nozzle diameter

D_t = 3/16 to 3/8"



$W \geq 0$

$X \geq 3/4"$ for 1/2" Nozz

$Y \geq 3"$

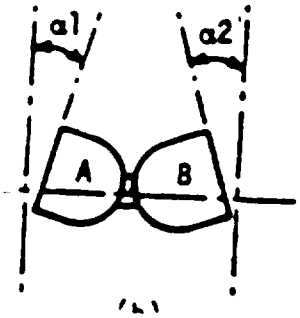
$Z \geq 2"$

GEOMETRIC PITOT CALIBRATION

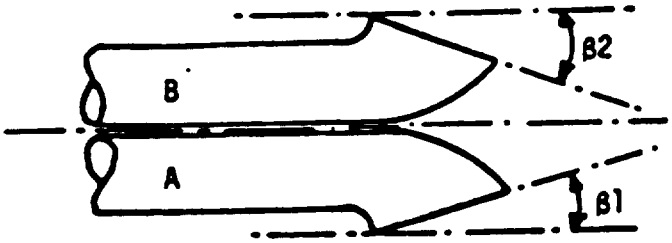
Probe No. 1-1
Date 6/29/90
Initials [illegible]

pre-test

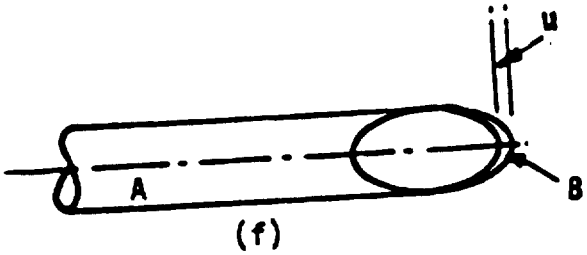
α1 = 2°
α2 = 1°
β1 = 2°
β2 = 4°
A = 1.059
μ = .018
V = 0
W = ≥0
X = ≥3/4"
Y = ≥3"
Z = ≥2"
D_t = .380



α1, α2 <10°



β1, β2 <5



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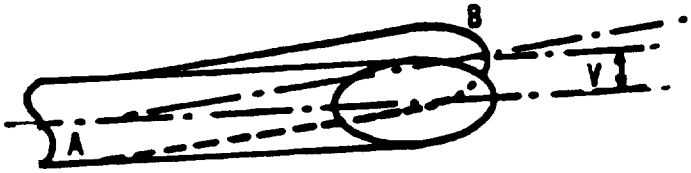
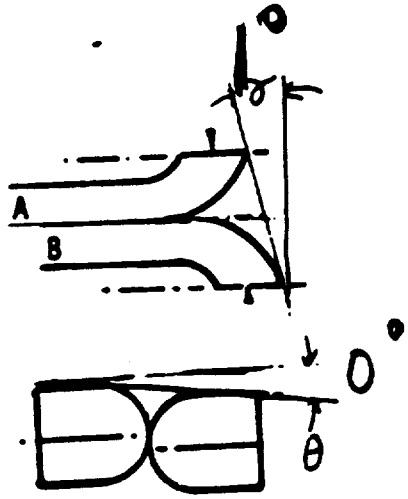
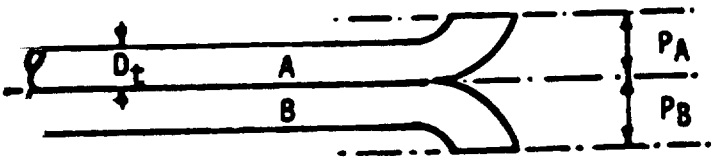




μ = A SIN θ

V = A SIN θ

A-SIDE PLANE



B-SIDE PLANE

.399 .570

1.05 D_t <P <1.50 D_t

$P_A = P_B$

2.10 D_t <A <3.00 D_t

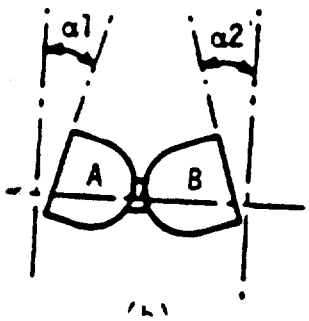
.798 1.14

GEOMETRIC PITOT CALIBRATION

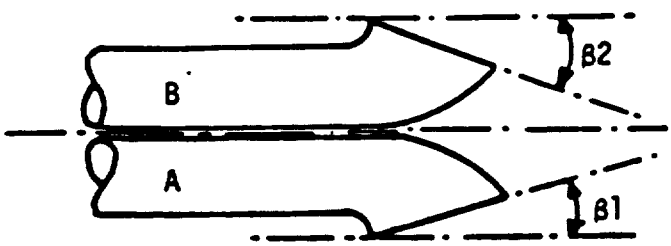
Probe No. 7-1
Date 8-30-96
Initials GM

post-test

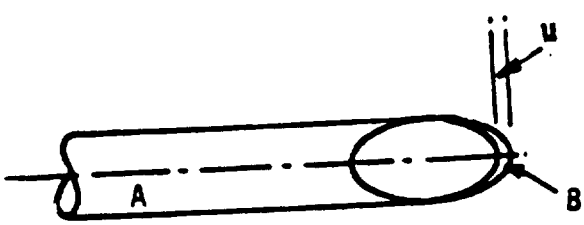
α1 = 4°
α2 = 1°
β1 = 3°
β2 = 0°
A = 1.055
μ = .036
V = .036
W = ≥0
X = .828
Y = ≥3
Z = ≥2
D_t = .38



α1, α2 <10°



β1, β2 <5



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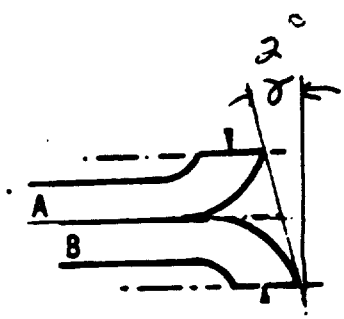
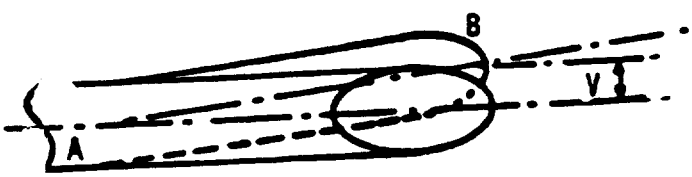
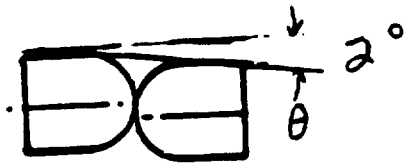


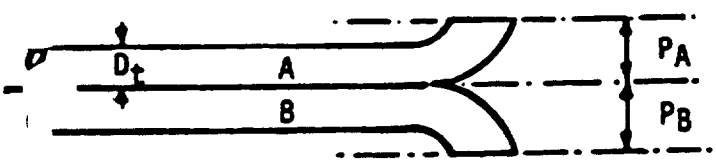
2° μ = A SIN γ

2° V = A SIN Θ





A-SIDE PLANE



B-SIDE PLANE

405 .579

1.05 D_t <P <1.50 D_t

$P_A = P_B$

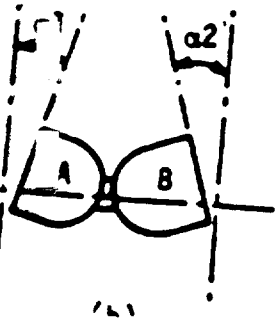
2.10 D_t <A <3.00 D_t

.811 1.16

GEOMETRIC PITOT CALIBRATION

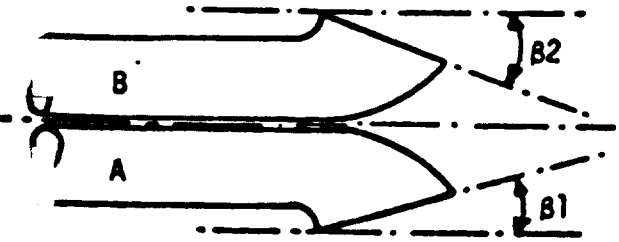
Probe No. 1-6
Date 6-29-90
Initials ATS

pre-test

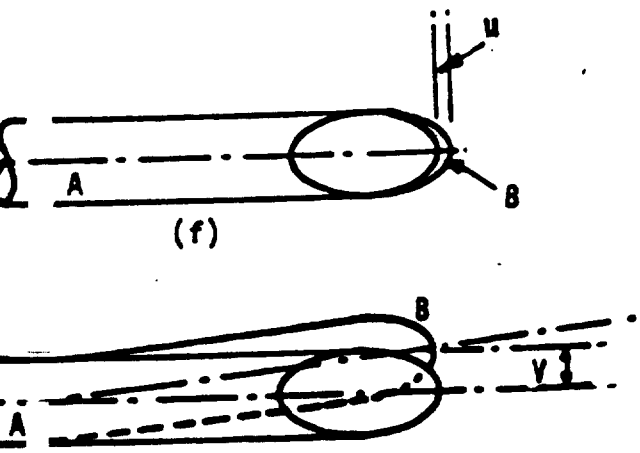


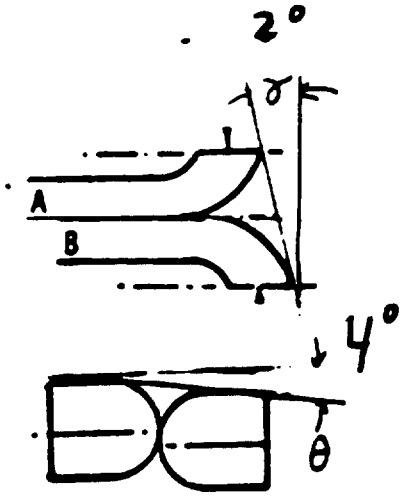
α1, α2 <10°

α1 = 4°
α2 = 3°
β1 = 1°
β2 = 3°
A = .988
μ = .034
V = .069
W = >0
X = >3/4"
Y = >3"
Z = >2"
D_t = .385



β1, β2 <5

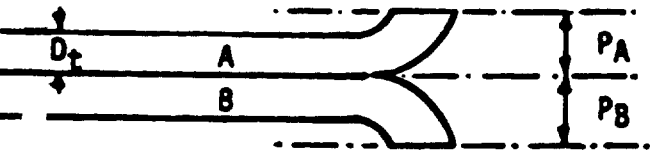




μ = A SIN γ

V = A SIN θ

A-SIDE PLANE



B-SIDE PLANE

.404 .5775

1.05 D_t <P <1.50 D_t

$P_A = P_B$

2.10 D_t <A <3.00 D_t

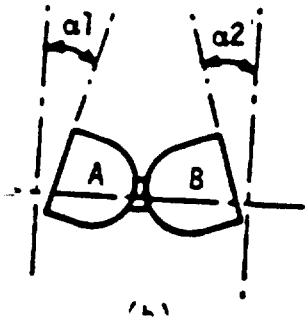
.808 1.155

GEOMETRIC PITOT CALIBRATION

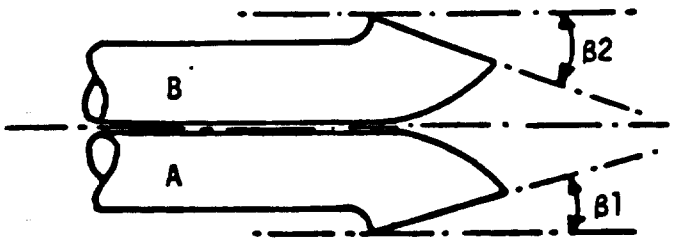
Probe No. 2·2
Date 8·20·90
Initials [illegible]

α1 = 1°
α2 = 3°
β1 = 4°
β2 = 1°
A = .962
μ = .067
V = .033
W = ≥0
X = .989
Y = ≥3"
Z = ≥2"
D_t = .376

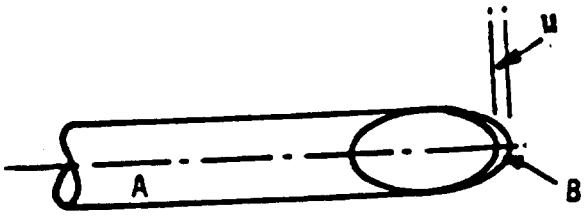
post-test



α1, α2 <10°



β1, β2 <5



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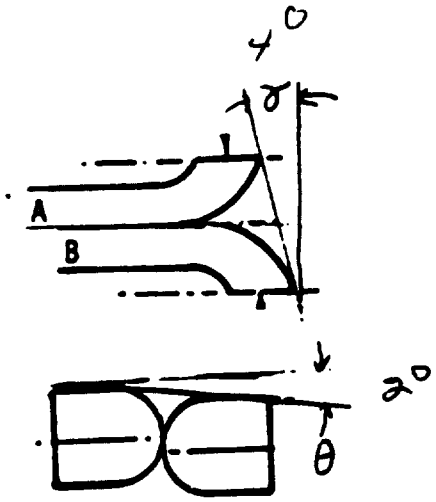
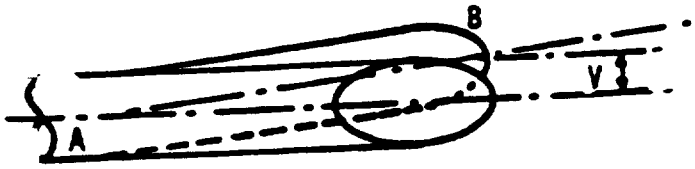
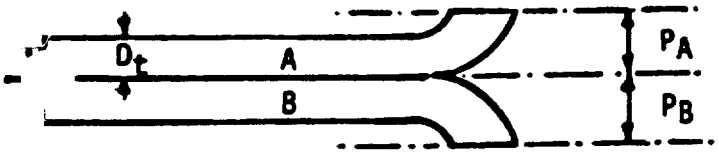


μ = A SIN ϑ

V = A SIN Θ



A-SIDE PLANE



B-SIDE PLANE

.304 .564

1.05 D_t <P <1.50 D_t

$P_A = P_B$

2.10 D_t <A <3.00 D_t

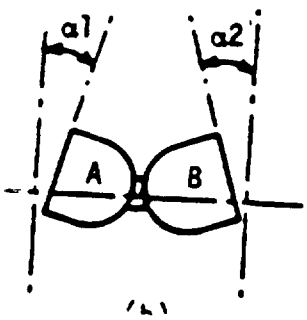
.789 1.128

GEOMETRIC PITOT CALIBRATION

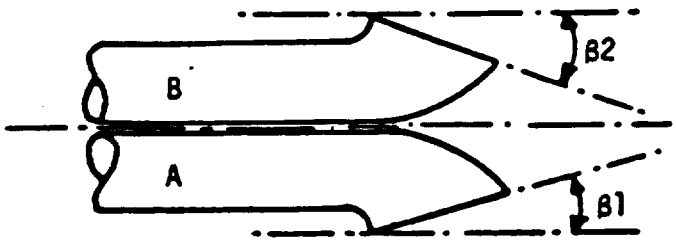
Probe No. 7-3
Date 6/29/90
Initials ATS

pre-test

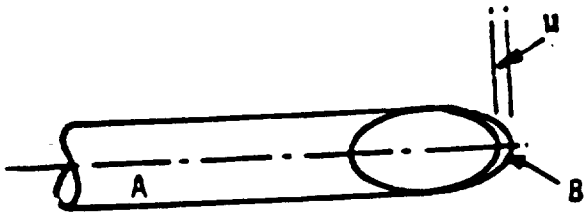
α1 = 4°
α2 = 2°
β1 = 0°
β2 = 1°
A = .954
μ = 0°
V = ~~.004~~ .050
W = >0
X = >3/4"
Y = 73"
Z = 52"
D_t = .376



α1, α2 <10°



β1, β2 <5



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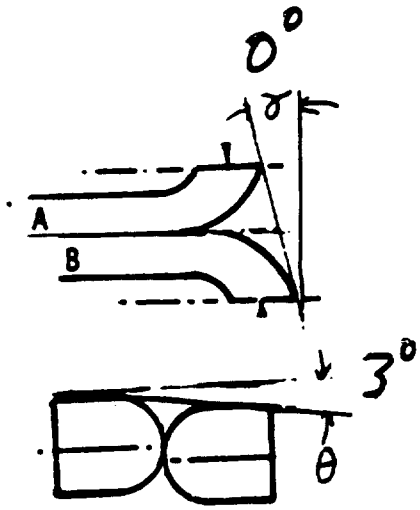
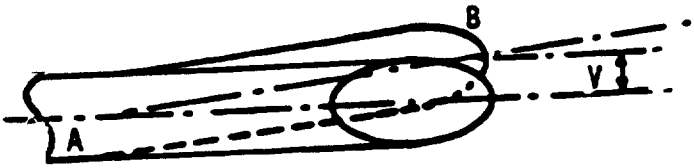
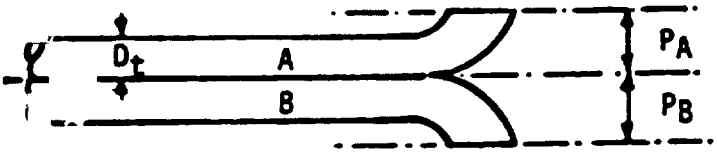


μ = A SIN γ

V = A SIN θ



A-SIDE PLANE



B-SIDE PLANE

.395 .564

1.05 D_t <P <1.50 D_t

$P_A = P_B$

2.10 D_t <A <3.00 D_t

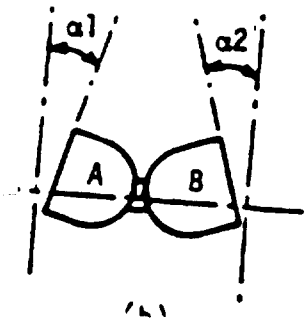
.799 1.128

GEOMETRIC PITOT CALIBRATION

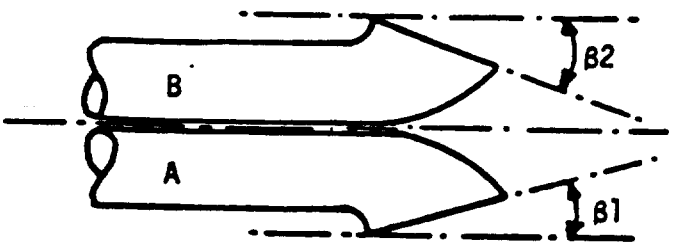
Probe No. 2-3
Date 8-20-90
Initials [illegible]

$\alpha 1$ = 2°
$\alpha 2$ = 2°
$\beta 1$ = 1°
$\beta 2$ = 0°
A = .961
μ = .016
V = .067
W = ≥0
X = .945
Y = ≥3"
Z = ≥2"
D_t = .327

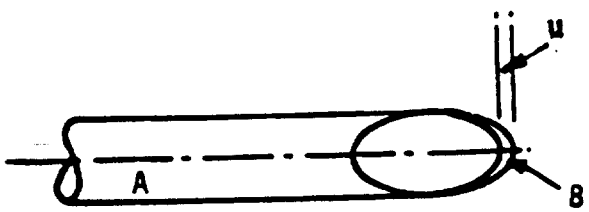
post-test



$\alpha 1, \alpha 2 < 10°$



$\beta 1, \beta 2 < 5$



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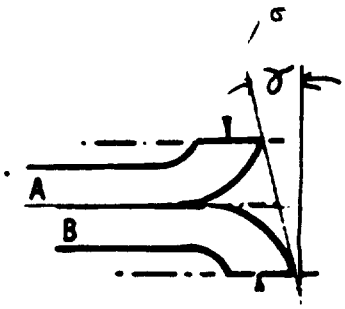
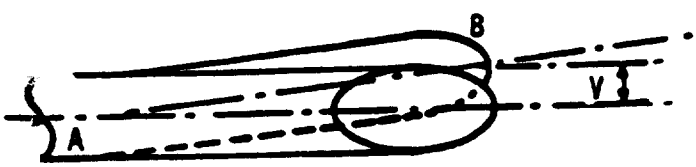
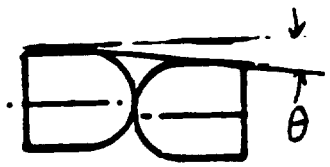


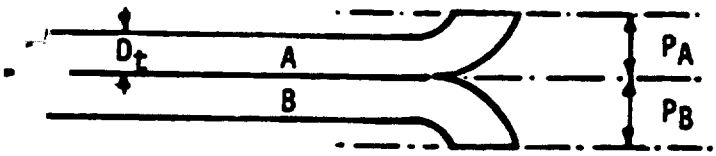
$\mu = A \sin \gamma$

$V = A \sin \theta$





A-SIDE PLANE



B-SIDE PLANE

.355 .565

$1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

$2.10\ D_t < A < 3.00\ D_t$

.791 1.13

CONTROL BOX CALIBRATION

THREE POINT CALIBRATION

BOX NO. 1
DATE 6-12-90
BP 29.1
OPERATOR TJM

	TIME	WET TEST METER TEMP T_W	WET TEST METER VOLUME V_M	P_W	PRESSURE T_I	T_O	DRY TEST METER TEMP IN T_A	TEMP OUT P_D	TEMP AVG V_D	Y	ORIFICE H_a	VOLUME	METER CORRECT	ORIFICE COEIFFICE
START				0.000		29.10					0.50	464.200		
HALF			78.0				94.0	92.0	93.0					
STOP	11.50			5.000								469.118		
CALCULATION	11.50		538.0	5.057		29.10				553.0	29.14	4.918	1.0555	1.475
START				0.000		29.10					1.00	470.000		
HALF			78.0				98.0	91.0	94.5					
STOP	8.43			5.000								474.977		
CALCULATION	8.43		538.0	5.057		29.10				554.5	29.17	4.977	1.0445	1.580
START				0.000		29.10					2.00	476.000		
HALF			78.0				99.0	92.0	95.5					
STOP	6.12			5.000								480.920		
CALCULATION	6.12		538.0	5.057		29.10				555.5	29.25	4.920	1.0558	1.663
AVERAGE													1.0519	1.573

POST TEST

BOX NO. 1
DATE 8-15-90
BP 29.03
OPERATOR MGG

	TIME	WET TEST METER TEMP T_W	VOLUME V_M	P_W	PRESSURE T_I	T_O	DRY TEST METER TEMP IN T_A	TEMP OUT P_D	V_D	TEMP AVG Y	ORIFICE $H_@$	VOLUME	METER CORRECT	ORIFICE COEIFFICE
START				0.000		29.03					1.50	139.400		
HALF			77.0				94.0		85.0	89.5				
STOP	7.22			5.000								144.422		
CALCULATION	7.22		537.0	5.057		29.03				549.5	29.14	5.022	1.0264	1.753
START				0.000		29.03					1.50	145.600		
HALF			77.0				94.0		84.0	89.0				
STOP	7.18			5.002								150.643		
CALCULATION	7.18		537.0	5.059		29.03				549.0	29.14	5.043	1.0216	1.733
START				0.000		29.03					1.50	152.700		
HALF			77.0				94.0		83.0	88.5				
STOP	7.12			5.001								157.744		
CALCULATION	7.12		537.0	5.058		29.03				548.5	29.14	5.044	1.0203	1.707
AVERAGE													1.0228	1.731
DIFFERENCE													2.85%	-9.14%

MAGNAHELIC CALIBRAATION

DATE 8-15-90

OPERATOR MGG

P 0-10 MAGNEHILIC	MANOMETER	P 0-.5 MAGNEHILIC	MANOMETER	H MAGNEHILIC	MANOMETER
0.50	0.50	0.50	0.50	4.00	4.00
1.00	1.00	0.40	0.40	3.00	3.00
2.00	2.00	0.30	0.30	2.00	2.00
4.00	4.00	0.20	0.20	1.00	1.00
6.00	6.00	0.10	0.10	0.50	0.50
8.00	8.00				

LEAK CHECK

DATE 8-15-90

OPERATOR MGG

	START CF	STOP CF	VOL	TIME	LEAK RATE
DRY	138.270	138.413	0.143	10.000	0.023
WET	0.000	0.371	0.371		

PYROMETER CALIBRATION

DATE 04-28-88

OPERATOR AGL

mV input	temp °F	temp rdg °F
0.18	40	40.0
0.40	50	50.0
0.84	70	70.0
1.29	90	90.0
1.74	110	110.0
2.66	150	150.0
3.82	200	200.0
6.09	300	301.0
8.31	400	400.0
10.57	500	500.0

PYROMETER CHECK

DATE 8-6-90

OPERATOR TM

mV input °F	temp °F	temp rdg
0.18	40	40.0
0.40	50	50.0
0.84	70	70.0
1.29	90	90.0
1.74	110	110.0
2.66	150	150.0
3.82	200	200.0
6.09	300	300.0
8.31	400	400.0
10.57	500	500.0

Phone: 825-9761

Name: Keystone Env. Res

Date 6-25-90 Train ID Box 1 DGM Cal. Factor, Y 1.0519 Orifice No. BAPC#3

Type of Meter Box Napp 100 Type of Pump Diaphragm

		Example	Run Number 1	2	3
DGM					
Final reading	ft^3	966.461	114.340	121.375	128.375
Initial reading	ft^3	946.602	107.300	114.400	121.400
Difference, V_m	ft^3	9.859	7.040	6.975	6.975
Percent Accuracy, %A					
Inlet/Outlet temperatures					
Initial	°F.	108/88	92/192	89/189	89/189
After 5 minutes		110/88	91/190	90/189	91/190
After 10 minutes		111/88	91/190	90/189	92/190
Final		112/89	90/189	90/190	92/191
Avg. temperature, t_d	°F/°R	99.3/559.3	90.6/550.6	89.5/549.5	90.5/550.5
Time, θ	min	15.0	15.0	15.0	15.0
Orifice man. rdg., delta H		1.35	.70	.70	.70
Bar. pressure, P_{bar}		29.75	28.94	28.94	28.94
Ambient temperature, t_i	°F/°C	74/23.3	74/23.3	74/23.3	74/23.3
Pump vacuum	in. Hg	18.8	19.0	19.0	19.0
$V_{m(std)}$*	ft^3	9.2815			
DGM cal. factor, Y_c		1.0593			
*Vm(std)(M)	m^3	0.2629			

*If you calculate dry gas volume in English Units, use the conversion factor of 0.02832 m^3/ft^3 to obtain the volume in metric units.

Data Sheet

6-25-10

Box #1

Box 1

VOLUMETRIC FLOW DEVICE CALCULATION SHEET

Eq. 8-1 $$Vm(std) = VmY \left(\frac{Tstd}{Tm}\right) \left(\frac{Pbar + \frac{Delta\ H}{13.6}}{Pstd}\right)$$

Run #1 $$Vm(std)' = Vm \times Y \times \frac{528}{Tm} \times \left(\frac{Pbar + \frac{Delta\ H}{13.6}}{29.92}\right)$$

Vm(std)' = (7.040)(1.0519)(.9580)(.9690)

Vm(std)' = 6.882 ft³ (round to 3 decimals)

Run #2 Vm(std)' = (6.975)(1.0519)(.9608)(.9690)

Vm(std)' = 6.831 ft³

Run #3 Vm(std)' = (6.975)(1.0519)(.9591)(.9690)

Vm(std)' = 6.819 ft³

$$Vstd(M) = \frac{Vm(std)'\ Run\ \#1 + Vm(std)'\ Run\ \#2 + Vm(std)'\ Run\ \#3}{3}$$

Vstd(M) = 6.844 ft³

- -

(To Be Completed By Auditor)

$$\%\ A = \frac{Vstd(M) - Vstd(A)}{Vstd(A)} \times 100 \leq \pm 3\%$$

% A = _____ x 100

% A = _____ %

Name: KEYSTONE ENV. RES. Phone: 825-9761

Date 8/21/90 Train ID BOX 1 DGM Cal. Factor, Y 1.0519 Orifice No. BAPC-3

Type of Meter Box NAPP 100 Type of Pump DIAPHRAM

		Example	Run Number 1	2	3
DGM					
Final reading	ft^3	966.461	338.857	345.980	353.060
Initial reading	ft^3	946.602	331.900	339.000	346.10
Difference, V_m	ft^3	9.859	6.957	6.980	6.966
Percent Accuracy, ZA					
Inlet/Outlet temperatures					
Initial	°F.	108/88	77/74	78/76	77/75
After 5 minutes		110/88	77/74	78/75	78/75
After 10 minutes		111/88	77/74	78/75	78/75
Final		112/89	76/74	77/75	77/75
Avg. temperature, t_d	°F/°R	99.3/559.3	75.4 535.4	76.8 536.5	76.3 536
Time, θ	min	15.0	15.0	15.0	15.0
Orifice man. rdg., delta H		1.35	0.65	0.65	0.65
Bar. pressure, P_{bar}		29.75	28.981	28.98	28.98
Ambient temperature, t_i	°F/°C	74/23.3	82/27.8	82/27.8	82/27
Pump vacuum	in. Hg	18.8	19.5	19.5	19.5
$V_{m(std)}$'	ft^3	9.2815			
DGM cal. factor, Y_c		1.0593			
*Vm(std)(M)	m^3	0.2629			

*If you calculate dry gas volume in English Units, use the conversion factor of 0.02832 m^3/ft^3 to obtain the volume in metric units.

Data Sheet

Box 1 8-21-90

VOLUMETRIC FLOW DEVICE CALCULATION SHEET

Eq. 8-1 $$Vm(std) = VmY \left(\frac{Tstd}{Tm}\right) \left(\frac{Pbar + \frac{Delta\ H}{13.6}}{Pstd}\right)$$

Run #1 $$Vm(std)' = Vm \times Y \times \frac{528}{Tm} \times \left(\frac{Pbar + \frac{Delta\ H}{13.6}}{29.92}\right)$$

Vm(std)' = (6.957)(~~1.011~~ 1.0519)(0.9862)(0.9704)

Vm(std)' = ~~6.731~~ 7.002 ft³ (round to 3 decimals)

Run #2 Vm(std)' = (6.980)(~~1.011~~ 1.0519)(0.9842)(0.9704)

Vm(std)' = ~~6.740~~ 7.011 ft³

Run #3 Vm(std)' = (6.966)(~~1.011~~ 1.0519)(0.9845)(0.9704)

Vm(std)' = ~~6.728~~ 6.999 ft³

$$Vstd(M) = \frac{Vm(std)'\ Run\ \#1 + Vm(std)'\ Run\ \#2 + Vm(std)'\ Run\ \#3}{3}$$

Vstd(M) = ~~6.733~~ 7.004 ft³

(To Be Completed By Auditor)

$$\%\ A = \frac{Vstd(M) - Vstd(A)}{Vstd(A)} \times 100 \leq \pm 3\%$$

% A = _____ x 100

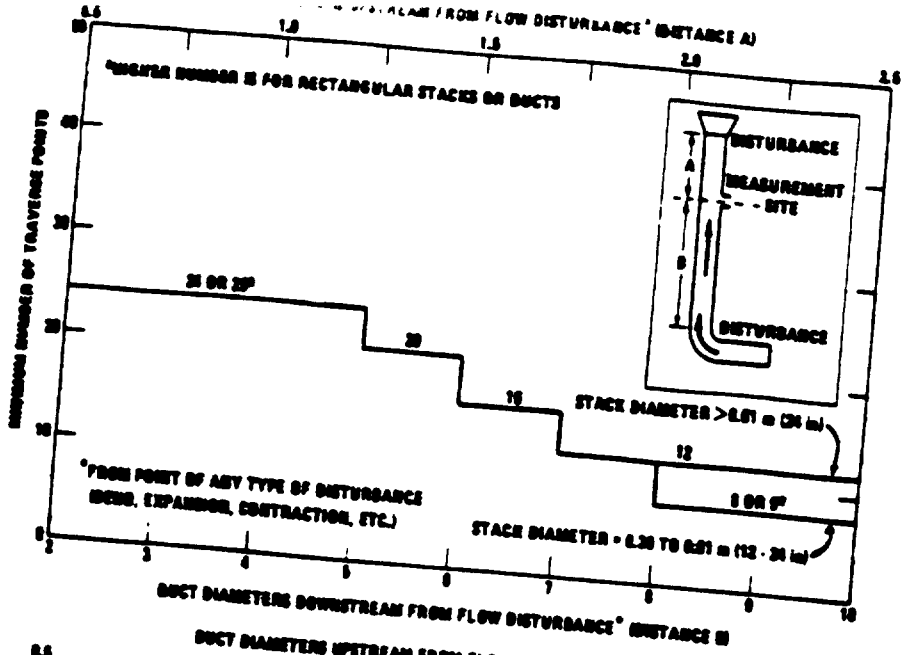
% A = _____ %

USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#13 BATTERY COMBUSTION STACK

APPENDIX C

FIELD DATA SHEETS
FOR PARTICULATE MATTER EMISSIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.



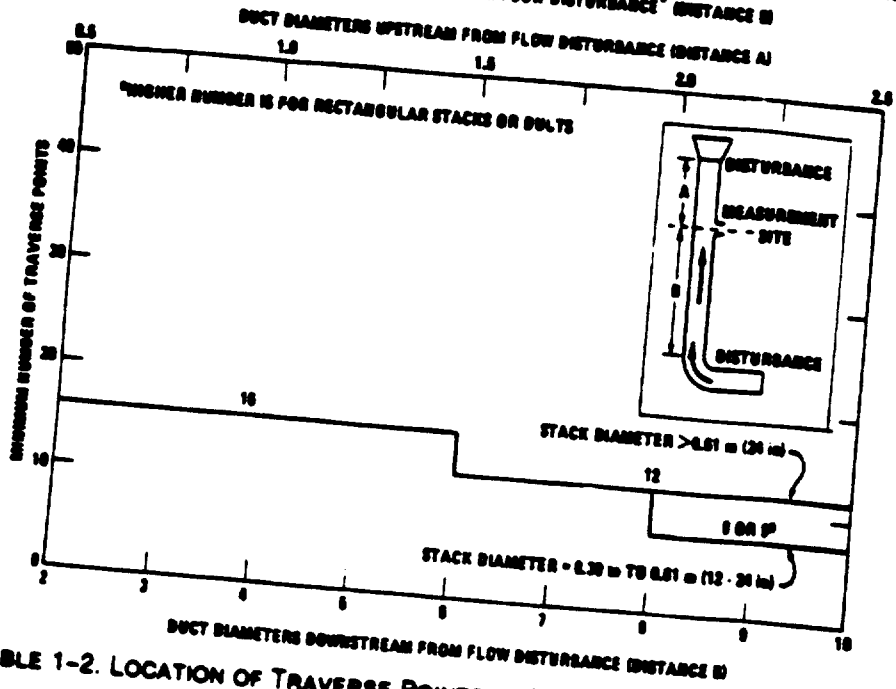


TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[Percent of stack diameter from inside wall to traverse point]

Traverse point number on a diameter	Number of traverse points on a diameter—											
	2	4	6	8	10	12	14	16	18	20	22	24
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6	1.4	1.3	1.1	1.1
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9	4.4	3.9	3.5	3.2
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5	7.5	6.7	6.0	5.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5	10.9	9.7	8.7	7.9
5			85.4	67.7	34.2	25.0	20.1	16.9	14.6	12.9	11.6	10.5
6			95.6	80.6	65.8	35.6	26.9	22.0	18.8	16.5	14.6	13.2
7				89.5	77.4	64.4	36.6	28.3	23.6	20.4	18.0	16.1
8				96.6	85.4	75.0	63.4	37.5	29.6	25.0	21.8	19.4
9					91.8	82.3	73.1	62.5	38.2	30.6	26.2	23.0
10					97.4	88.2	79.9	71.7	61.8	39.8	31.5	27.2
11						93.3	85.4	78.0	70.4	61.2	39.3	32.3
12						97.9	90.1	83.1	78.4	69.4	60.7	39.8
13							94.3	87.5	81.2	75.0	68.5	60.2
14							96.2	91.5	85.4	79.6	73.8	67.7
15								95.1	89.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.0	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

TABLE 1-1. CROSS-SECTION LAYOUT FOR RECTANGULAR STACKS

Number of traverse points	Matrix layout
8	2x4
12	3x4
16	4x4
20	4x5
25	5x5
30	5x6
36	6x6
42	6x7
49	7x7

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
LOCATION: #13 Combustion Stack
ACTIVITY NO.:
CONTROL BOX OPERTOR:
PROBE HANDLER:
CLEAN UP:

DATE: 7-10-90
TEST NO.: CLR-13CS-1
NOZZLE: #52 0.556
STATIC PRESSURE Ps: -1.2
PORT DIRECTION: A, B
BAROMETRIC PRESSURE: 29.30

ΔH@: 1.573 (6-12-90)
METER CORRECTION: 1.0519
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

HOT BOX NO.: 2
COLD BOX NO.: 2
PROBE NO.: 7-3
FILTER NO.: 410
STACK DIA.: 120"

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments
A	42.7	910	160.776	.020	.99	.99	82	77	6.0	483	260	<68°F Ice/Down	250	5 min/pt
	30.0			.020	.87	.87	85	78	5.5	514				
	21.3			.020	.86	.86	88	80	5.5	517		58°		
	14.2			.025	1.08	1.08	91	83	7.0	519				
	8.0			.020	.86	.86	93	84	5.5	510		58°		
	2.6	940	175.429	.010	.43	.43	93	86	3.0	500				
B	42.7	945	175.429	.020	.86	.86	91	87	5.5	500		58°		
	30.0			.025	1.08	1.08	96	88	6.0	498				
	21.3			.020	.88	.88	97	86	5.5	501		59°		
	14.2			.025	1.10	1.10	98	90	6.5	497				
	8.0			.020	.88	.88	99	91	5.5	490		56°		
	2.6	1015	190.880	.010	.44	.44	98	92	3.0	490				

A

B

C-2

LEAK CHECK

	in. Hg.	Rate
fore	5.0	<.02 CFM
ter	10.0	0.000 CFM No leak

ORSAT

	1	2
CO_2	4.5	4.5
O_2	3	2
CO	Bad Pyrite Solution	for O_2 only
N		

PITOT LEAK CHECK

POS.	NEG.
OK 15 sec	OK 15 sec

Impinger No.	Final	Initial	Difference	
1	768.7	527.1	241.6	100 ml H_2O
2	563.5	512.2	51.3	100 ml H_2O
3	474.4	470.0	4.4	empty
4	689.0	673.0	16.0	Silica Gel

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT USX Clairton
LOCATION #13 Combustion Stack
ACTIVITY NO.:
CONTROL BOX OPERTOR:
PROBE HANDLER:
CLEAN UP:

DATE: 7-10-90
TEST NO.: CLR-13CS-1
NOZZLE: #52 0.556
STATIC PRESSURE Ps: -1.2
PORT DIRECTION: C, D
BAROMETRIC PRESSURE: 29.30

ΔH@: 1.573 (6-12-90)
METER CORRECTION: 1.0519
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

HOT BOX NO.: 2
COLD BOX NO.: 2
PROBE NO.: 7-3
FILTER NO.: 410
STACK DIA.: 120"

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments	
C	42.7	1020	190.880	.040	1.76	1.76	96	92	9.0	507	260	<68°F Ice Bath	250	5 min/pt	↑
	30.0			.035	1.54	1.54	101	93	8.5	522					C
	21.3			.030	1.32	1.32	101	93	7.5	527		59°			
	14.2			.030	1.32	1.32	102	93	7.5	529					
	8.0			.035	1.54	1.54	103	94	8.0	520		57°			
	2.6	1050	211.318	.025	1.10	1.10	103	95	6.0	510					↓
D	42.7	1055	211.318	.040	1.76	1.76	94	93	9.0	500		59°			↑
	30.0			.040	1.76	1.76	100	92	9.0	514					D
	21.3			.040	1.76	1.76	101	92	9.0	507		56°			
	14.2			.035	1.54	1.54	102	93	8.5	507					
	8.0			.030	1.32	1.32	102	94	7.5	498		55°			
	2.6	1025	231.945	.020	.88	.88	102	94	5.5	495					↓

C-3

LEAK CHECK

	in. Hg.	Rate
Before		
After		

ORSAT

	1	2
CO_2	4.25	4.5
O_2		
CO		
N		

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			

2-1

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
DATE: 7-10-90
ΔH@: 1.573 (6-12-90)
HOT BOX NO.: 6
LOCATION: #13 Combustion Stack
TEST NO.: CLR-13CS-2
METER CORRECTION: 1.0519
COLD BOX NO.: 6
ACTIVITY NO.:
NOZZLE: #52 0.556
PITOT CORRECTION: 0.84
PROBE NO.: 7-2
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 397
PROBE HANDLER:
PORT DIRECTION: D, C
NOMOGRAPH SET POINT:
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.30
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments	
D	42.7	1200	232.350	.040	1.74	1.74	97	95	6.0	499	260	<68°F Ice Bath	250	5 min/pt	↑
	30.0			.025	1.09	1.09	104	97	4.0	500					
	21.3			.030	1.31	1.31	106	97	4.0	489		58°			D
	14.2			.020	.87	.87	107	98	3.0	492					
	8.0			.010	.44	.44	106	100	2.0	485		56°			
	2.6	1230	248.836	.010	.44	.44	106	100	2.0	480					↓
C	42.7	1235	248.836	.030	1.31	1.31	106	101	4.0	502		59°			↑
	30.0			.035	1.53	1.53	111	102	5.0	505					
	21.3			.030	1.43	1.43	112	103	5.0	495		56°			C
	14.2			.030	1.43	1.43	113	104	5.0	490					
	8.0			.030	1.43	1.43	114	104	5.0	490		57°			
	2.6	1305	268.938	.020	.95	.95	115	106	3.0	480					↓

LEAK CHECK

	in. Hg.	Rate
Before	5.0	<.02 CFM
After	7.0	.005 CFM

ORSAT

	1	2
CO_2	4.0	4.0
O_2	11.0	11.0
CO		
N		

PITOT LEAK CHECK

POS.	NEG.
15 sec OK	15 sec OK

Impinger No.	Final	Initial	Difference	
1	783.8	558.3	225.5	100 ml H_2O
2	623.5	586.2	37.3	100 ml H_2O
3	382.5	375.4	7.1	empty
4	698.3	680.7	17.6	Silica Gel

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
DATE: 7-10-90
ΔH@: 1.573 (6-12-90)
HOT BOX NO.: 6
LOCATION: #13 Combustion Stack
TEST NO.: CLR-13CS-2
METER CORRECTION: 1.0519
COLD BOX NO.: 6
ACTIVITY NO.:
NOZZLE: #52 0.556
PITOT CORRECTION: 0.84
PROBE NO.: 7-2
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 397
PROBE HANDLER:
PORT DIRECTION: B, A
NOMOGRAPH SET POINT:
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.30
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments	
B	42.7	1310	268.938	.030	1.43	1.43	112	107	5.0	495	260	<68°F Ice Down	250	5 min/pt	↑
	30.0			.030	1.43	1.43	114	108	5.0	490					
	21.3			.030	1.43	1.43	115	108	5.0	490		57°			B
	14.2			.030	1.43	1.43	116	109	5.0	490					
	8.0			.030	1.43	1.43	116	109	5.0	482		59°			
	2.6	1340	289.221	.020	.95	.95	117	110	3.5	475					↓
A	42.7	1345	289.221	.030	1.43	1.43	113	109	5.0	490		57°			↑
	30.0			.025	1.19	1.19	116	109	4.5	478					
	21.3			.025	1.19	1.19	117	110	4.5	480		56°			A
	14.2			.020	.95	.95	117	110	4.0	480					
	8.0			.020	.92	.92	117	110	4.0	475		55°			
	2.6	1415	307.546	.020	.92	.92	117	110	4.0	470					↓

C-5

LEAK CHECK

	in. Hg.	Rate
Before		
er		

ORSAT

	1	2
CO_2		
O_2		
CO		
N		

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
DATE: 7-10-90
ΔH@: 1.573 (6-12-90)
HOT BOX NO.: 7
LOCATION: #13 Combustion Stack
TEST NO.: CLR-13CS-3
METER CORRECTION: 1.0519
COLD BOX NO.: 7
ACTIVITY NO.:
NOZZLE: #52 0.556
PITOT CORRECTION: 0.84
PROBE NO.: 7-1
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 409
PROBE HANDLER:
PORT DIRECTION: A,B
NOMOGRAPH SET POINT:
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.30
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments	
A	42.7	1435	307.725	.040	1.84	1.84	110	109	8.0	485	260	<68°F Iced Down	250	5 min/pt	↑
	30.0			.035	1.61	1.61	117	110	7.5	485					
	21.3			.035	1.61	1.61	117	110	7.5	489		58°			A
	14.2			.035	1.61	1.61	117	110	7.5	493					
	8.0			.025	1.15	1.15	118	109	5.0	472		56°			
	2.6	1505	328.976	.020	.92	.92	118	109	4.0	470					↓
B	42.7	1510	328.976	.035	1.61	1.61	112	108	7.0	490		57°			↑
	30.0			.035	1.61	1.61	116	109	7.0	498					
	21.3			.030	1.38	1.38	116	109	6.0	507		56°			B
	14.2			.030	1.38	1.38	116	109	6.0	507					
	8.0			.025	1.15	1.15	116	109	5.0	495		57°			
	2.6	1540	349.164	.020	.92	.92	114	108	4.0	480					↓

C-6

LEAK CHECK

	in. Hg.	Rate
Before	5.0	<.02 CFM
After	4.0	.001

ORSAT

	1	2
CO_2	3.5	4.5
O_2	10.5	11.0
CO		
N		

PITOT LEAK CHECK

POS.	NEG.
15 sec OK	15 sec OK

Impinger No.	Final	Initial	Difference	
1	796.3	531.6	264.7	100 ml H_2O
2	586.9	537.1	49.8	100 ml H_2O
3	477.4	471.8	5.6	empty
4	680.1	659.8	20.3	Silica Gel

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
DATE: 7-10-90
ΔH@: 1.573 (6-12-90)
HOT BOX NO.: 7
LOCATION: #13 Combustion Stack
TEST NO.: CLR-13CS-3
METER CORRECTION: 1.0519
COLD BOX NO.: 7
ACTIVITY NO.:
NOZZLE: #52 0.556
PITOT CORRECTION: 0.84
PROBE NO.: 7-1
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -1.2
CONTROL BOX NO.: 1
FILTER NO.: 409
PROBE HANDLER:
PORT DIRECTION: C, D
NOMOGRAPH SET POINT:
STACK DIA.: 120"
CLEAN UP:
BAROMETRIC PRESSURE: 29.30
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Reg.	Orifice ΔH in. H_2O Act.	Meter Temp °F In	Meter Temp °F Out	Vacuum in. Hg	Stack Temp °F	Probe Temp °F	Imp. Temp. °C/°F	Hot Box °F	Comments	
C	42.7	1545	349.164	.040	1.84	1.84	111	108	8.0	487	260	<680°F Feed Down	250	5 min/pt	↑
	30.0			.040	1.84	1.84	114	108	8.0	489					
	21.3			.035	1.61	1.61	115	108	7.0	478		57°			C
	14.2			.030	1.38	1.38	114	107	6.0	476					
	8.0			.030	1.38	1.38	114	107	6.0	470		56°			
	2.6	1615	371.358	.030	1.38	1.38	115	107	6.0	470					↓
D	42.7	1620	371.358	.040	1.84	1.84	111	108	7.0	490		55°			↑
	30.0			.040	1.84	1.84	117	109	7.0	510					
	21.3			.040	1.84	1.84	118	111	7.0	517		57°			D
	14.2			.040	1.84	1.84	118	111	7.0	510					
	8.0			.040	1.84	1.84	118	111	7.0	498		56°			
	2.6	1650	394.043	.040	.92	.92	119	112	4.0	490					↓

C-7

LEAK CHECK

	in. Hg.	Rate
efore		
fter		

ORSAT

	1	2
CO_2		
O_2		
CO		
N		

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			

USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#13 BATTERY COMBUSTION STACK

APPENDIX D

PARTICULATE MATTER
EMISSIONS CALCULATIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

Plant: Clairton Steel (7/10/90)

Date: 7/13/90

Activity No. 601050-02

PARTICULATE REPORTING FORM

Test Number	Component	Molecular Weight	Cyclone Weight	Particulate Filter Weight (g)	Insol. Part. in Front Half	0.22 μ Millipore Filter Insol. Part. in Back Half (g)	Chloroform Ethyl Ether Extract Acetone Soluble Part. in Back Half	Soluble Part. in Front Half
CLR-13CS-1	Particulate			0.0390 ~~0.0437~~		0.0014	0.0097 ~~0.0066~~	0.0165 ~~0.0307~~
CLR-13CS-2	Particulate			0.0374 ~~0.0455~~		0.0014	0.0079 ~~0.0041~~	0.0159 ~~0.0276~~
CLR-13CS-3	Particulate			0.0347 ~~0.0413~~		0.0018	0.0053 ~~0.0041~~	0.0184 ~~0.0450~~

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION
STACK

DATE: 7-10-90
CHARGE #: ...150-601050
TEST #: CLR-13CS-1

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01247	2.80936

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2. STACK CONDITIONS

FLOW (ACFM)	59632.
(SCFM)	31807.
MOISTURE CONTENT (%)	17.37
STACK TEMPERATURE (F)	506.5

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	70.264
PERCENT ISOKINETIC	103.78

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-1 7-10-90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY) CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTED VELOCITY FT/SEC
42.7A	910.0	160.776	.020	.99	.99	82.	77.	6.0	483.	11.0
30.0A			.020	.87	.87	85.	78.	5.5	514.	11.2
21.3A			.020	.86	.86	88.	80.	5.5	517.	11.2
14.2A			.025	1.08	1.08	91.	83.	7.0	519.	12.6
8.0A			.020	.86	.86	93.	84.	5.5	510.	11.2
2.6A	940.0	175.429	.010	.43	.43	93.	86.	3.0	500.	7.9
42.7B	945.0	175.429	.020	.86	.86	91.	87.	5.5	500.	11.1
30.0B			.025	1.08	1.08	96.	88.	6.0	498.	12.4
21.3B			.020	.88	.88	97.	86.	5.5	501.	11.1
14.2B			.025	1.10	1.10	98.	90.	6.5	497.	12.4
8.0B			.020	.88	.88	99.	91.	5.5	490.	11.1
2.6B	1015.0	190.880	.010	.44	.44	98.	92.	3.0	490.	7.8
42.7C	1020.0	190.880	.040	1.76	1.76	96.	92.	9.0	507.	15.8
30.0C			.035	1.54	1.54	101.	93.	8.5	522.	14.9
21.3C			.030	1.32	1.32	101.	93.	7.5	527.	13.8
14.2C			.030	1.32	1.32	102.	93.	7.5	529.	13.8
8.0C			.035	1.54	1.54	103.	94.	8.0	520.	14.9
2.6C	1050.0	211.318	.025	1.10	1.10	103.	95.	6.0	510.	12.5
42.7D	1055.0	211.318	.040	1.76	1.76	94.	93.	9.0	500.	15.7
30.0D			.040	1.76	1.76	100.	92.	9.0	514.	15.9
21.3D			.040	1.76	1.76	101.	92.	9.0	507.	15.8
14.2D			.035	1.54	1.54	102.	93.	8.5	507.	14.8
8.0D			.030	1.32	1.32	102.	94.	7.5	498.	13.6
2.6D	1125.0	231.945	.020	.88	.88	102.	94.	5.5	495.	11.1

O R S A T

CO2	4.5
O2	11.0
CO	.0
N	84.5

IMPINGER NO.	1	241.6
	2	51.3
	3	4.4
	4	.0
ABSORBED H2O		16.0

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	6-29-90

LEAK CHECK

	RATE	IN.HG
INITIAL	LT 0.02CFM	5.0
FINAL	LT 0.02CFM	10.0

CONTROL BOX NO. 1 PROBE NO. 7-3 NOZZLE NO. 52

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-1 7-10-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.30
B.	AVG. DELTA H (IN H2O)	1.16
C.	METER PRESSURE (IN. HG.)	29.39
D.	STATIC PRESSURE (IN. H2O)	-1.20
E.	STATIC PRESSURE (IN. HG.)	-.088
F.	STACK PRESSURE (IN. HG.) (A+E)	29.21
G.	STACK DIAMETER (IN.)	120.00
H.	STACK AREA (SQ. FT.)	78.54
	NOZZLE DIAMETER	.5560
I.	NOZZLE AREA (SQ. FT.)	.001686
J.	AVG. STACK TEMP (DEG. R.)	966.5
K.	AVG. METER TEMP (DEG. R.)	552.9
L.	CONDENSATE VOL. (ML)	297.3
M.	ABSORBED H2O (ML)	16.0
N.	TOTAL H2O (ML)	313.3
O.	METERED GAS (CF)	71.169
P.	GAS METER CORRECTION	1.0519
Q.	CORRECTED METERED GAS (CF)	74.863
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	15.739
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	90.601
T.	PERCENT H2O (100R/S)	17.37
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	17.37
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	70.264

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-T/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	.045	X	.8263	X	44.0	=	1.64
CO	.000	X	.8263	X	28.0	=	.00
O2	.110	X	.8263	X	32.0	=	2.91
N2	.845	X	.8263	X	28.2	=	19.69
H2O		X	T/100= .1737	X	18.0	=	3.13
					MOLECULAR WEIGHT OF STACK GAS	=	27.36

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	12.65
Y.	AVG. FLOW RATE (CFM) (X*H*60)	59632.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	31807.
	STACK FLOW RATE (DRY)	26282.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	103.78

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-1 7-10-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.03900	.00000	.01650

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00140	.00970
PARTICULATE	.06660	
ALL MATLS.	.06660	

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01247	2.80936

Emission rates are based on the PA method.
The soluble impinger weight is excluded from the calculations

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION
STACK

DATE: 7-10-90
CHARGE #: ...150-601050
TEST #: CLR-13CS-2

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01166	2.67752

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2. STACK CONDITIONS

FLOW (ACFM)	58473.
(SCFM)	31810.
MOISTURE CONTENT (%)	15.80
STACK TEMPERATURE (F)	487.6

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	72.226
PERCENT ISOKINETIC	104.68

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-2 7-10-90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY) CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTED VELOCITY FT/SEC
42.7D	1200.0	232.350	.040	1.74	1.74	97.	95.	6.0	499.	15.7
30.0D			.025	1.09	1.09	104.	97.	4.0	500.	12.4
21.3D			.030	1.31	1.31	106.	97.	4.0	489.	13.5
14.2D			.020	.87	.87	107.	98.	3.0	492.	11.1
8.0D			.010	.44	.44	106.	100.	2.0	485.	7.8
2.6D	1230.0	248.836	.010	.44	.44	106.	100.	2.0	480.	7.8
42.7C	1235.0	248.836	.030	1.31	1.31	106.	101.	4.0	502.	13.6
30.0C			.035	1.53	1.53	111.	102.	5.0	505.	14.7
21.3C			.030	1.43	1.43	112.	103.	5.0	495.	13.6
14.2C			.030	1.43	1.43	113.	104.	5.0	490.	13.5
8.0C			.030	1.43	1.43	114.	104.	5.0	490.	13.5
2.6C	1305.0	268.938	.020	.95	.95	115.	106.	3.0	480.	11.0
42.7B	1310.0	268.938	.030	1.43	1.43	112.	107.	5.0	495.	13.6
30.0B			.030	1.43	1.43	114.	108.	5.0	490.	13.5
21.3B			.030	1.43	1.43	115.	108.	5.0	490.	13.5
14.2B			.030	1.43	1.43	116.	109.	5.0	490.	13.5
8.0B			.030	1.43	1.43	116.	109.	5.0	482.	13.5
2.6B	1340.0	289.221	.020	.95	.95	117.	110.	5.5	475.	11.0
42.7A	1345.0	289.221	.030	1.43	1.43	113.	109.	5.0	490.	13.5
30.0A			.025	1.19	1.19	116.	109.	4.5	478.	12.3
21.3A			.025	1.19	1.19	117.	110.	4.5	480.	12.3
14.2A			.020	.95	.95	117.	110.	4.0	480.	11.0
8.0A			.020	.92	.92	117.	110.	4.0	475.	11.0
2.6A	1415.0	307.546	.020	.92	.92	117.	110.	4.0	470.	10.9

O R S A T

CO2	4.0
O2	11.0
CO	.0
N	85.0

IMPINGER NO.	1	225.5
	2	37.3
	3	7.1
	4	.0
ABSORBED H2O		17.6

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	6-29-90

LEAK CHECK

	RATE	IN.HG
INITIAL	LT 0.02CFM	5.0
FINAL	0.005 CFM	7.0

CONTROL BOX NO. 1 PROBE NO. 7-2 NOZZLE NO. 52

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-2 7-10-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.30
B.	AVG. DELTA H (IN H2O).....	1.19
C.	METER PRESSURE (IN. HG.).....	29.39
D.	STATIC PRESSURE (IN. H2O).....	-1.20
E.	STATIC PRESSURE (IN. HG.).....	-.088
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.21
G.	STACK DIAMETER (IN.).....	120.00
H.	STACK AREA (SQ. FT.).....	78.54
	NOZZLE DIAMETER.....	.5560
I.	NOZZLE AREA (SQ. FT.).....	.001686
J.	AVG. STACK TEMP (DEG. R.).....	947.6
K.	AVG. METER TEMP (DEG. R.).....	568.3
L.	CONDENSATE VOL. (ML).....	269.9
M.	ABSORBED H2O (ML).....	17.6
N.	TOTAL H2O (ML).....	287.5
O.	METERED GAS (CF).....	75.196
P.	GAS METER CORRECTION.....	1.0519
Q.	CORRECTED METERED GAS (CF).....	79.099
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	14.845
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	93.944
T.	PERCENT H2O (100R/S).....	15.80
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	15.80
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	72.226

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-T/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	.040	X	.8420	X	44.0	=	1.48
CO	.000	X	.8420	X	28.0	=	.00
O2	.110	X	.8420	X	32.0	=	2.96
N2	.850	X	.8420	X	28.2	=	20.18
H2O		X	T/100= .1580	X	18.0	=	2.84
					MOLECULAR WEIGHT OF STACK GAS	=	27.47

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	12.41
	[85.49*W*SQRT{(J*DELTA P)/(V*F)}]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	58473.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	31810.
	STACK FLOW RATE (DRY).....	26784.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	104.68
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-2 7-10-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.03740	.00000	.01590

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00140	.00790

PARTICULATE	.06260
ALL MATLS.	.06260

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01166	2.67752

Emission rates are based on the PA method.
The soluble impinger weight is excluded from the calculations

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION
STACK

DATE: 7-10-90
CHARGE #: ...150-601050
TEST #: CLR-13CS-3

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01026	2.69222

---

2. STACK CONDITIONS

FLOW (ACFM)	67397.
(SCFM)	36578.
MOISTURE CONTENT (%)	16.30
STACK TEMPERATURE (F)	489.8

---

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	82.411
PERCENT ISOKINETIC	104.49

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-3 7-10-90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY)CF	DELTA P IN.H2O	ORIFICE DELTA H REQ	ORIFICE DELTA H ACT	METER TEMP DEG F IN	METER TEMP DEG F OUT	VACUUM IN.HG.	STACK TEMP DEG F	CORRECTED VELOCITY FT/SEC
42.7A	1435.0	307.725	.040	1.84	1.84	110.	109.	8.0	485.	15.6
30.0A			.035	1.61	1.61	117.	110.	7.5	485.	14.6
21.3A			.035	1.61	1.61	117.	110.	7.5	489.	14.6
14.2A			.035	1.61	1.61	117.	110.	7.5	493.	14.7
8.0A			.025	1.15	1.15	118.	109.	5.0	472.	12.2
2.6A	1505.0	328.976	.020	.92	.92	118.	109.	4.0	470.	10.9
42.7B	1510.0	328.976	.035	1.61	1.61	112.	108.	7.0	490.	14.6
30.0B			.035	1.61	1.61	116.	109.	7.0	498.	14.7
21.3B			.030	1.38	1.38	116.	109.	6.0	507.	13.7
14.2B			.030	1.38	1.38	116.	109.	6.0	507.	13.7
8.0B			.025	1.15	1.15	116.	109.	5.0	495.	12.4
2.6B	1540.0	349.164	.020	.92	.92	114.	108.	4.0	480.	11.0
42.7C	1545.0	349.164	.040	1.84	1.84	111.	108.	8.0	487.	15.6
30.0C			.040	1.84	1.84	114.	108.	8.0	489.	15.6
21.3C			.035	1.61	1.61	115.	108.	7.0	478.	14.5
14.2C			.030	1.38	1.38	114.	107.	6.0	476.	13.4
8.0C			.030	1.38	1.38	114.	107.	6.0	470.	13.4
2.6C	1615.0	371.358	.030	1.38	1.38	115.	107.	6.0	470.	13.4
42.7D	1620.0	371.358	.040	1.84	1.84	111.	108.	7.0	490.	15.6
30.0D			.040	1.84	1.84	117.	109.	7.0	510.	15.8
21.3D			.040	1.84	1.84	118.	111.	7.0	517.	15.9
14.2D			.040	1.84	1.84	118.	111.	7.0	510.	15.8
8.0D			.040	1.84	1.84	118.	111.	7.0	498.	15.7
2.6D	1650.0	394.043	.040	.92	.92	119.	112.	4.0	490.	15.6

O R S A T

CO2	4.0
O2	10.8
CO	.0
N	85.3

IMPINGER NO.	1	264.7
	2	49.8
	3	5.6
	4	.0
ABSORBED H2O		20.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	6-29-90

LEAK CHECK

	RATE	IN.HG
INITIAL	LT 0.02CFM	5.0
FINAL	0.001 CFM	9.0

CONTROL BOX NO. 1 PROBE NO. 7-1 NOZZLE NO. 52

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-3 7-10-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.30
B.	AVG. DELTA H (IN H2O)	1.51
C.	METER PRESSURE (IN. HG.)	29.41
D.	STATIC PRESSURE (IN. H2O)	-1.20
E.	STATIC PRESSURE (IN. HG.)	-.088
F.	STACK PRESSURE (IN. HG.) (A+E)	29.21
G.	STACK DIAMETER (IN.)	120.00
H.	STACK AREA (SQ. FT.)	78.54
	NOZZLE DIAMETER	.5560
I.	NOZZLE AREA (SQ. FT.)	.001686
J.	AVG. STACK TEMP (DEG. R.)	949.8
K.	AVG. METER TEMP (DEG. R.)	572.2
L.	CONDENSATE VOL. (ML)	320.1
M.	ABSORBED H2O (ML)	20.3
N.	TOTAL H2O (ML)	340.4
O.	METERED GAS (CF)	86.318
P.	GAS METER CORRECTION	1.0519
Q.	CORRECTED METERED GAS (CF)	90.798
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	17.683
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	108.481
T.	PERCENT H2O (100R/S)	16.30
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	16.30
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	82.411

V. MOLECULAR WEIGHT OF STACK GAS

COMPONENT	ORSAT-DRY VOL.PCT./100	X	MOISTURE CORRECTION (1-T/100)	X	MOLECULAR WEIGHT	=	WEIGHT PER MOLE
CO2	.040	X	.8370	X	44.0	=	1.47
CO	.000	X	.8370	X	28.0	=	.00
O2	.108	X	.8370	X	32.0	=	2.88
N2	.853	X	.8370	X	28.2	=	20.12
H2O		X	T/100= .1630	X	18.0	=	2.93
					MOLECULAR WEIGHT OF STACK GAS	=	27.41

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	14.30
Y.	AVG. FLOW RATE (CFM) (X*H*60)	67397.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	36578.
	STACK FLOW RATE (DRY)	30616.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	104.49

AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#13 COMBUSTION STACK
CLR-13CS-3 7-10-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.03470	.00000	.01840

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00180	.00530

PARTICULATE	.06020
ALL MATLS.	.06020

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01026	2.69222

Emission rates are based on the PA method.
The soluble impinger weight is excluded from the calculations

USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#13 BATTERY COMBUSTION STACK

APPENDIX E

ANALYTICAL RESULTS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

RJ LeeGroup

The Materials Characterization Specialists

August 21, 1990

Mr. Patrick Stockton
Keystone Environmental
3000 Tech Center Drive
Monroeville, PA 15146

Re: RJ Lee Project Number: CHH008019-1
Customer Purchase Order: 601050-02

Dear Pat:

At your request, we examined three samples, provided by you for total sulfate (SO_4^{-2}) content. The solutions contained a mixture of organic solvents and water and were prepared for analysis by evaporation of a 100 ml aliquot to 25ml and rediluting back to the original 100ml volume. This removed the solvents. The samples were then analyzed along with standard sulfate solutions on a Dionex 2000i ion chromatography unit. Results are calculated as milligrams per liter (ppm) and then converte to total milligrams using the volumes of the solutions that you provided. These results are reported on the enclosed table. The precision of this analysis is ± 5% of the value reported.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the samples covered by this report, RJ Lee Group will store the samples for a period of ninety (90) days before discarding. A shipping and handling fee will be assessed for the return of any samples.

If you have any questions on this report or if we can be of further assistance, please feel free to call me.

Sincerely,

Gary A. Cooke

Gary A. Cooke
Manager, Analytical Chemistry

GAC/ljm
Enclosure

RJ Lee Group, Inc • 350 Hochberg Road, Monroeville, PA 15146 • 412/325-1776 412/733-1799-FAX

BERKELEY, CA WASHINGTON, D.C. WESTERN NY

Table I

CHH008019-1

For Keystone Environmental

Client Sample Number	RJ Lee Sample Number	SO_4^{-2} (ppm)	Solution volume (ml)	Total Sulfate (mg)
CLR-13CS-1	90593	36.8	930	34.2
CLR-13CS-2	90594	39.6	740	29.3
CLR-13CS-3	90595	54.2	950	51.5

Authorized Signature Gary A. Cooke
Date 9/21/90

RJ Lee Group, Inc.
Headquarters
350 Hochberg Road
Monroeville, PA 15146
(412) 325-1776
FAX (412) 733-1799

USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#13 BATTERY COMBUSTION STACK

APPENDIX F

FIELD DATA SHEETS
FOR VISIBLE EMISSIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Mr Roy

DATE: 10 July 1990

FACILITY: US Clairton Works

OBSERVATION: START TIME: 9:10 Am

END TIME: 10:10 Am

OBSERVATION POINT: Wabash Employee Wash Home Lot #13

SOURCE: Battery Draft Stack

DISTANCE: @ 560'

DIRECTION FROM: SW of

HEIGHT: @ 200'

WIND:

SPEED: 9 mph

DIRECTION: → SW

TEMPERATURE: 79°

SKY CONDITION: Overcast

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: B FOREMAN: R. McNalt

COMMENTS:

#13 Stack

	0	0	0	0	0	:40	30	0	0	0	0
	1	0	0	0	0		31	0	0	0	0
	2	0	0	0	0		32	0	0	0	0
	3	0	0	0	0		33	0	0	0	0
	4	0	0	0	0		34	0	0	0	0
:15	5	0	0	0	0	:45	35	0	0	0	0
	6	0	0	0	0		36	0	0	0	0
	7	0	0	0	0		37	0	0	0	0
	8	0	0	0	0		38	0	0	0	0
	9	0	0	0	0		39	0	0	0	0
:20	10	0	0	0	0	:50	40	0	0	0	0
	11	0	0	0	0		41	0	0	0	0
	12	0	0	0	0		42	0	0	0	0
	13	0	0	0	0		43	0	0	0	0
	14	0	0	0	0		44	0	0	0	0
:25	15	0	0	0	0	:55	45	0	0	0	0
	16	0	0	0	0		46	0	0	0	0
	17	0	0	0	0		47	0	0	0	0
	18	0	0	0	0		48	0	0	0	0
	19	0	0	0	0		49	0	0	0	0
:30	20	0	0	0	0	:00	50	0	0	0	0
	21	0	0	0	0		51	0	0	0	0
	22	0	0	0	0		52	0	0	0	0
	23	0	0	0	0		53	0	0	0	0
	24	0	0	0	0		54	0	0	0	0
:35	25	0	0	0	0	:05	55	0	0	0	0
	26	0	0	0	0		56	0	0	0	0
	27	0	0	0	0		57	0	0	0	0
	28	0	0	0	0		58	0	0	0	0
	29	0	0	0	0		59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 10 July 1990

FACILITY: USX Clairton Works

OBSERVATION: START TIME: 10:10 AM

END TIME: 11:10 AM

OBSERVATION POINT: North Wabash Employee Home Lot #13

SOURCE: Battery Draft Stack

DISTANCE: @ 575'

DIRECTION FROM: S-W of

HEIGHT: @ 200'

WIND:

SPEED: 0 mph

DIRECTION: ≠ SW

TEMPERATURE: 79°

SKY CONDITION: Overcast

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: B FOREMAN: R. McNatt

COMMENTS:

#13 Stack

	0	0	0	0	0	:40	30	0	0	0	0
	1	0	0	0	0		31	0	0	0	0
	2	0	0	0	0		32	0	0	0	0
	3	0	0	0	0		33	0	0	0	0
	4	0	0	0	0		34	0	0	0	0
:15	5	0	0	0	0	:45	35	0	0	0	0
	6	0	0	0	0		36	0	0	0	0
	7	0	0	0	0		37	0	0	0	0
	8	0	0	0	0		38	0	0	0	0
	9	0	0	0	0		39	0	0	0	0
:20	10	0	0	0	0	:50	40	0	0	0	0
	11	0	0	0	0		41	0	0	0	0
	12	0	0	0	0		42	0	0	0	0
	13	0	0	0	0		43	0	0	0	0
	14	0	0	0	0		44	0	0	0	0
:25	15	0	0	0	0	:55	45	0	0	0	0
	16	0	0	0	0		46	0	0	0	0
	17	0	0	0	0		47	0	0	0	0
	18	0	0	0	0		48	0	0	0	0
	19	0	0	0	0		49	0	0	0	0
:30	20	0	0	0	0	:00	50	0	0	0	0
	21	0	0	0	0		51	0	0	0	0
	22	0	0	0	0		52	0	0	0	0
	23	0	0	0	0		53	0	0	0	0
	24	0	0	0	0		54	0	0	0	0
:35	25	0	0	0	0	:05	55	0	0	0	0
	26	0	0	0	0		56	0	0	0	0
	27	0	0	0	0		57	0	0	0	0
	28	0	0	0	0		58	0	0	0	0
	29	0	0	0	0		59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 10 July, 1990

FACILITY: USS Clairton Works

OBSERVATION: START TIME: 11:10

END TIME: [redacted] 11:28

OBSERVATION POINT: Wabash Employee House wash Lot

SOURCE: #13 Battery Duct Stack

DISTANCE: @ 570'

DIRECTION FROM: → SW 80 F''

HEIGHT: @ 200'

WIND:

SPEED:

DIRECTION:

TEMPERATURE:

SKY CONDITION:

BACKGROUND:

READING CONDITIONS:

COLOR OF EMISSION:

TOTAL No. OF READINGS:

No. READINGS >= 20%

No. READINGS >= 60%

GREATEST OPACITY:

CREW: FOREMAN:

COMMENTS:

#13 Stack

	0	0	0	0	0	:40	30				
	1	0	0	0	0		31				
	2	0	0	0	0		32				
	3	0	0	0	0		33				
	4	0	0	0	0		34				
:15	5	0	0	0	0	:45	35				
	6	0	0	0	0		36				
	7	0	0	0	0		37				
	8	0	0	0	0		38				
	9	0	0	0	0		39				
:20	10	0	0	0	0	:50	40				
	11	0	0	0	0		41				
	12	0	0	0	0		42				
	13	0	0	0	0		43				
	14	0	0	0	0		44				
:25	15	0	0	0	0	:55	45				
	16	0	0	0	0		46				
	17	0	0	0	0		47				
	18	0	0	0	0		48				
	19						49				
:30	20					:00	50				
	21						51				
	22						52				
	23						53				
	24						54				
:35	25					:05	55				
	26						56				
	27						57				
	28						58				
	29						59				

1 of

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 10 July, 1990

FACILITY: USS Clairton Works

OBSERVATION: START TIME: 12:00 n

END TIME: 1:00 pm

OBSERVATION POINT: wash Wabash Employee House Lot #13

SOURCE: Battery Draft Stack

DISTANCE: a 570

DIRECTION FROM: SW "OF"

HEIGHT: a 200'

WIND:

SPEED: 12-mPH

DIRECTION: > SW

TEMPERATURE: 83°

SKY CONDITION: Partly Cloudy

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: B FOREMAN: R. McNatt

COMMENTS:

#13 Stack

0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 10 July, 1990

FACILITY: USS Clairton Works

OBSERVATION: START TIME: 1:00 PM
END TIME: 2:00 PM

OBSERVATION POINT: South End #19 Batt. #13

SOURCE: Battery Draft Stack

DISTANCE: a 560'

DIRECTION FROM: SW "OF"

HEIGHT: a 200'

WIND:

SPEED: 10 MPH

DIRECTION: → SW

TEMPERATURE: 83°

SKY CONDITION: Partly Cloudy

BACKGROUND: SKY

READING CONDITIONS: GOOD

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: B FOREMAN: L. McNutt

COMMENTS:

#13 Stack

0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

2 of 2

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKoy

DATE: 10 July 1990

FACILITY: USS Clairton Works

OBSERVATION: START TIME: 2:00 PM

END TIME: 2:10 PM

OBSERVATION POINT: South End #19 Batt.

SOURCE: #13 Battery 2 Uptake Stack

DISTANCE: @ 550'

DIRECTION FROM: SW of

HEIGHT: @ 200'

WIND:

SPEED:

DIRECTION:

TEMPERATURE:

SKY CONDITION: Partly

BACKGROUND: Sky

READING CONDITIONS:

COLOR OF EMISSION:

TOTAL No. OF READINGS:

No. READINGS >= 20%

No. READINGS >= 60%

GREATEST OPACITY:

CREW: FOREMAN:

COMMENTS:

#13 Stack

0	0	0	0	0	30					
1	0	0	0	0	31					
2	0	0	0	0	32					
3	0	0	0	0	33					
4	0	0	0	0	34					
5	0	0	0	0	35					
6	0	0	0	0	36					
7	0	0	0	0	37					
8	0	0	0	0	38					
9	0	0	0	0	39					
10					40					
11					41					
12					42					
13					43					
14					44					
15					45					
16					46					
17					47					
18					48					
19					49					
20					50					
21					51					
22					52					
23					53					
24					54					
25					55					
26					56					
27					57					
28					58					
29					59					

1 of #3

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay

DATE: 10 July, 1990

FACILITY: USX Clairton Works

OBSERVATION: START TIME: 2:35 PM

END TIME: 3:35 PM

OBSERVATION POINT: South end #19 Batt.

SOURCE: #13 Battery Duct Stack

DISTANCE: @ 555'

DIRECTION FROM: SW of

HEIGHT: @ 200'

WIND:

SPEED: 16 M.P.H.

DIRECTION: S W

TEMPERATURE: 88°

SKY CONDITION: 1/2 Clouds

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY:

CREW: B FOREMAN: [illegible]

COMMENTS:

#13 Stack

	0	0	0	0	0	:05	30	0	0	0	0
	1	0	0	0	0		31	0	0	0	0
	2	0	0	0	0		32	0	0	0	0
	3	0	0	0	0		33	0	0	0	0
	4	0	0	0	0		34	0	0	0	0
:10	5	0	0	0	0	:10	35	0	0	0	0
	6	0	0	0	0		36	0	0	0	0
	7	0	0	0	0		37	0	0	0	0
	8	0	0	0	0		38	0	0	0	0
	9	0	0	0	0		39	0	0	0	0
:15	10	0	0	0	0	:15	40	0	0	0	0
	11	0	0	0	0		41	0	0	0	0
	12	0	0	0	0		42	0	0	0	0
	13	0	0	0	0		43	0	0	0	0
	14	0	0	0	0		44	0	0	0	0
:50	15	0	0	0	0	:20	45	0	0	0	0
	16	0	0	0	0		46	0	0	0	0
	17	0	0	0	0		47	0	0	0	0
	18	0	0	0	0		48	0	0	0	0
	19	0	0	0	0		49	0	0	0	0
:55	20	0	0	0	0	:25	50	0	0	0	0
	21	0	0	0	0		51	0	0	0	0
	22	0	0	0	0		52	0	0	0	0
	23	0	0	0	0		53	0	0	0	0
	24	0	0	0	0		54	0	0	0	0
:00	25	0	0	0	0	:30	55	0	0	0	0
	26	0	0	0	0		56	0	0	0	0
	27	0	0	0	0		57	0	0	0	0
	28	0	0	0	0		58	0	0	0	0
	29	0	0	0	0		59	0	0	0	0

2 of #3

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: McKay

DATE: 10 July, 1990

FACILITY: USX Clairton works

OBSERVATION: START TIME: 3:35 pm
END TIME: 4:35 pm

OBSERVATION POINT: Wabash Employee wash House Lot #13

SOURCE: Battery Draft Stack

DISTANCE: a 5

DIRECTION FROM: SW of

HEIGHT: a 200'

WIND:

SPEED: 18-25 mph

DIRECTION: → NW

TEMPERATURE: 87°

SKY CONDITION: Over Cast & Rain

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: A/N

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: B FOREMAN: B. Hall

COMMENTS:

	0	0	0	0	0	105	30	0	0	0	0
	1	0	0	0	0		31	0	0	0	0
	2	0	0	0	0		32	0	0	0	0
	3	0	0	0	0		33	0	0	0	0
	4	0	0	0	0		34	0	0	0	0
:40	5	0	0	0	0	:10	35	0	0	0	0
	6	0	0	0	0		36	0	0	0	0
	7	0	0	0	0		37	0	0	0	0
	8	0	0	0	0		38	0	0	0	0
	9	0	0	0	0		39	0	0	0	0
:45	10	0	0	0	0	:15	40	0	0	0	0
	11	0	0	0	0		41	0	0	0	0
	12	0	0	0	0		42	0	0	0	0
	13	0	0	0	0		43	0	0	0	0
	14	0	0	0	0		44	0	0	0	0
:50	15	0	0	0	0	:20	45	0	0	0	0
	16	0	0	0	0		46	0	0	0	0
	17	0	0	0	0		47	0	0	0	0
	18	0	0	0	0		48	0	0	0	0
	19	0	0	0	0		49	0	0	0	0
:55	20	0	0	0	0	:25	50	0	0	0	0
	21	0	0	0	0		51	0	0	0	0
	22	0	0	0	0		52	0	0	0	0
	23	0	0	0	0		53	0	0	0	0
	24	0	0	0	0		54	0	0	0	0
:00	25	0	0	0	0	:30	55	0	0	0	0
	26	0	0	0	0		56	0	0	0	0
	27	0	0	0	0		57	0	0	0	0
	28	0	0	0	0		58	0	0	0	0
	29	0	0	0	0		59	0	0	0	0

3 of #3

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Mc Kay

DATE: 10 July, 1990

FACILITY: USS Clinton W.K

OBSERVATION: START TIME: 4:35

END TIME: 4:47

OBSERVATION POINT: :40

#13

SOURCE: Battery Draft Stack

DISTANCE: @ 550' :45

DIRECTION FROM: SW of

HEIGHT: @ 200'

WIND:

SPEED: 18 MPH

DIRECTION: → NE

TEMPERATURE: 86°

SKY CONDITION: Hazy

BACKGROUND: Sky

READING CONDITIONS:

COLOR OF EMISSION:

TOTAL No. OF READINGS:

No. READINGS >= 20%

No. READINGS >= 60%

GREATEST OPACITY:

CREW: FOREMAN:

COMMENTS:

#13 Stack

0	0	0	0	0	30					
1	0	0	0	0	31					
2	0	0	0	0	32					
3	0	0	0	0	33					
4	0	0	0	0	34					
5	0	0	0	0	35					
6	0	0	0	0	36					
7	0	0	0	0	37					
8	0	0	0	0	38					
9	0	0	0	0	39					
10	0	0	0	0	40					
11	0	0	0	0	41					
12	0	0	0	0	42					
13					43					
14					44					
15					45					
16					46					
17					47					
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27					57					
28					58					
29					59					