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 #7 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. 601050-07

SEPTEMBER 1990

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ABSTRACT

On August 22, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #7 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 0.014 gr/scfd and 4.32 lb/hr, respectively. The allowable concentration is 0.030 gr/scfd. Thus, the emissions from the stack are in compliance. No visible emissions were observed from the stack during any of the tests.

USS
Clairton Works
400 State Street
Clairton, PA 15025

RECEIVED
DEC 19 1990
DEPUTY DIRECTOR'S OFFICE
Bureau of Air Pollution Control

November 14, 1990

Director
Department of Environmental Resources
Bureau of Air Quality Control
Executive House - 2nd & Chestnut Sts.
P.O. Box 2357
Harrisburg, PA 17105-2357

Deputy Director
Allegheny County Health Department
Bureau of Air Pollution Control
301 Thirty-ninth Street
Pittsburgh, PA 15201

U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19017

Office of Chief Counsel
Western Region
Department of Environmental Resources
1303 Highland Building
121 South Highland Avenue
Pittsburgh, PA 15026

Gentlemen:

Subject: Compliance Demonstration
Clairton Batteries #7, 8, 9, 14, and 15

Please find enclosed with this letter the reports on Batteries #7, 8, 9, 14, and 15 compliance mass emission stack tests, conducted at USS Clairton Works, Division of USX Corporation, on August 22, October 2, October 3, June 20, and July 12, 1990 respectively.

Please refer questions concerning these reports to Paul Kiswardy at (412) 233-1046.

Very truly yours,

G. T. Weber, Jr.
General Manager
Clairton Works

GTW/BAC-nt
Attachment

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DEC 14 1990
ENVIRONMENTAL AFFAIRS
U.S. STEEL CORPORATION

1.0 INTRODUCTION

On August 22, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #7 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 Richard Casselberry, Thomas Morgan, and John Shimshock. Visible emissions determinations were performed by Ken Kuiros and 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. The gas volume sampled for each 120 minute test was greater than 50 dry standard cubic feet.

The process exhaust exited through a 114" 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 an acetone rinse of the front-half components. The water soluble and water insoluble portions of the front-half of the sampling train were determined as a total. The rinses were dried, desiccated, and weighed to a constant weight. These weights were added to the filter weights to determine the total catch. These procedures followed the methodology of EPA Method 5.

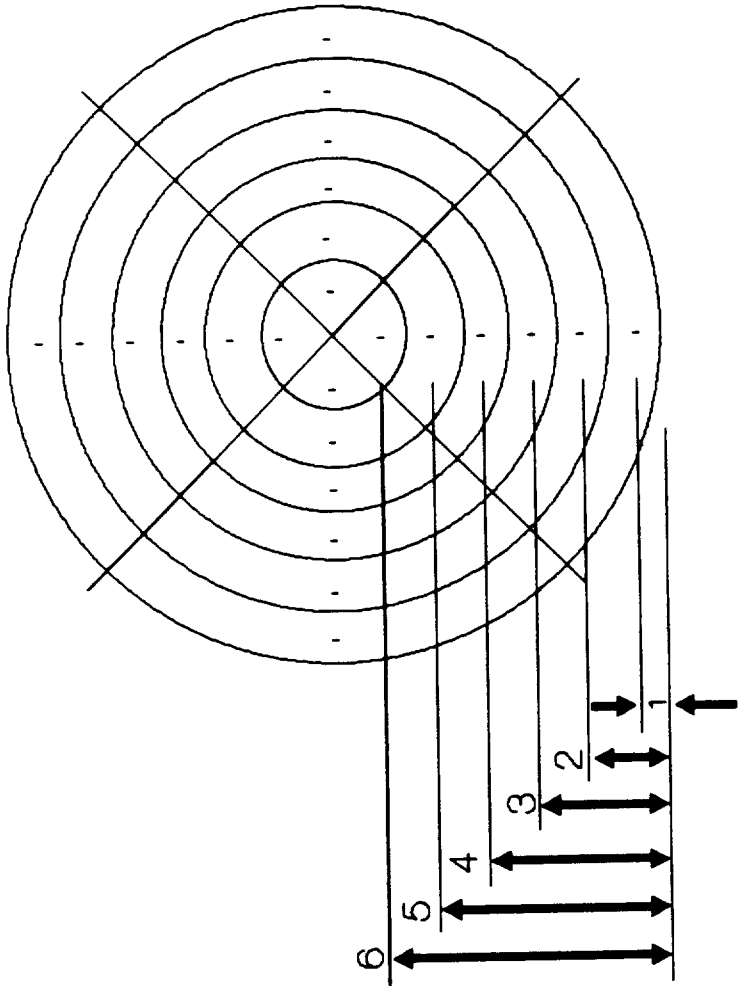
All visible emissions determinations were performed in accordance with EPA Stationary Source Sampling Method 9. Visible emissions were recorded for the duration of each particulate matter test.

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

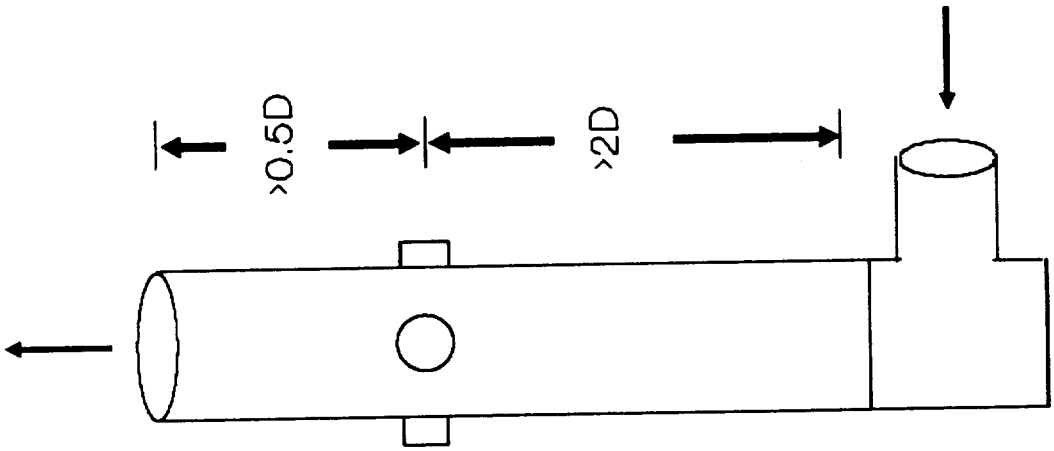
3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146

SKETCH SHEET

	NAME	DATE
DRAWN		
CHECKED		



Traverse Point	Distance (in.)
1	2.4
2	7.6
3	13.5
4	20.2
5	28.5
6	40.6



Stack Diameter (in.) = 114
D

2-1a

ACTIVITY No.

REVISION

TITLE

SCHEMATIC DIAGRAM OF THE STACK AND TRAVERSE POINTS

FIGURE 2-1

RD-157 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 0.014 grains per standard cubic foot dry (gr/scfd) and 4.32 pounds per hour (lb/hr), respectively.

As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the particulate matter standard for #7 Battery Combustion Stack is 0.030 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.

Copies of the field data sheets for the visible emissions determinations can be found in Appendix E. 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

USS CLAIRTON WORKS
CLAIRTON, PA

TABLE 3-1

PARTICULATE MATTER EMISSIONS DATA

EMISSIONS	TEST #1	TEST #2	TEST #3	AVERAGE
gr/dscf	0.014	0.019	0.010	0.014
lb/hr	4.36	5.94	2.67	4.32
STACK CONDITIONS				
Flow (acfm)	78233	75390	66007	73210
Flow (scfm)	42551	40800	35941	39764
Moisture Content (%)	12.10	12.16	11.88	12.05
Stack Temp. (^{o}F)	489	493	488	490
SAMPLING CONDITIONS				
Sampling Time (min)	120	120	120	
Sample Volume (scfd)	59.714	60.955	53.133	
Isokinetics (%)	97.09	100.08	97.81	

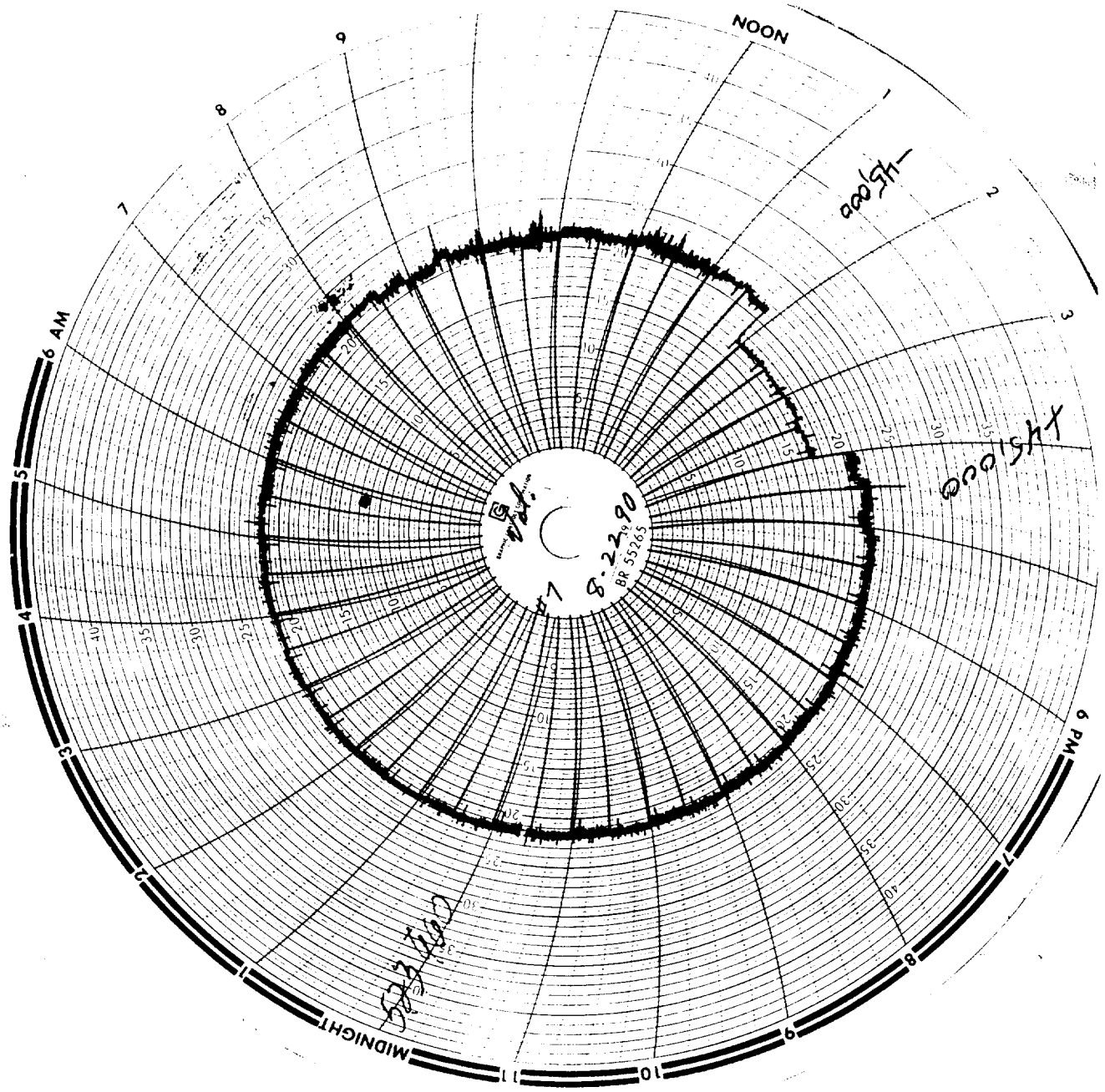
aggregating in excess of 3 minutes in any 60-minute period and shall never equal or exceed 60% opacity. Thus, the emissions are in compliance.

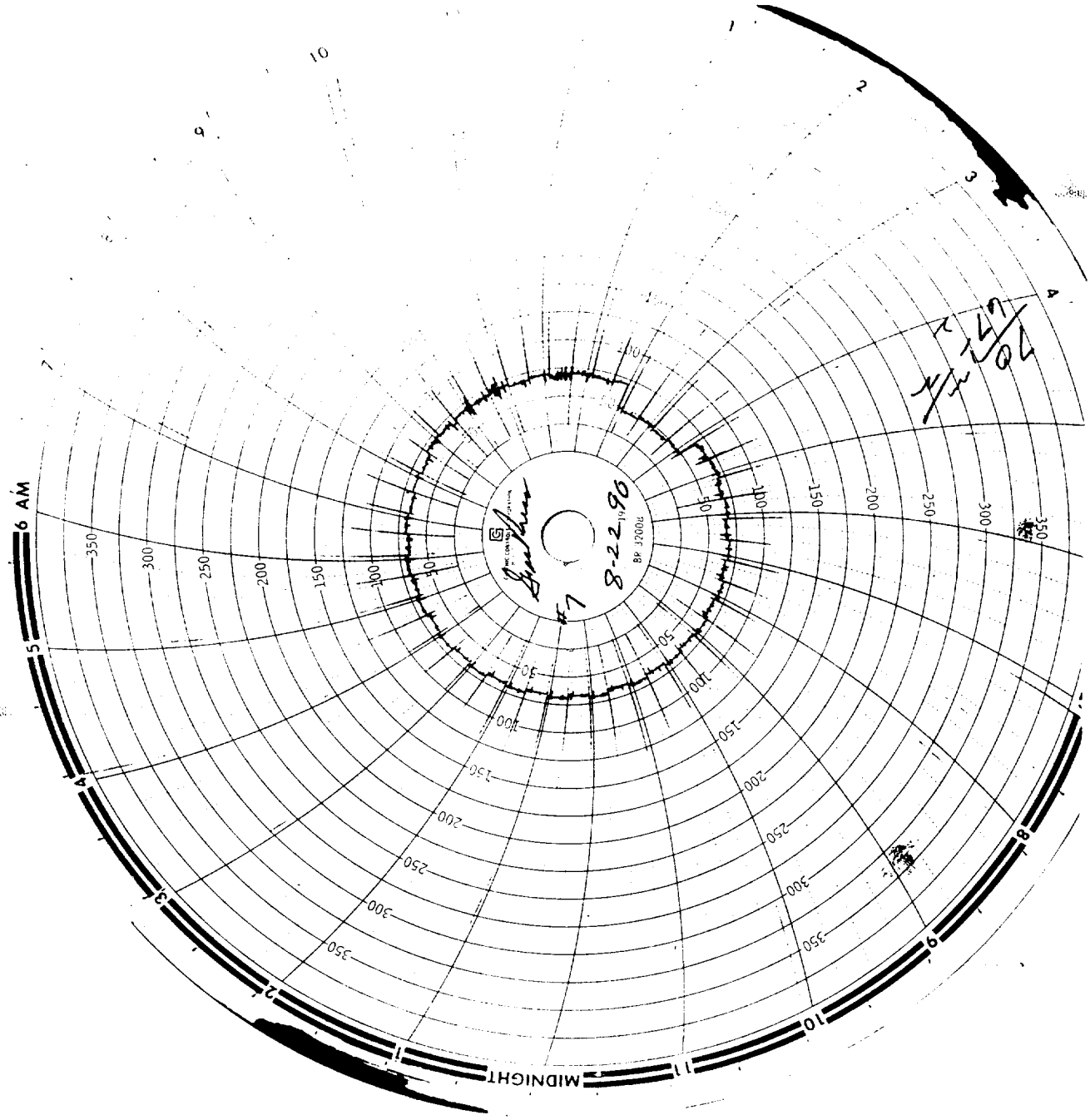
USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION OF THE
#7 BATTERY COMBUSTION STACK

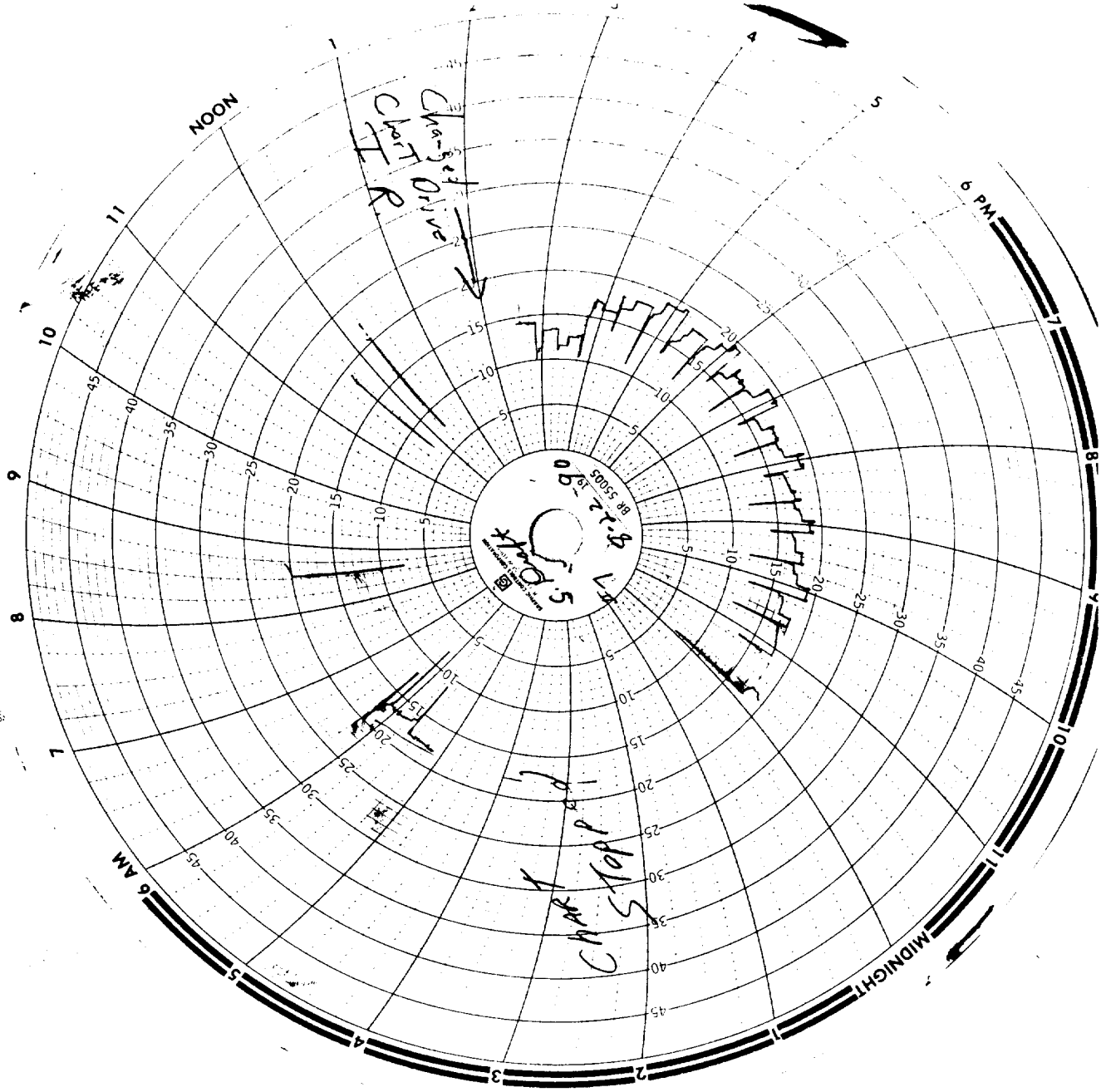
APPENDIX A

OPERATIONAL RECORDS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.


NOON
1
2
3
4
5
6 PM
7
8
9
10
11
MIDNIGHT
1
2
3
4
5
6 AM
7
8
9
8-22-90
BR 55265


6 AM
MIDNIGHT
#1 8-22-90


NOON
6 PM
MIDNIGHT
6 AM
Changed Chart Drive I.R.
Chart Stopped
BR 55005

PUSHING SCHEDULE FOR BATTERIES 7-9

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	A12/ 7	A10/ 7		11:45	12: 0	12:20
2	A12/ 8	A10/ 8		11:51	12: 6	12:26
3	B12/ 7	B10/ 7		11:57	12:12	12:32
4	B31/ 7	A12/ 9		12: 3	12:18	12:38
5	A14/ 9	A12/ 9		12: 9	12:24	12:44
6	B14/ 8	B12/ 8		12:15	12:30	12:50
7	B14/ 9	B12/ 9		12:21	12:36	12:56
8	A14/ 7	A12/ 7		12:27	12:42	1: 2
9	A14/ 8	A12/ 8		12:33	12:48	1: 8
10	B14/ 7	B31/ 7		12:39	12:54	1:14
11	A16/ 9	A14/ 9		12:45	1: 0	1:20
12	B16/ 8	B14/ 8		12:51	1: 6	1:26
13	B16/ 9	B14/ 9		12:57	1:12	1:32
14	A16/ 7	A14/ 7		1: 3	1:18	1:38
15	A16/ 8	A14/ 8		1:10	1:25	1:45
16	B16/ 7	B14/ 7		1:16	1:31	1:51
17	A18/ 9	A16/ 9		1:22	1:37	1:57
18	B18/ 8	B16/ 8		1:28	1:43	2: 3
19	B18/ 9	B16/ 9		1:34	1:49	2: 9
20	A18/ 7	A16/ 7		1:40	1:55	2:15
21	A18/ 8	A16/ 8		1:46	2: 1	2:21
22	B18/ 7	B16/ 7		1:52	2: 7	2:27
23	A20/ 9	A18/ 9		1:58	2:13	2:33
24	B20/ 8	B18/ 8		2: 4	2:19	2:39
25	B20/ 9	B18/ 9		2:10	2:25	2:45
26	A20/ 7	A18/ 7		2:16	2:31	2:51
27	A20/ 8	A18/ 8		2:22	2:37	2:57
28	B20/ 7	B18/ 7		2:29	2:44	3: 4
29	A22/ 9	A20/ 9		2:35	2:50	3:10
30	B22/ 8	B20/ 8		2:41	2:56	3:16
31	B22/ 9	B20/ 9		2:47	3: 2	3:22
32	A22/ 7	A20/ 7		2:53	3: 8	3:28
33	A22/ 8	A20/ 8		2:59	3:14	3:34
34	B22/ 7	B20/ 7		3: 5	3:20	3:40
35	A24/ 9	A22/ 9		3:11	3:26	3:46
36	B24/ 8	B22/ 8		3:17	3:32	3:52
37	B24/ 9	B22/ 9		3:23	3:38	3:58
38	A24/ 7	A22/ 7		3:29	3:44	4: 4
39	A24/ 8	A22/ 8		3:35	3:50	4:10
40	B24/ 7	B22/ 7		3:41	3:56	4:16
41	A26/ 9	A24/ 9		3:48	4: 3	4:23
42	B26/ 8	B24/ 8		3:54	4: 9	4:29
43	B26/ 9	B24/ 9		4: 0	4:15	4:35
44	A26/ 7	A24/ 7		4: 6	4:21	4:41
45	A26/ 8	A24/ 8		4:12	4:27	4:47
46	B26/ 7	B24/ 7		4:18	4:33	4:53
47	A28/ 9	A26/ 9		4:24	4:39	4:59
48	B28/ 8	B26/ 8		4:30	4:45	5: 5
49	B28/ 9	B26/ 9		4:36	4:51	5:11
50	A28/ 7	A26/ 7		4:42	4:57	5:17
51	A28/ 8	A26/ 8		4:48	5: 3	5:23
52	B28/ 7	B26/ 7		4:54	5: 9	5:29
53	A30/ 9	A28/ 9		5: 0	5:15	5:35
54	B30/ 8	B28/ 8		5: 7	5:22	5:42
55	B30/ 9	B28/ 9		5:13	5:28	5:48
56	A30/ 7	A28/ 7		5:19	5:34	5:54
57	A30/ 8	A28/ 8		5:25	5:40	6: 0
58	B30/ 7	B28/ 7		5:31	5:46	6: 6
59	A 1/ 9	B30/ 9		5:37	5:52	6:12
60	B 1/ 9	A30/ 9		5:43	5:58	6:18
61	C 1/ 8	B30/ 8		5:49	6: 4	6:24
62	C 1/ 9	A30/ 8		5:55	6:10	6:30
63	A 1/ 7	A30/ 7		6: 1	6:16	6:36
64	A 1/ 8	A 1/ 9		6: 7	6:22	6:42
65	B 1/ 7	B30/ 7		6:13	6:28	6:48
66	B 1/ 8	B 1/ 9		6:19	6:34	6:54
67	A 3/ 7	A 1/ 7		6:26	6:41	7: 1
68	B 3/ 8	C 1/ 8		6:32	6:47	7: 7
69	B 3/ 9	B 1/ 8		6:38	6:53	7:13
70	A 3/ 7	C 1/ 9		6:44	6:59	7:19
71	A 3/ 8	B 1/ 7		6:50	7: 5	7:25
72	B 3/ 7	A 1/ 8		6:56	7:11	7:31
73	A 5/ 9	A 3/ 9		7: 2	7:17	7:37
74	B 5/ 8	B 3/ 8		7: 8	7:23	7:43
75	B 5/ 9	B 3/ 9		7:14	7:29	7:49
76	A 5/ 7	A 3/ 7		7:20	7:35	7:55
77	A 5/ 8	A 3/ 8		7:26	7:41	8: 1
78	B 5/ 7	B 3/ 7		7:32	7:47	8: 7
79	A 7/ 9	A 5/ 9		7:38	7:53	8:10

WED AUG 22 1990 12X 8 TURN

PUSHING SCHEDULE FOR BATTERIES 7-9

EQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	B 7/ 8	B 5/ 8		7:45	8: 0	8:20
2	B 7/ 9	B 5/ 9		7:51	8: 6	8:26
3	A 7/ 7	A 5/ 7		7:57	8:12	8:32
4	A 7/ 8	A 5/ 8		8: 3	8:18	8:38
5	B 7/ 7	B 5/ 7		8: 9	8:24	8:44
6	A 9/ 9	A 7/ 9		8:16	8:31	8:51
7	B 9/ 8	B 7/ 8		8:22	8:37	8:57
8	B 9/ 9	B 7/ 9		8:28	8:43	9: 3
9	A 9/ 7	A 7/ 7		8:34	8:49	9: 9
10	A 9/ 8	A 7/ 8		8:41	8:56	9:16
11	B 9/ 7	B 7/ 7		8:47	9: 2	9:22
12	A11/ 9	A 9/ 9		8:53	9: 8	9:28
13	B11/ 8	B 9/ 8		8:59	9:14	9:34
14	B11/ 9	B 9/ 9		9: 6	9:21	9:41
15	A11/ 7	A 9/ 7		9:12	9:27	9:47
16	A11/ 8	A 9/ 8		9:18	9:33	9:53
17	B11/ 7	B 9/ 7		9:24	9:39	9:59
18	A13/ 9	A11/ 9		9:30	9:45	10: 5
19	B13/ 8	B11/ 8		9:37	9:52	10:12
20	B13/ 9	B11/ 9		9:43	9:58	10:18
21	A13/ 7	A11/ 7		9:49	10: 4	10:24
22	A13/ 8	A11/ 8		9:55	10:10	10:30
23	B13/ 7	B11/ 7		10: 2	10:17	10:37
24	A15/ 9	A13/ 9		10: 8	10:23	10:43
25	B15/ 8	B13/ 8		10:14	10:29	10:49
26	B15/ 9	B13/ 9		10:20	10:35	10:55
27	A15/ 7	A13/ 7		10:27	10:42	11: 2
28	A15/ 8	A13/ 8		10:33	10:48	11: 8
29	B15/ 7	B13/ 7		10:39	10:54	11:14
30	A17/ 9	A15/ 9		10:45	11: 0	11:20
31	B17/ 8	B15/ 8		10:52	11: 7	11:27
32	B17/ 9	B15/ 9		10:58	11:13	11:33
33	A17/ 7	A15/ 7		11: 4	11:19	11:39
34	A17/ 8	A15/ 8		11:10	11:25	11:45
35	A19/ 9	A17/ 9		11:16	11:31	11:51
36	B19/ 8	B17/ 8		11:23	11:38	11:58
37	B19/ 9	B17/ 9		11:29	11:44	12: 4
38	A19/ 7	A17/ 7		11:35	11:50	12:10
39	A19/ 8	A17/ 8		11:41	11:56	12:16
40	B19/ 7	B17/ 7		11:48	12: 3	12:23
41	A21/ 9	A19/ 9		11:54	12: 9	12:29
42	B21/ 8	B19/ 8		12: 0	12:15	12:35
43	B21/ 9	B19/ 9		12: 6	12:21	12:41
44	A21/ 7	A19/ 7		12:13	12:28	12:48
45	A21/ 8	A19/ 8		12:19	12:34	12:54
46	B21/ 7	B19/ 7		12:25	12:40	1: 0
47	A23/ 9	A21/ 9		12:31	12:46	1: 6
48	B23/ 8	B21/ 8		12:37	12:52	1:12
49	B23/ 9	B21/ 9		12:44	12:59	1:19
50	A23/ 7	A21/ 7		12:50	1: 5	1:25
51	A23/ 8	A21/ 8		12:56	1:11	1:31
52	B23/ 7	B21/ 7		1: 2	1:17	1:37
53	B25/ 8	B23/ 8		1: 9	1:24	1:44
54	B25/ 9	B23/ 9		1:15	1:30	1:50
55	A25/ 7	A23/ 7		1:21	1:36	1:56
56	A25/ 8	A23/ 8		1:27	1:42	2: 2
57	B25/ 7	B23/ 7		1:34	1:49	2: 9
58	A27/ 9	A25/ 9		1:40	1:55	2:15
59	B27/ 8	B25/ 8		1:46	2: 1	2:21
60	B27/ 9	B25/ 9		1:52	2: 7	2:27
61	A27/ 7	A25/ 7		1:59	2:14	2:34
62	A27/ 8	A25/ 8		2: 5	2:20	2:40
63	B27/ 7	B25/ 7		2:11	2:26	2:46
64	A29/ 9	A27/ 9		2:17	2:32	2:52
65	B29/ 8	B27/ 8		2:23	2:38	2:58
66	B29/ 9	B27/ 9		2:30	2:45	3: 5
67	A29/ 7	A27/ 7		2:36	2:51	3:11
68	A29/ 8	A27/ 8		2:42	2:57	3:17
69	B29/ 7	B27/ 7		2:48	3: 3	3:23
70	A31/ 9	A29/ 9		2:55	3:10	3:30
71	B31/ 8	B29/ 8		3: 1	3:16	3:36
72	B31/ 9	B29/ 9		3: 7	3:22	3:42
73	A31/ 7	A29/ 7		3:13	3:28	3:48
74	A31/ 8	A29/ 8		3:20	3:35	3:55
75	B31/ 7	B29/ 7		3:26	3:41	4: 1
76	A 2/ 9	B31/ 9		3:32	3:47	4: 7
77	B 2/ 8	A31/ 8		3:38	3:53	4:10

WED AUG 22 1990 8X 4 TURN

PUSHING SCHEDULE FOR BATTERIES 7-9

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	A31/ 7	A29/ 7		3:45	4: 0	4:20
2	A31/ 8	A29/ 8		3:51	4: 6	4:26
3	A 2/ 9	B31/ 9		3:57	4:12	4:32
4	B 2/ 8	A31/ 8		4: 3	4:18	4:38
5	B 2/ 9	A31/ 9		4: 9	4:24	4:44
6	C 2/ 8	B31/ 8		4:15	4:30	4:50
7	C 2/ 9	A 2/ 9		4:21	4:36	4:56
8	A 2/ 7	B31/ 7		4:27	4:42	5: 2
9	A 2/ 8	B 2/ 8		4:33	4:48	5: 8
10	B 2/ 7	A31/ 7		4:39	4:54	5:14
11	A 4/ 9	A 2/ 7		4:45	5: 0	5:20
12	B 4/ 8	C 2/ 9		4:51	5: 6	5:26
13	B 4/ 9	C 2/ 8		4:57	5:12	5:32
14	A 4/ 7	B 2/ 9		5: 3	5:18	5:38
15	A 4/ 8	A 2/ 8		5:10	5:25	5:45
16	B 4/ 7	B 2/ 7		5:16	5:31	5:51
17	A 6/ 9	A 4/ 9		5:22	5:37	5:57
18	B 6/ 8	B 4/ 8		5:28	5:43	6: 3
19	B 6/ 9	B 4/ 9		5:34	5:49	6: 9
20	A 6/ 7	A 4/ 7		5:40	5:55	6:15
21	A 6/ 8	A 4/ 8		5:46	6: 1	6:21
22	B 6/ 7	B 4/ 7		5:52	6: 7	6:27
23	A 8/ 9	A 6/ 9		5:58	6:13	6:33
24	B 8/ 8	B 6/ 8		6: 4	6:19	6:39
25	B 8/ 7	B 6/ 9		6:10	6:25	6:45
26	A 8/ 7	A 6/ 7		6:16	6:31	6:51
27	A 8/ 8	A 6/ 8		6:22	6:37	6:57
28	B 8/ 7	B 6/ 7		6:29	6:44	7: 4
29	A10/ 9	A 8/ 9		6:35	6:50	7:10
30	B10/ 8	B 8/ 8		6:41	6:56	7:16
31	B10/ 9	B 8/ 9		6:47	7: 2	7:22
32	A10/ 7	A 8/ 7		6:53	7: 8	7:28
33	A10/ 8	A 8/ 8		6:59	7:14	7:34
34	B10/ 7	B 8/ 7		7: 5	7:20	7:40
35	A12/ 9	A10/ 9		7:11	7:26	7:46
36	B12/ 8	B10/ 8		7:17	7:32	7:52
37	B12/ 9	B10/ 9		7:23	7:38	7:58
38	A12/ 7	A10/ 7		7:29	7:44	8: 4
39	A12/ 8	A10/ 8		7:35	7:50	8:10
40	B12/ 7	B10/ 7		7:41	7:56	8:16
41	A14/ 9	A12/ 9		7:48	8: 3	8:23
42	B14/ 8	B12/ 8		7:54	8: 9	8:29
43	B14/ 9	B12/ 9		8: 0	8:15	8:35
44	A14/ 7	A12/ 7		8: 6	8:21	8:41
45	A14/ 8	A12/ 8		8:12	8:27	8:47
46	B14/ 7	B12/ 7		8:18	8:33	8:53
47	A16/ 9	A14/ 9		8:24	8:39	8:59
48	B16/ 8	B14/ 8		8:30	8:45	9: 5
49	B16/ 9	B14/ 9		8:36	8:51	9:11
50	A16/ 7	A14/ 7		8:42	8:57	9:17
51	A16/ 8	A14/ 8		8:48	9: 3	9:23
52	B16/ 7	B14/ 7		8:54	9: 9	9:29
53	A18/ 9	A16/ 9		9: 0	9:15	9:35
54	B18/ 8	B16/ 8		9: 7	9:22	9:42
55	B18/ 9	B16/ 9		9:13	9:28	9:48
56	A18/ 7	A16/ 7		9:19	9:34	9:54
57	A18/ 8	A16/ 8		9:25	9:40	10: 0
58	B18/ 7	B16/ 7		9:31	9:46	10: 6
59	A20/ 9	A18/ 9		9:37	9:52	10:12
60	B20/ 8	B18/ 8		9:43	9:58	10:18
61	B20/ 9	B18/ 9		9:49	10: 4	10:24
62	A20/ 7	A18/ 7		9:55	10:10	10:30
63	A20/ 8	A18/ 8		10: 1	10:16	10:36
64	B20/ 7	B18/ 7		10: 7	10:22	10:42
65	A22/ 9	A20/ 9		10:13	10:28	10:48
66	B22/ 8	B20/ 8		10:19	10:34	10:54
67	B22/ 9	B20/ 9		10:26	10:41	11: 1
68	A22/ 7	A20/ 7		10:32	10:47	11: 7
69	A22/ 8	A20/ 8		10:38	10:53	11:13
70	B22/ 7	B20/ 7		10:44	10:59	11:19
71	A24/ 9	A22/ 9		10:50	11: 5	11:25
72	B24/ 8	B22/ 8		10:56	11:11	11:31
73	B24/ 9	B22/ 9		11: 2	11:17	11:37
74	A24/ 7	A22/ 7		11: 8	11:23	11:43
75	A24/ 8	A22/ 8		11:14	11:29	11:49
76	B24/ 7	B22/ 7		11:20	11:35	11:55
77	A26/ 9	A24/ 9		11:26	11:41	12: 1
78	B26/ 8	B24/ 8		11:32	11:47	12: 7
79	B26/ 9	B24/ 9		11:38	11:53	12:10

WED AUG 22 1990 4X12 TURN

.MSCAN *RUNTIME ERROR* 0494 @ 36232

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

APPENDIX B

PRE-TEST AND POST-TEST
CALIBRATION AND AUDIT RESULTS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

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	PRESSURE T_O	DRY TEST METER TEMP IN T_A	TEMP OUT P_D	TEMP AVG V_D	ORIFICE Y	ORIFICE $H_@$	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	9-4-90
BP	29.15
OPERATOR	KS

	TIME	WET TEST METER TEMP T_W	WET TEST METER VOLUME V_M	WET TEST METER PRESSURE P_W	DRY TEST METER PRESSURE T_I	DRY TEST METER PRESSURE T_O	DRY TEST METER TEMP IN T_A	DRY TEST METER TEMP OUT P_D	DRY TEST METER TEMP AVG V_D	ORIFICE Y	ORIFICE H_a	VOLUME	METER CORRECT	ORIFICE COEIFFICE
START				0.000		29.15					0.75	724.000		
HALF			78.0				96.0	95.0	95.5					
STOP	10.18			5.000								729.124		
CALCULATION	10.18		538.0	5.057		29.15				555.5	29.21	5.124	1.0170	1.722
START				0.000		29.15					0.75	729.700		
HALF			78.0				98.0	94.0	96.0					
STOP	10.20			5.000								734.827		
CALCULATION	10.20		538.0	5.057		29.15				556.0	29.21	5.127	1.0173	1.728
START				0.000		29.15					0.75	735.100		
HALF			78.0				98.0	94.0	96.0					
STOP	13.13			6.500								741.777		
CALCULATION	13.13		538.0	6.573		29.15				556.0	29.21	6.677	1.0155	1.694
AVERAGE													1.0166	1.715
DIFFERENCE													3.48%	-8.29%

MAGNAHELIC CALIBRAATION

DATE 9-4-90

OPERATOR MGG

P 0-10		P 0-.5		H	
MAGNEHILIC	MANOMETER	MAGNEHILIC	MANOMETER	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 9-4-90

OPERATOR KS

	START CF	STOP CF	VOL	TIME	LEAK RATE
DRY	722.690	722.977	0.287	10.000	0.015
WET	0.000	0.434	0.434		

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	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

Name: KEYSTONE ENV. RES. Phone: 825-976

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	353.06
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	76.5 536.5	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.

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

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

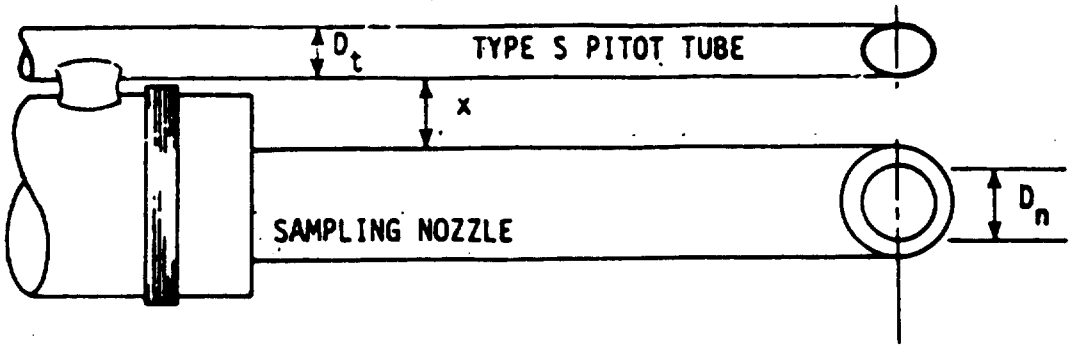
- -

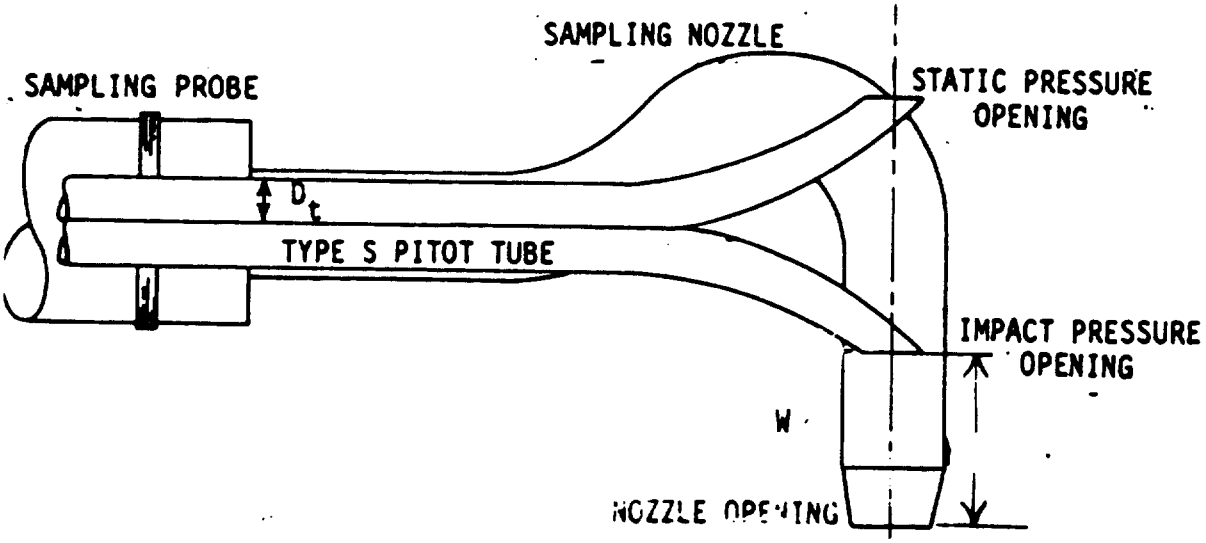
(To Be Completed By Auditor)

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

% A = _____ x 100

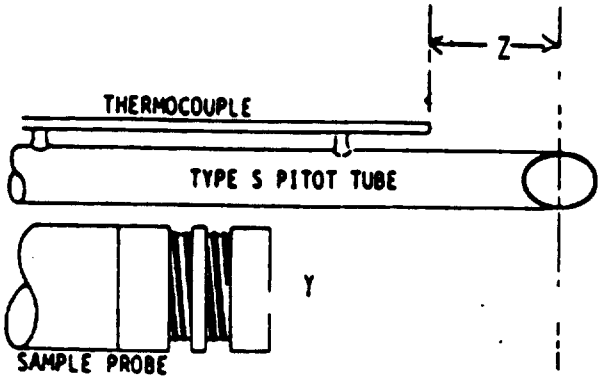
% A = _____ %





D_n = Nozzle diameter

D_t = 3/16 to 3/8"



$W \geq 0$

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

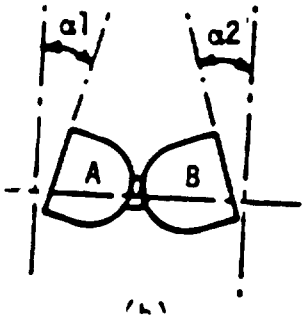
$Y \geq$ 3"

$Z \geq$ 2"

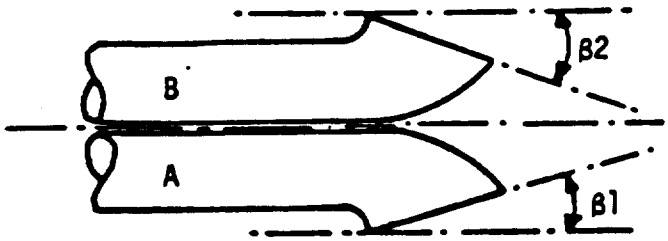
Probe No. 7-1
Date 8-20-90
Initials GM
preclock

GEOMETRIC PITOT CALIBRATION

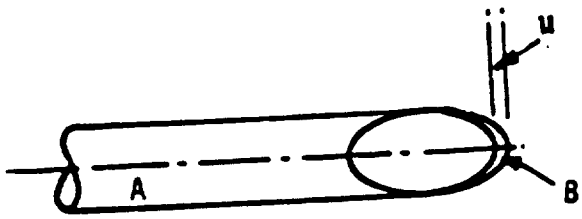
$\alpha 1$ = 4°
$\alpha 2$ = 1°
$\beta 1$ = 3°
$\beta 2$ = 0°
A = 1.055
μ = .036
V = .036
W = ≥ 0
X = .828
Y = ≥ 3
Z = ≥ 2
D_t = 38



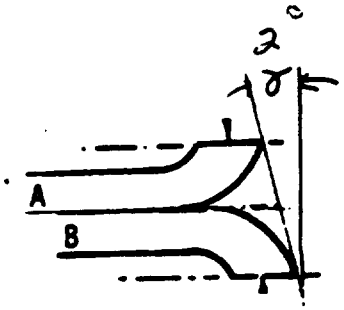
$\alpha 1, \alpha 2 < 10°$

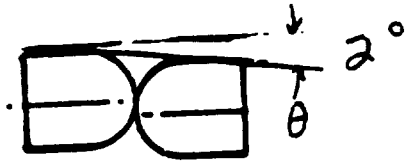


$\beta 1, \beta 2 < 5$



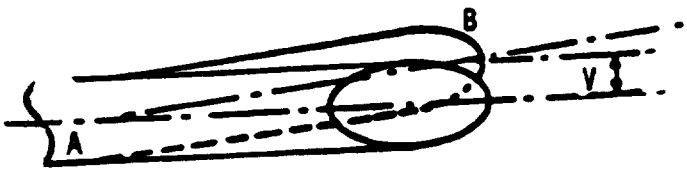
(f)



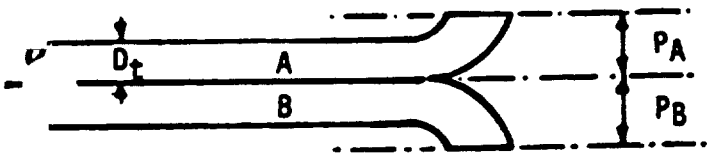


$2°$ $\mu = A \sin \gamma$

$2°$ $V = A \sin \Theta$



A-SIDE PLANE



B-SIDE PLANE

405 .579

$1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

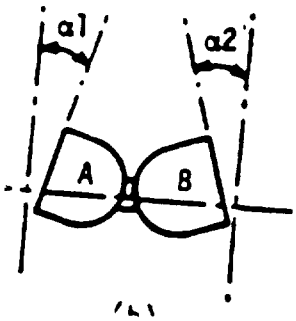
$2.10\ D_t < A < 3.00\ D_t$

.811 1.16

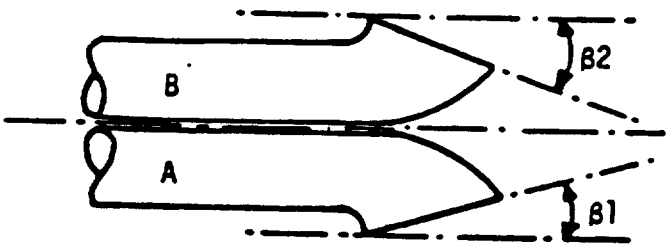
GEOMETRIC PITOT CALIBRATION

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

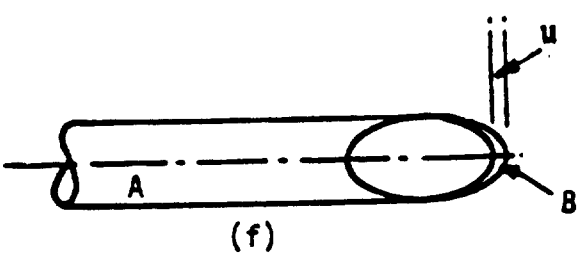
$\alpha 1$ = 2°
$\alpha 2$ = 2°
$\beta 1$ = 1°
$\beta 2$ = 0°
A = .961
μ = .016
V = .067
W = ≥0
X = .945
Y = ≥3"
Z = ≥2"
D_t = .327



$\alpha 1, \alpha 2 < 10°$



$\beta 1, \beta 2 < 5$



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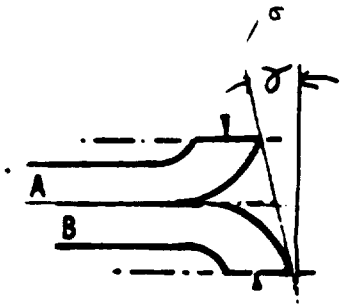
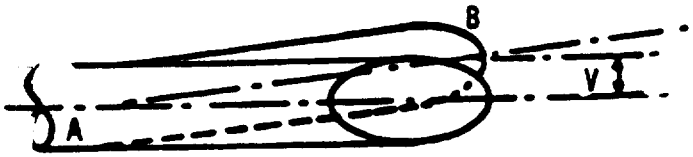
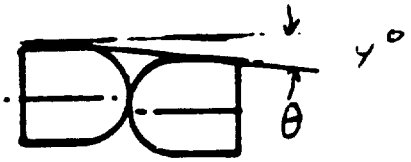


$\mu = A \sin \gamma$

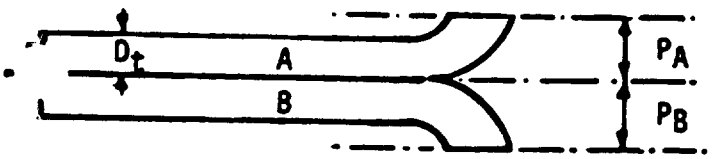
$V = A \sin \theta$





A-SIDE PLANE

.385 .565



$1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

$2.10\ D_t < A < 3.00\ D_t$

B-SIDE PLANE

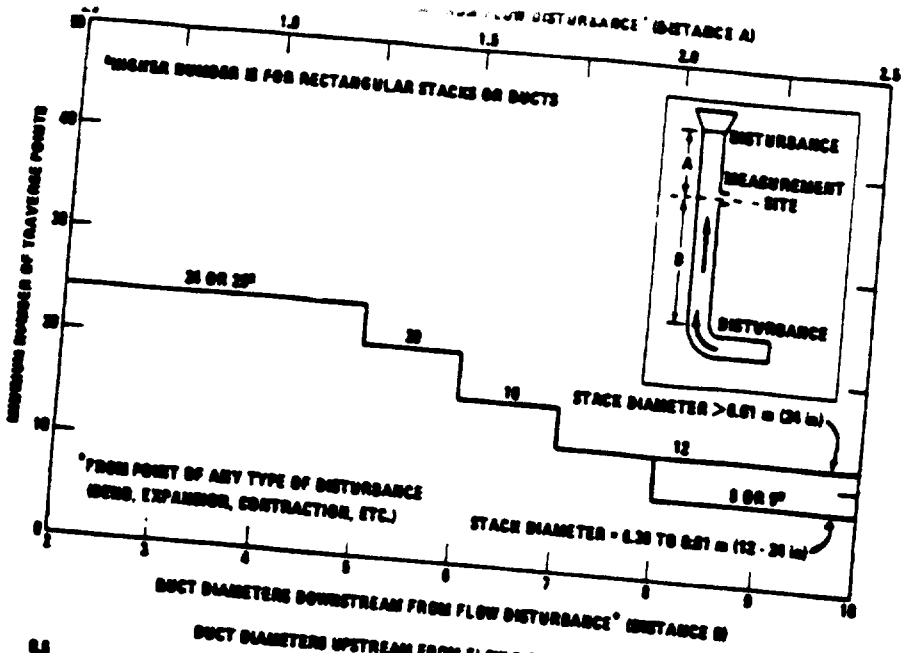
.791 1.13

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

APPENDIX C

FIELD DATA SHEETS
FOR PARTICULATE MATTER EMISSIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.



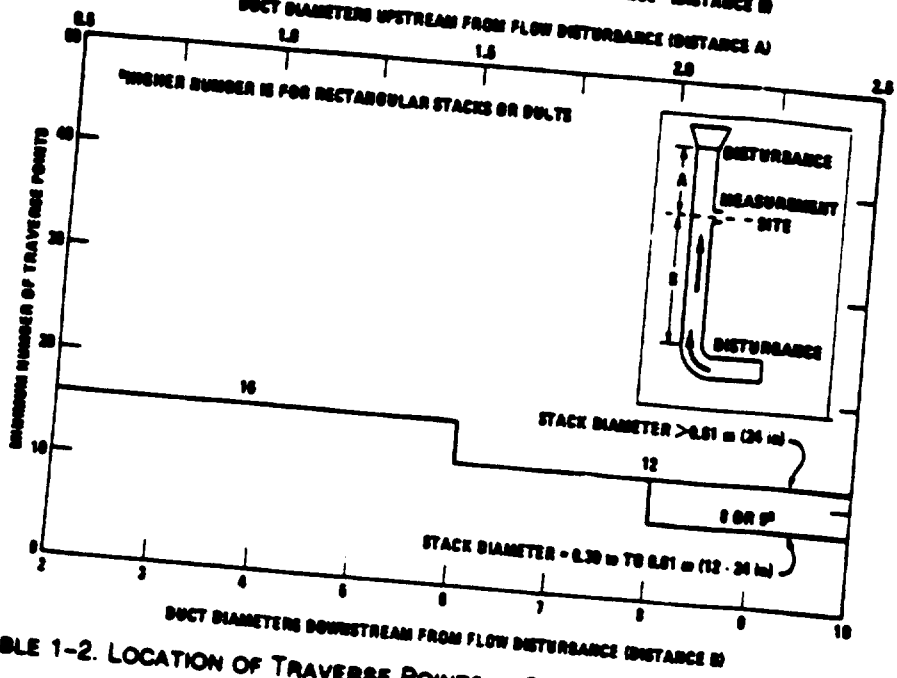


TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[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				96.8	86.4	75.0	63.4	37.5	29.6	25.0	21.6	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	38.8	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	76.4	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												96.6
24												98.9

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

Number of traverse points	Matrix layout
9	3 x 3
12	3 x 4
16	4 x 4
20	4 x 5
25	5 x 5
30	5 x 6
36	6 x 6
42	6 x 7
49	7 x 7

5 4

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
LOCATION: #7 Battery Combustion
ACTIVITY NO.: Stack
CONTROL BOX OPERTOR:
PROBE HANDLER:
CLEAN UP:

DATE: 8/22/90
TEST NO.: CLR 7CS-1
NOZZLE: #1 0.422
STATIC PRESSURE Ps: -1.0
PORT DIRECTION: A, B
BAROMETRIC PRESSURE: 29.31

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.: 1
COLD BOX NO.: 1
PROBE NO.: 7-1
FILTER NO.: 438
STACK DIA.: 114"

	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	40.6	0840	353.125	0.060	0.77	0.77	66	64	4.0	489	260	<68°F Ice Bath	250	5 min/pt
	28.5			0.065	0.83	0.83	73	66	4.5	497				
	20.2			0.055	0.71	0.71	76	68	4.0	503				
	13.5			0.055	0.71	0.71	78	70	4.0	507				
	7.6			0.030	0.38	0.38	79	72	3.0	453				
	2.4	0910	366.876	0.035	0.45	0.45	80	73	3.0	422				
B	40.6	0926	366.876	0.065	0.83	0.83	80	77	4.0	505				
	28.5			0.065	0.82	0.82	83	77	4.0	535				
	20.2			0.065	0.82	0.82	85	77	4.0	539				
	13.5			0.040	0.50	0.50	84	78	3.0	488				
	7.6			0.025	0.32	0.32	84	78	2.0	462				
	2.4	0956	379.517	0.010	0.13	0.13	83	78	1.0	438	[redacted]	66°F		

C-2

LEAK CHECK

	in. Hg.	Rate
Before	5.0	<0.02 cfm
After	6.0	<0.02

ORSAT

	1	2
CO_2	3.5	
O_2	13.5	
CO	0.0	
N	[illegible]	

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference	
1	665.9	522.8	143.1	100 ml H_2O
2	584.0	564.3	19.7	100 ml H_2O
3	436.1	434.8	1.3	empty
4	650.5	640.2	10.3	silica gel

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
LOCATION: #7 Battery Combustion
ACTIVITY NO.: Stack
CONTROL BOX OPERTOR:
PROBE HANDLER:
CLEAN UP:

DATE: 8/22/90
TEST NO.: CUR - 7CS 1
NOZZLE: #1 0.422
STATIC PRESSURE Ps: -1.0
PORT DIRECTION: C, D
BAROMETRIC PRESSURE: 29.31

ΔH@: ~~1.573~~ 1.573
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.: 1
COLD BOX NO.: 1
PROBE NO.: 7-1
FILTER NO.: 438
STACK DIA.: 114"

	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	40.6	1007	379.517	0.080	1.06	1.06	83	81	5.0	481	260	<68°F Iced Down	250	5 min/pt
	28.5			0.095	1.25	1.25	87	81	6.0	503				
	20.2			0.095	1.25	1.25	89	80	6.0	511				
	13.5			0.075	0.99	0.99	88	80	5.0	516		58°F		
	7.6			0.065	0.86	0.86	87	80	4.0	482				
	2.4	1037	396.201	0.045	0.59	0.59	87	80	3.5	499				
D	40.6	1041	396.201	0.090	1.19	1.19	85	82	6.0	481				
	28.5			0.090	1.19	1.19	89	82	6.0	496				
	20.2			0.090	1.19	1.19	90	81	6.0	502				
	13.5			0.080	1.06	1.06	90	81	6.0	507				
	7.6			0.045	0.59	0.59	88	81	4.0	469				
	2.4	1111	412.259	0.010	0.13	0.13	87	82	2.0	441				

C-3

LEAK CHECK

	in. Hg.	Rate
fore		
ter		

ORSAT

	1	2
CO_2	~~13.5~~	
O_2	~~3.0~~	
CO	~~0.0~~	
N	~~0.0~~	

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: 8/22/90
ΔH@: 1.573
HOT BOX NO.: 7
LOCATION: #7 Battery Combustion
TEST NO.: CLR-7CS-2
METER CORRECTION: 1.0519
COLD BOX NO.: 4
ACTIVITY NO.: Stack
NOZZLE: #56 0.429
PITOT CORRECTION: 0.84
PROBE NO.: 7 3
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -1.0
CONTROL BOX NO.: 1
FILTER NO.: 424
PROBE HANDLER:
PORT DIRECTION: A,B
NOMOGRAPH SET POINT:
STACK DIA.: 114"
CLEAN UP:
BAROMETRIC PRESSURE: 29.31
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	40.6	1147	412.700	0.070	0.98	0.98	80	80	5.0	498	260	46.8°F Ice Bath	250	5 min/pt
	28.5			0.060	0.84	0.84	86	80	4.5	508				
	20.2			0.065	0.91	0.91	87	80	4.5	512				
	13.5			[illegible]	0.70	0.70	87	80	4.0	513				
	7.6			[illegible]	0.21	0.21	85	80	1.5	481				
	2.4	1217	426.482	0.010	0.14	0.14	85	80	1.5	468				
B	40.6	1227	426.482	0.070	0.98	0.98	85	82	5.0	514				
	28.5			0.070	0.98	0.98	89	81	5.0	529				
	20.2			0.075	1.05	1.05	89	81	5.5	536				
	13.5			0.045	0.63	0.63	81	82	4.0	487				
	7.6			0.020	0.28	0.28	87	82	2.0	479				
	2.4	1252	440.342	0.010	0.14	0.14	87	82	2.0	460				

LEAK CHECK

	in. Hg.	Rate
Before	5.0	[illegible] cfm
After	[illegible]	0.015

ORSAT

	1	2
CO_2	3.0	3.5
O_2	13.5	13.5
CO	0.0	0.0
N	[illegible]	[illegible]

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference	
1	711.9 [redacted]	567.2	144.7	100 ml H_2O
2	554.0	533.1	20.9	100 ml H_2O
3	449.8	447.4	2.4	empty
4	646.9	636.0	10.9	silica gel

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
DATE: 8/22/90
ΔH@: 1.573
HOT BOX NO.: 4
LOCATION: #7 Battery Combustion
TEST NO.: CLR 7CS-2
METER CORRECTION: 1.0519
COLD BOX NO.: 4
ACTIVITY NO.: 1 Stack
NOZZLE: #56 0.429
PITOT CORRECTION: 0.84
PROBE NO.: 7-3
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -1.0
CONTROL BOX NO.: 1
FILTER NO.: 424
PROBE HANDLER:
PORT DIRECTION: C,D
NOMOGRAPH SET POINT:
STACK DIA.: 114"
CLEAN UP:
BAROMETRIC PRESSURE: 29.31
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
40.6	1258	440.342	0.090	1.26	1.26	87	84	6.5	500	260	<68°F Ice down	250	5 min/pt
28.5			0.100	1.41	1.41	92	84	7.0	517				
20.2			0.095	1.34	1.34	92	83	7.0	490				
13.5			0.080	1.13	1.13	92	83	6.0	503				
7.6			0.060	0.85	0.85	91	83	5.0	501				
2.4	1328	457.949	0.020	0.28	0.28	89	83	2.0	444				
40.6	1331	457.949	0.070	0.99	0.99	89	85	5.0	503		55°F		
28.5			0.090	1.27	1.27	92	85	6.5	486				
20.2			0.090	1.27	1.27	93	84	6.5	488				
13.5			0.080	1.13	1.13	93	84	6.0	495				
7.6			0.025	0.35	0.35	91	84	3.0	465				
2.4	1401	473.648	0.010	0.14	0.14	89	85	2.0	443				

C-5

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			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
DATE: 8/22/90
ΔH@: 1.573
HOT BOX NO.: 6
LOCATION: #7 Battery Combustion
TEST NO.: CLR-7CS-3
METER CORRECTION: 1.0579
COLD BOX NO.: 6
ACTIVITY NO.: Stack
NOZZLE: #50 0.431
PITOT CORRECTION: 0.84
PROBE NO.: 7 1
CONTROL BOX OPERTOR:
STATIC PRESSURE Ps: -10
CONTROL BOX NO.: 1
FILTER NO.: 423
PROBE HANDLER:
PORT DIRECTION: A-B
NOMOGRAPH SET POINT:
STACK DIA.: 114"
CLEAN UP:
BAROMETRIC PRESSURE: 29.31
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

	Point	Time	Meter Reading (dry) CF	Velocity HD in. H_2O	Orifice ΔH in. H_2O Req.	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	40.6	1435	473.845	0.055	0.79	0.79	86	85	6.0	524	260	<68°F Ice Bath	252	5 min/pt
	28.5			0.055	0.79	0.79	91	85	6.0	481				
	20.2			0.050	0.72	0.72	92	85	6.0	487				
	13.5			0.040	0.57	0.57	91	85	5.0	490				
	7.0			0.030	0.43	0.43	91	85	4.5	483				
	2.4	1505	486.862	0.010	0.14	0.14	90	86	2.5	471				
B	40.6	1507	486.862	0.045	0.65	0.65	90	86	5.5	470				
	28.5			0.040	0.58	0.58	93	86	5.0	492				
	20.2			0.030	0.43	0.43	92	87	4.0	499				
	13.5			0.030	0.43	0.43	92	87	4.0	500		49°F		
	7.6			0.020	0.29	0.29	92	87	3.5	481				
	2.4	1537	497.867	0.010	0.14	0.14	91	87	2.5	460				

LEAK CHECK

	in. Hg.	Rate
Before	5.0	<0.02 cfm
After	7.5	0.014 cfm

ORSAT

	1	2
CO_2	3.0	4.0
O_2	13.0	14.0
CO	0.0	0.0
N	0.0	0.0

PITOT LEAK CHECK

POS.	NEG.

Impinger No.	Final	Initial	Difference	
1	626.1	504.2	121.9	Ice and H_2O
2	578.7	559.8	18.9	Ice and H_2O
3	453.8	451.8	2.0	empty
4	667.2	658.1	9.1	Silica Gel

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton
LOCATION: #7 Battery Combustion Stack
ACTIVITY NO.:
CONTROL BOX OPERTOR:
PROBE HANDLER:
CLEAN UP:

DATE: 8/22/90
TEST NO.: CLR-7CS-3
NOZZLE: # 50 0.431
STATIC PRESSURE Ps: -1.0
PORT DIRECTION: C,D
BAROMETRIC PRESSURE: 29.31

ΔH@: 1.573
METER CORRECTION: 1.0579
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

HOT BOX NO.: 6
COLD BOX NO.: 6
PROBE NO.: 7 1
FILTER NO.: 423
STACK DIA.: 114"

	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	40.6	1540	497.867	0.065	0.94	0.94	91	87	7.0	463	260	<68°F Freed down	250	5 min/pt
	28.5			0.055	0.80	0.80	94	87	6.5	486				
	20.2			0.060	0.87	0.87	94	87	6.5	490				
	13.5			0.035	0.51	0.51	93	87	5.0	492				
	7.6			0.035	0.51	0.51	94	88	5.0	489				
	2.4	1610	512.305	0.035	0.51	0.51	93	88	5.0	488				
D	40.6	1613	512.305	0.070	1.01	1.01	92	88	7.5	477		43°F		
	28.5			0.070	1.01	1.01	95	88	7.5	507				
	20.2			0.070	1.01	1.01	95	88	7.5	514				
	13.5			0.065	0.94	0.94	95	88	7.2	518				
	7.6			0.040	0.58	0.58	94	88	5.5	481				
	2.4	1643	527.391	0.010	0.14	0.14	93	88	3.0	458				

C-7

LEAK CHECK

	in. Hg.	Rate
fore		
ter		

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
#7 BATTERY COMBUSTION STACK

APPENDIX D

PARTICULATE MATTER
EMISSIONS CALCULATIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

Plant: Clairton Steel **Date:** 8/27/90

Activity No. 601050-07

PARTICULATE REPORTING FORM

Test Number	Component	Molecular Weight	Cyclone Weight	Particulate Filter Weight (g)	Insol. Part. in Front Half	Insol. Part. in Back Half	Soluble Part. in Back Half	Soluble Part. in Front Half (g)
CLR-7CS-1	Particulate			0.0365				0.0162
CLR-7CS-2	Particulate			0.0513				0.0252
CLR-7CS-3	Particulate			0.0221				0.0118

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
BATTERY COMBUSTION STACK NO.7

DATE: 8-22-90
CHARGE #: ...150-601050
TEST #: CLR-7CS-1

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01359	4.35704

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2. STACK CONDITIONS

FLOW (ACFM)	78233.
(SCFM)	42551.
MOISTURE CONTENT (%)	12.10
STACK TEMPERATURE (F)	488.6

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	59.714
PERCENT ISOKINETIC	97.09

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
CLR-7CS-1

BATTERY COMBUSTION
8-22-90

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
40.6A	840.0	353.125	.060	.77	.77	66.	64.	4.0	489.	19.0
28.5			.065	.83	.83	73.	66.	4.5	497.	19.8
20.2			.055	.71	.71	76.	68.	4.0	503.	18.3
13.5			.055	.71	.71	78.	70.	4.0	507.	18.3
7.6			.030	.38	.38	79.	72.	3.0	453.	13.2
2.4A	910.0	366.876	.035	.45	.45	80.	73.	3.0	422.	14.0
40.6B	926.0	366.876	.065	.83	.83	80.	77.	4.0	505.	19.9
28.5			.065	.82	.82	83.	77.	4.0	535.	20.2
20.2			.065	.82	.82	85.	77.	4.0	539.	20.3
13.5			.040	.50	.50	84.	78.	3.0	488.	15.5
7.6			.025	.32	.32	84.	78.	2.0	462.	12.1
2.4B	956.0	379.517	.010	.13	.13	83.	78.	1.0	438.	7.5
40.6C	1007.0	379.517	.080	1.06	1.06	83.	81.	5.0	481.	21.8
28.5			.095	1.25	1.25	87.	81.	6.0	503.	24.0
20.2			.095	1.25	1.25	89.	80.	6.0	511.	24.1
13.5			.075	.99	.99	88.	80.	5.0	516.	21.5
7.6			.065	.86	.86	87.	80.	4.0	482.	19.7
2.4C	1037.0	396.201	.045	.59	.59	87.	80.	3.5	499.	16.5
40.6D	1041.0	396.201	.090	1.19	1.19	85.	82.	6.0	481.	23.1
28.5			.090	1.19	1.19	89.	82.	6.0	496.	23.3
20.2			.090	1.19	1.19	90.	81.	6.0	502.	23.4
13.5			.080	1.06	1.06	90.	81.	4.0	507.	22.1
7.6			.045	.59	.59	88.	81.	4.0	469.	16.3
2.4D	1111.0	412.259	.010	.13	.13	87.	82.	2.0	441.	7.5

O R S A T

CO2	3.5
O2	13.5
CO	.0
N	83.0

IMPINGER NO.	1	143.1
	2	19.7
	3	1.3
	4	.0
ABSORBED H2O		10.3

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	8-20-90

LEAK CHECK

	RATE	IN.HG
INITIAL	LT 0.02CFM	5.0
FINAL	LT 0.02CFM	6.0

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

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA — BATTERY COMBUSTION
CLR-7CS-1 — 8-22-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.31
B.	AVG. DELTA H (IN H2O)	.78
C.	METER PRESSURE (IN. HG.)	29.37
D.	STATIC PRESSURE (IN. H2O)	-1.00
E.	STATIC PRESSURE (IN. HG.)	-.074
F.	STACK PRESSURE (IN. HG.) (A+E)	29.24
G.	STACK DIAMETER (IN.)	114.00
H.	STACK AREA (SQ. FT.)	70.88
	NOZZLE DIAMETER	.4220
I.	NOZZLE AREA (SQ. FT.)	.000971
J.	AVG. STACK TEMP (DEG. R.)	948.6
K.	AVG. METER TEMP (DEG. R.)	540.2
L.	CONDENSATE VOL. (ML)	164.1
M.	ABSORBED H2O (ML)	10.3
N.	TOTAL H2O (ML)	174.4
O.	METERED GAS (CF)	59.134
P.	GAS METER CORRECTION	1.0519
Q.	CORRECTED METERED GAS (CF)	62.203
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	8.566
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	70.769
T.	PERCENT H2O (100R/S)	12.10
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.10
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	59.714

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	.035	X	.8790	X	44.0	=	1.35
CO	.000	X	.8790	X	28.0	=	.00
O2	.135	X	.8790	X	32.0	=	3.80
N2	.830	X	.8790	X	28.2	=	20.57
H2O		X	T/100= .1210	X	18.0	=	2.18
					MOLECULAR WEIGHT OF STACK GAS	=	27.90

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	18.39
Y.	AVG. FLOW RATE (CFM) (X*H*60)	78233.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	42551.
	STACK FLOW RATE (DRY)	37401.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	97.09

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
CLR-7CS-1

BATTERY COMBUSTION
8-22-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.03650	.00000	.01620

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00000	.00000
PARTICULATE	.05270	
ALL MATLS.	.05270	

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01359	4.35704

Emission rates are based on EPA Method 5.

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
BATTERY COMBUSTION STACK NO.7

DATE: 8-22-90
CHARGE #: ...150-601050
TEST #: CLR-7CS-2

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01933	5.93749

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2. STACK CONDITIONS

FLOW (ACFM)	75390.
(SCFM)	40800.
MOISTURE CONTENT (%)	12.16
STACK TEMPERATURE (F)	493.3

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	60.955
PERCENT ISOKINETIC	100.08

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA — BATTERY COMBUSTION
CLR-7CS-2 — 8-22-90

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
40.6A	1147.0	412.700	.070	.98	.98	80.	80.	5.0	498.	20.6
28.5			.060	.84	.84	86.	80.	4.5	508.	19.2
20.2			.065	.91	.91	87.	80.	4.5	512.	20.0
13.5			.050	.70	.70	87.	80.	4.0	513.	17.5
7.6			.015	.21	.21	85.	80.	1.5	481.	9.4
2.4A	1217.0	426.482	.010	.14	.14	85.	80.	1.5	468.	7.7
40.6B	1222.0	426.482	.070	.99	.99	85.	82.	5.0	504.	20.7
28.5			.070	.99	.99	89.	81.	5.0	529.	20.9
20.2			.075	1.05	1.05	89.	81.	5.5	536.	21.7
13.5			.045	.63	.63	89.	82.	4.0	487.	16.4
7.6			.020	.28	.28	87.	82.	2.0	479.	10.9
2.4B	1252.0	440.342	.010	.14	.14	87.	82.	2.0	460.	7.6
40.6C	1258.0	440.342	.090	1.27	1.27	87.	84.	6.5	500.	23.4
28.5			.100	1.41	1.41	92.	84.	7.0	517.	24.9
20.2			.095	1.34	1.34	92.	83.	7.0	490.	23.9
13.5			.080	1.13	1.13	92.	83.	6.0	503.	22.1
7.6			.060	.85	.85	91.	83.	5.0	501.	19.1
2.4C	1328.0	457.947	.020	.28	.28	89.	83.	3.2	474.	10.9
40.6D	1331.0	457.947	.070	.99	.99	89.	85.	5.0	503.	20.6
28.5			.090	1.27	1.27	92.	85.	6.5	486.	23.2
20.2			.090	1.27	1.27	93.	84.	6.5	488.	23.2
13.5			.080	1.13	1.13	93.	84.	6.0	495.	22.0
7.6			.025	.35	.35	91.	84.	3.0	465.	12.1
2.4D	1401.0	473.648	.010	.14	.14	89.	85.	2.0	443.	7.6

O R S A T

CO2	3.5
O2	13.5
CO	.0
N	83.0

IMPINGER NO.	1	144.7
	2	20.9
	3	2.4
	4	.0
ABSORBED H2O		10.9

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	8-20-90

LEAK CHECK

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

CONTROL BOX NO. 1 — PROBE NO. 7-3 — NOZZLE NO. 56

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA — BATTERY COMBUSTION
CLR-7CS-2 — 8-22-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.31
B.	AVG. DELTA H (IN H2O)	.80
C.	METER PRESSURE (IN. HG.)	29.37
D.	STATIC PRESSURE (IN. H2O)	-1.00
E.	STATIC PRESSURE (IN. HG.)	-.074
F.	STACK PRESSURE (IN. HG.) (A+E)	29.24
G.	STACK DIAMETER (IN.)	114.00
H.	STACK AREA (SQ. FT.)	70.88
	NOZZLE DIAMETER	.4290
I.	NOZZLE AREA (SQ. FT.)	.001004
J.	AVG. STACK TEMP (DEG. R.)	953.3
K.	AVG. METER TEMP (DEG. R.)	545.5
L.	CONDENSATE VOL. (ML)	168.0
M.	ABSORBED H2O (ML)	10.9
N.	TOTAL H2O (ML)	178.9
O.	METERED GAS (CF)	60.948
P.	GAS METER CORRECTION	1.0519
Q.	CORRECTED METERED GAS (CF)	64.111
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	8.872
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	72.983
T.	PERCENT H2O (100R/S)	12.16
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	12.16
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	60.955

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	.035	X	.8784	X	44.0	=	1.35
CO	.000	X	.8784	X	28.0	=	.00
O2	.135	X	.8784	X	32.0	=	3.79
N2	.830	X	.8784	X	28.2	=	20.56
H2O		X	T/100= .1216	X	18.0	=	2.19
					MOLECULAR WEIGHT OF STACK GAS	=	27.90

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	17.73
Y.	AVG. FLOW RATE (CFM) (X*H*60)	75390.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	40800.
	STACK FLOW RATE (DRY)	35841.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	100.08

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
CLR-7CS-2

BATTERY COMBUSTION
8-22-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.05130	.00000	.02520

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00000	.00000

PARTICULATE	.07650
ALL MATLS.	.07650

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.01933	5.93749

Emission rates are based on EPA Method 5.

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
BATTERY COMBUSTION STACK NO.7

DATE: 8-22-90
CHARGE #: ...150-601050
TEST #: CLR-7CS-3

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00983	2.66733

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2. STACK CONDITIONS

FLOW (ACFM)	66007.
(SCFM)	35941.
MOISTURE CONTENT (%)	11.88
STACK TEMPERATURE (F)	487.5

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3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	53.133
PERCENT ISOKINETIC	97.81

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA
CLR-7CS-3

BATTERY COMBUSTION
8-22-90

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
40.6A	1435.0	473.845	.055	.79	.79	86.	85.	6.0	524.	18.5
28.5			.055	.79	.79	91.	85.	6.0	481.	18.1
20.2			.050	.72	.72	92.	85.	6.0	487.	17.3
13.5			.040	.57	.57	91.	85.	5.0	490.	15.5
7.6			.030	.43	.43	91.	85.	4.5	483.	13.4
2.4A	1505.0	486.862	.010	.14	.14	90.	86.	2.5	471.	7.7
40.6B	1507.0	486.862	.045	.65	.65	90.	86.	5.5	470.	16.3
28.5			.040	.58	.58	93.	86.	5.0	492.	15.5
20.2			.030	.43	.43	92.	87.	4.0	499.	13.5
13.5			.030	.43	.43	92.	87.	4.0	500.	13.5
7.6			.020	.29	.29	92.	87.	3.5	481.	10.9
2.4B	1537.0	497.867	.010	.14	.14	91.	87.	2.5	460.	7.6
40.6C	1540.0	497.867	.065	.94	.94	91.	87.	7.0	463.	19.5
28.5			.055	.80	.80	94.	87.	6.5	486.	18.1
20.2			.060	.87	.87	94.	87.	6.5	490.	19.0
13.5			.035	.51	.51	93.	87.	5.0	492.	14.5
7.6			.035	.51	.51	94.	88.	5.0	489.	14.5
2.4C	1610.0	497.867	.035	.51	.51	93.	88.	5.0	488.	14.5
40.6D	1613.0	497.867	.070	1.01	1.01	92.	88.	7.5	477.	20.4
28.5			.070	1.01	1.01	95.	88.	7.5	507.	20.7
20.2			.070	1.01	1.01	95.	88.	7.5	514.	20.7
13.5			.065	.94	.94	95.	88.	7.2	518.	20.0
7.6			.040	.58	.58	94.	88.	5.5	481.	15.4
2.4D	1643.0	527.391	.010	.14	.14	93.	88.	3.0	458.	7.6

O R S A T

CO2	3.5
O2	13.5
CO	.0
N	83.0

IMPINGER NO.	1	121.9
	2	18.9
	3	2.0
	4	.0
ABSORBED H2O		9.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	1.573	6-12-90
METER	1.0519	6-12-90
PITOT	0.84	8-20-90

LEAK CHECK

	RATE	IN.HG
INITIAL	LT 0.02CFM	5.0
FINAL	LT 0.02CFM	7.5

CONTROL BOX NO. 1 PROBE NO. 7-1 NOZZLE NO. 50

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA — BATTERY COMBUSTION
CLR-7CS-3 — 8-22-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG	29.31
B.	AVG. DELTA H (IN H2O)	.62
C.	METER PRESSURE (IN. HG.)	29.36
D.	STATIC PRESSURE (IN. H2O)	-1.00
E.	STATIC PRESSURE (IN. HG.)	-.074
F.	STACK PRESSURE (IN. HG.) (A+E)	29.24
G.	STACK DIAMETER (IN.)	114.00
H.	STACK AREA (SQ. FT.)	70.88
	NOZZLE DIAMETER	.4310
I.	NOZZLE AREA (SQ. FT.)	.001013
J.	AVG. STACK TEMP (DEG. R.)	947.5
K.	AVG. METER TEMP (DEG. R.)	549.5
L.	CONDENSATE VOL. (ML)	142.8
M.	ABSORBED H2O (ML)	9.1
N.	TOTAL H2O (ML)	151.9
O.	METERED GAS (CF)	53.546
P.	GAS METER CORRECTION	1.0519
Q.	CORRECTED METERED GAS (CF)	56.325
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)	7.592
S.	TOTAL SAMPLED VOLUME (CF) (Q+R)	63.917
T.	PERCENT H2O (100R/S)	11.88
	THEORETICAL MAXIMUM	100.00
	PERCENT WATER USED	11.88
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K))	53.133

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	.035	X	.8812	X	44.0	=	1.36
CO	.000	X	.8812	X	28.0	=	.00
O2	.135	X	.8812	X	32.0	=	3.81
N2	.830	X	.8812	X	28.2	=	20.63
H2O		X	T/100= .1188	X	18.0	=	2.14
					MOLECULAR WEIGHT OF STACK GAS	=	27.93

W.	PITOT CORRECTION	.840
X.	AVERAGE CORRECTED VELOCITY (FPS) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	15.52
Y.	AVG. FLOW RATE (CFM) (X*H*60)	66007.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92)	35941.
	STACK FLOW RATE (DRY)	31672.
AA.	SAMPLE TIME (SEC)	7200.
BB.	PERCENT ISOKINETIC (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	97.81

AIR QUALITY ENGINEERING

USX CLAIRTON
CLAIRTON PA — BATTERY COMBUSTION
CLR-7CS-3 — 8-22-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.02210	.00000	.01180

PARAMETER	INSOL.MATL. IN IMP.(G)	SOLUBLE MATL. IN IMP.(G)
PARTICULATE	.00000	.00000

PARTICULATE	.03390
ALL MATLS.	.03390

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00983	2.66733

Emission rates are based on EPA Method 5.

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

APPENDIX E

FIELD DATA SHEETS
FOR VISIBLE EMISSIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

(1)

VISIBLE EMISSIONS OBSERVATIONS FORM

7 - Test

OBSERVER: K. Kuiros

DATE: 8/22/90

FACILITY: USX-Clairton

OBSERVATION: START TIME: 8 40 A

END TIME: 9 40 A

OBSERVATION POINT: Maple Ave Park Lot

SOURCE: #7-STACK

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 10 MPH

DIRECTION: N/E

TEMPERATURE: 66

SKY CONDITION: Overcast

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: Shelton

COMMENTS:

1st Test Start											
8 40 A	0	0	0	0	0	10	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
45	5	0	0	0	0	15	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
9 00 A	20	0	0	0	0	30	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
5	25	0	0	0	0	35	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)

VISIBLE EMISSIONS OBSERVATIONS FORM

#7-STACK-EST

OBSERVER: K. Kuiros

DATE: 8/22/90

FACILITY: US-A-Clairton

OBSERVATION: START TIME: 9 40 A

END TIME: 10 40 A

OBSERVATION POINT: Maple Ave Park Lot

SOURCE: #7-STACK

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 9 MPH

DIRECTION: E

TEMPERATURE: 67

SKY CONDITION: Overcast/Hazy

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: Shelton

COMMENTS:

9 40 A	0	0	0	0	0	10	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
45	5	0	0	0	0	15	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
10 A	20	0	0	0	0	30	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
5	25	0	0	0	0	35	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)

VISIBLE EMISSIONS OBSERVATIONS FORM

#7 - Test

OBSERVER: K. Kuiros

DATE: 8/22/90

FACILITY: USX-Clairton

OBSERVATION: START TIME: 10 40 A

END TIME: 11 40 A

OBSERVATION POINT:

Maple Ave Park Lot

SOURCE: #2 Stack

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 10 MPH

DIRECTION: E

TEMPERATURE: 68

SKY CONDITION: Overcast/Rain

BACKGROUND: Sky

READING CONDITIONS: Fair

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: Shelton

COMMENTS:

10 40 A	0	0	0	0	0	10	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
45	5	0	0	0	0	15	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
11 00 A	20	0	0	0	0	30	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
5	25	0	0	0	0	35	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

End 1st Test

(4)

VISIBLE EMISSIONS OBSERVATIONS FORM

#7-Test

OBSERVER: K. Kuikos

DATE: 8/22/90

FACILITY: USX-Clairton

OBSERVATION: START TIME: 11 AM

END TIME: 12 PM

OBSERVATION POINT: Maple Ave Park lot

SOURCE: #7-STACK

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 10 MPH

DIRECTION: E

TEMPERATURE: 68

SKY CONDITION: Overcast/Rain

BACKGROUND: SKY

READING CONDITIONS: Fair

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: Sheston

COMMENTS:

11:00	0	0	0	0	0	10	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
45	5	0	0	0	0	15	35	0	0	0	0
	6	0	0	0	0		36	0	0	0	0
Start 2nd Test	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
12:00	20	0	0	0	0	30	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
5	25	0	0	0	0	35	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

(5)

VISIBLE EMISSIONS OBSERVATIONS FORM

#7-TeST

OBSERVER: K. Kuiros

DATE: 8/22/90

FACILITY: USX-CLAIRTON

OBSERVATION: START TIME: 12:00 P

END TIME: 1:00 P

OBSERVATION POINT:

Maple Ave - Park Lot

SOURCE: #7-STACK

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 12 MPH

DIRECTION: E

TEMPERATURE: 68

SKY CONDITION: OVERCAST

BACKGROUND: SKY

READING CONDITIONS: FAIR

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: SHELTON

COMMENTS:

12:45 P	0	0	0	0	0	10	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
45	5	0	0	0	0	15	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
1:00 P	20	0	0	0	0	30	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
5	25	0	0	0	0	35	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

(6)

#7-Test

OBSERVER: K. Kuiros

DATE: 8/22/90

FACILITY: USX-Clairton

OBSERVATION: START TIME: 1:40 P

END TIME: 2:40 P

OBSERVATION POINT: Maple Ave Park Lot

SOURCE: #7-STACK

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 12 MPH

DIRECTION: E

TEMPERATURE: 67

SKY CONDITION: OVERCAST

BACKGROUND: SKY

READING CONDITIONS: FAIR

COLOR OF EMISSION: 0

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: C FOREMAN: SHelton

COMMENTS:

1:40 P	0	0	0	0	0	10	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
45	5	0	0	0	0	15	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
2:00 P	20	0	0	0	0	30	50	0	0	0	0
End 2:40 Test	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
5	25	0	0	0	0	35	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

Start 3rd Test

(7)

VISIBLE EMISSIONS OBSERVATIONS FORM

#7-Test

OBSERVER: K. Kuiros

DATE: 8/22/90

FACILITY: USX-Clairton

OBSERVATION: START TIME: 2:40 P

END TIME: 3:40 P

OBSERVATION POINT: Maple Ave Park Lot

SOURCE: #7-STACK

DISTANCE: 900'

DIRECTION FROM: S/W

HEIGHT: 200'

WIND:

SPEED: 12 MPH

DIRECTION: E

TEMPERATURE: 67

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: C FOREMAN: Shelton

COMMENTS:

2:40	0	0	0	0	0	10	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
45	5	0	0	0	0	15	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
50	10	0	0	0	0	20	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
55	15	0	0	0	0	25	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
3:00 P	20	0	0	0	0	30	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
5	25	0	0	0	0	35	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

(8)

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Mc Kay

DATE: 22 August 1990

FACILITY: USX Clairton

OBSERVATION: START TIME: 3:40 PM

END TIME: 4:40 PM

OBSERVATION POINT: Maple Ave Parking Lot #7

SOURCE: Battery Draft Stack

DISTANCE: 0-900'

DIRECTION FROM: SW of

HEIGHT: 0-200

WIND:

SPEED: 10-MPH

DIRECTION: → NE

TEMPERATURE: 68°

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: C FOREMAN: Shelton

COMMENTS:

7 - Test

	0	0	0	0	0	:10	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
:45	5	0	0	0	0	:15	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
:50	10	0	0	0	0	:20	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
:55	15	0	0	0	0	:25	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
:00	20	0	0	0	0	:30	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
:05	25	0	0	0	0	:35	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

(9)

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Mc Koy

DATE: 22 August 1990

FACILITY: 2158 Clinton

OBSERVATION: START TIME: 4:40 end

END TIME: 4:43

OBSERVATION POINT: Maple Ave Parking Lot #7

SOURCE: Battery Dust Stack

DISTANCE: a 900'

DIRECTION FROM: SW of

HEIGHT: a 200'

WIND:

SPEED: 10-mph

DIRECTION: → N.E.

TEMPERATURE: 68°

SKY CONDITION: overcast

BACKGROUND: sky

READING CONDITIONS: Fair

COLOR OF EMISSION: N/A

TOTAL No. OF READINGS: 16

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0

CREW: D FOREMAN: Karpeal

COMMENTS:

#7 Test

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					34					
5					35					
6					36					
7					37					
8					38					
9					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					