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1990
**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY
COMBUSTION STACK**

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. 601050-11

JANUARY 1991

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ABSTRACT

On November 14, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #19 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 0.013 gr/dscf and 7.98 lb/hr, respectively. The allowable concentration is 0.030 gr/dscf. Thus, the emissions from the stack are in compliance. The visible emissions observed from the stack during the tests were not in compliance. This was due solely to a leak into the oven flue at the standpipe base during the charging of a particular oven. This leak has been temporarily patched and repair time has been allotted to correct this condition.

1.0 INTRODUCTION

On November 14, 1990, a compliance test program was conducted for USS Clairton Works, Clairton, PA, on the #19 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, Thomas Morgan, and John Shimshock. Visible emissions determinations were performed by Elmer Spiker 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

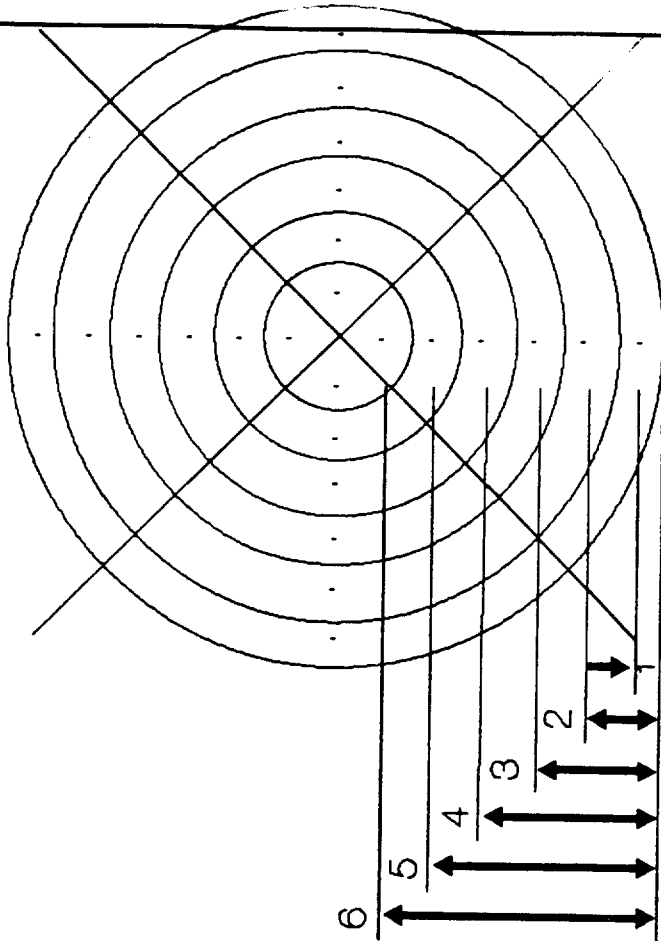
Particulate matter sampling was performed in accordance with EPA Stationary Source Sampling Methods 1 through 5. The gas volume sampled for each 120 minute test was about 50 dry standard cubic feet.

The process exhausted through a 186" 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.

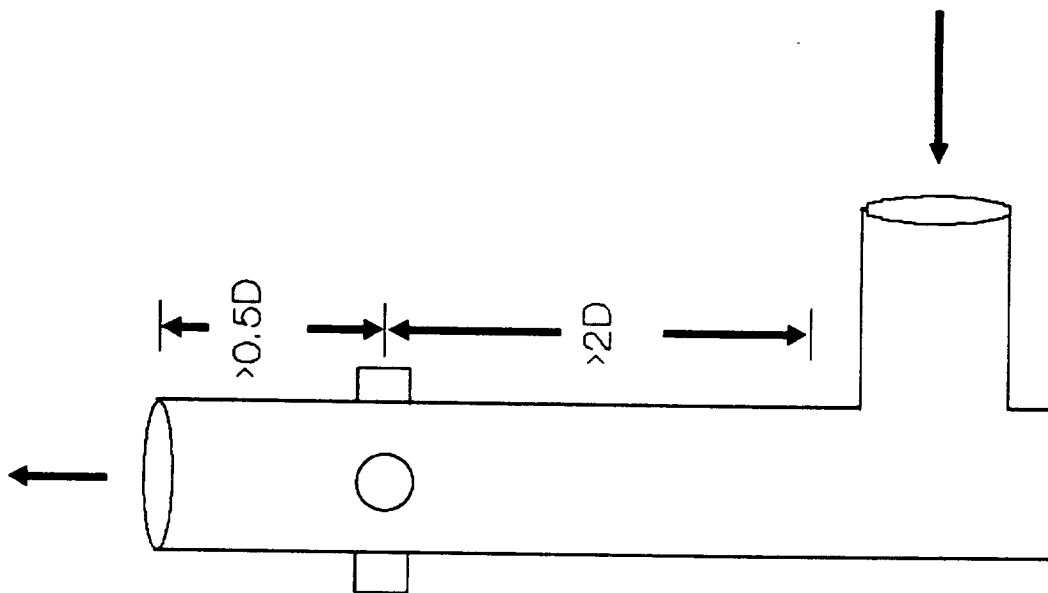
A total of three test runs were performed. During each test, gas concentrations of CO₂, O₂, and N₂ (by difference) were determined with the use of a Fyrite apparatus as specified by EPA Method 3.

Clean up of the sampling train included an acetone rinse of the front-half components. The 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.



Traverse Point	Distance (in.)
1	4.0
2	12.5
3	22.0
4	33.0
5	46.5
6	66.2



Stack Diameter (in.) = 186
D

ACTIVITY No.
REVISION

TITLE Schematic Diagram of the Stack and Traverse Points

Figure 2-1
2-1a

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 operated 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 0.013 grains per dry standard cubic foot (gr/dscf) and 7.98 pounds per hour (lb/hr), respectively.

As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the particulate matter standard for ^{should be #19} ~~#9~~ Battery Combustion Stack is 0.030 gr/dscf. 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. 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. A total of 34 readings had opacities

**USS CLAIRTON WORKS
CLAIRTON, PA**

TABLE 3-1

PARTICULATE MATTER EMISSIONS DATA

<u>EMISSIONS</u>	<u>TEST #1</u>	<u>TEST #2</u>	<u>TEST #3</u>	<u>AVERAGE</u>
gr/dscf	0.008	0.008	0.022	0.013
lb/hr	5.25	4.86	13.85	7.98

**STACK
CONDITIONS**

Flow (acfm)	153100	152449	154290	153280
Flow (scfm)	84173	84936	84613	84574
Moisture Content (%)	12.33	11.82	11.89	12.01
Stack Temp. (°F)	493	481	496	490

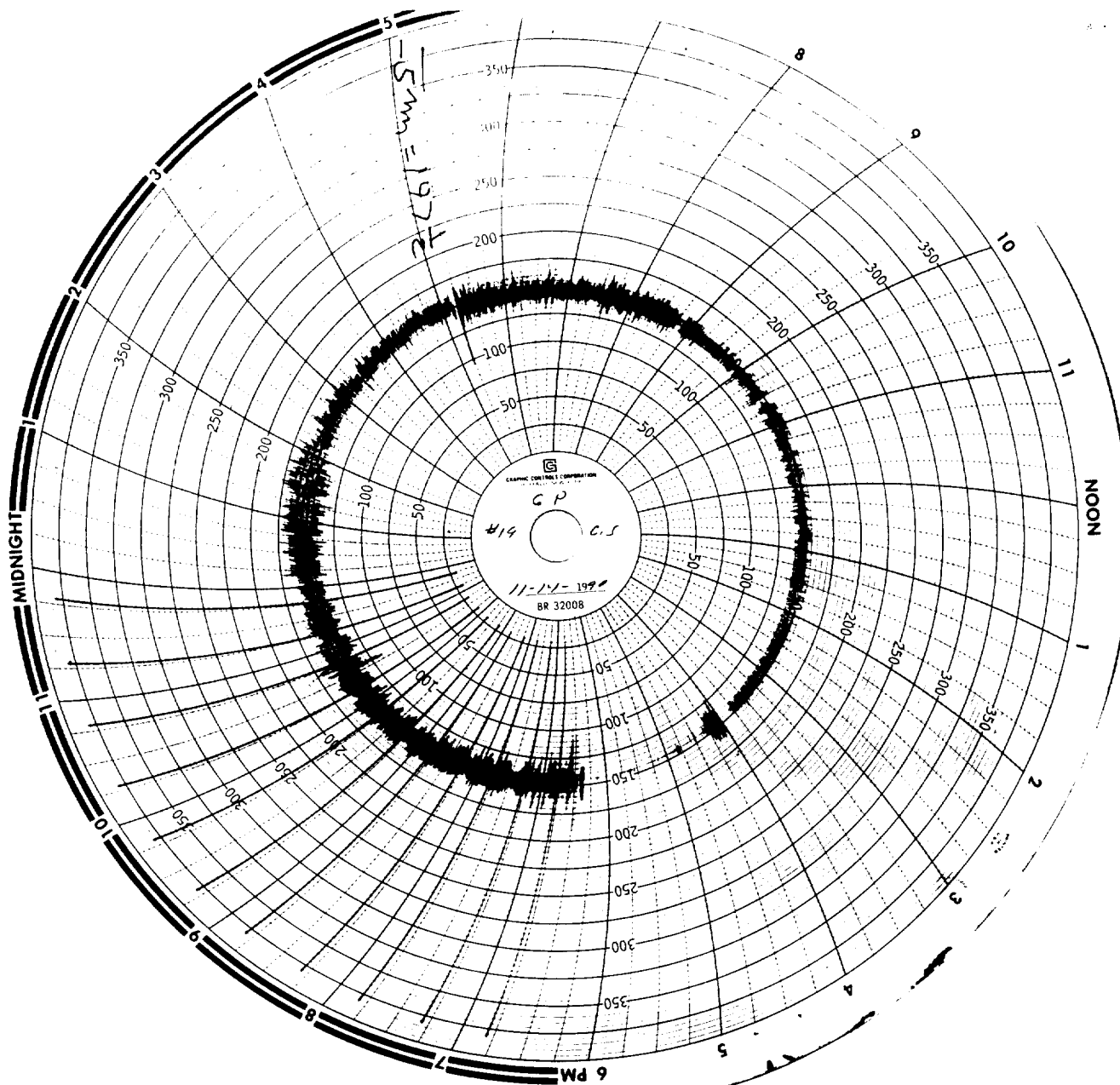
**SAMPLING
CONDITIONS**

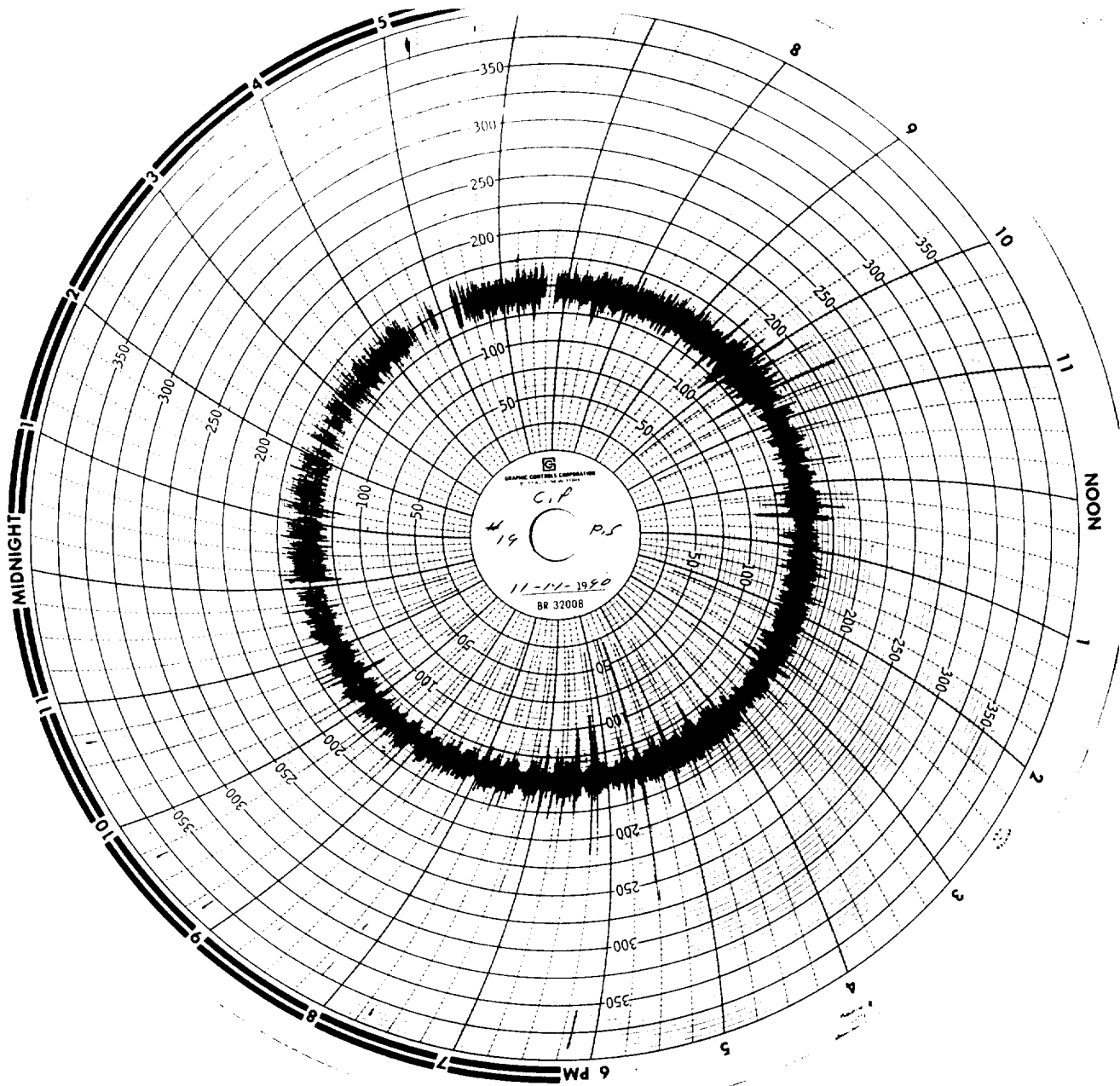
Sampling Time (min)	120	120	120	
Sample Volume (dscf)	48.783	49.472	49.112	
Isokinetics (%)	103.55	102.51	103.20	

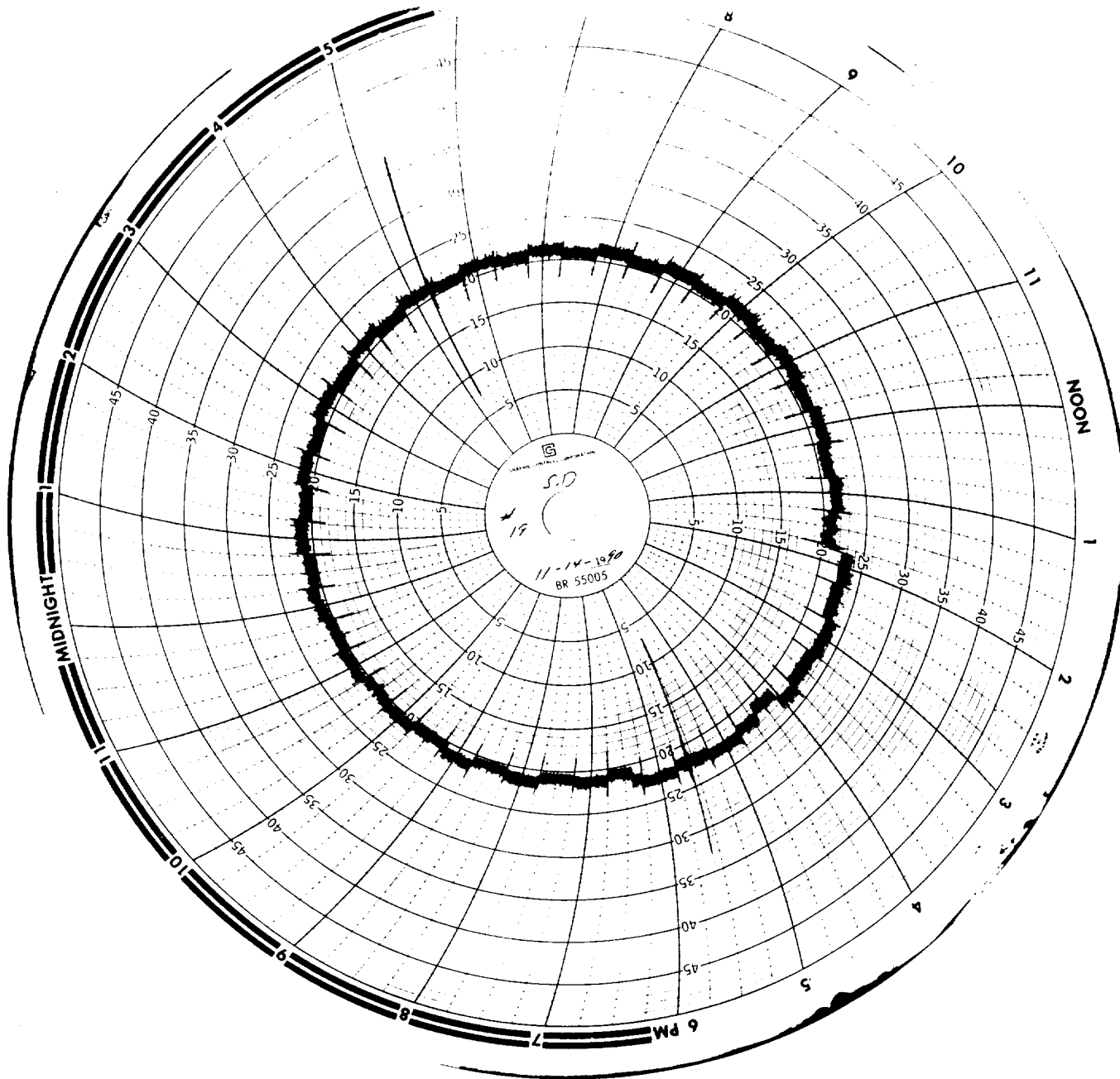
greater than or equal to 20% opacity (from 1339 to 1347 only). These visible emissions observed were due solely to leakage into the oven flues at the standpipe base during the charging of the C-1 oven. The standpipe bases have been temporarily patched and the leakage has stopped. The USS Clairton Works maintenance department has been notified, repair parts ordered, and repair time has been allotted for the task.

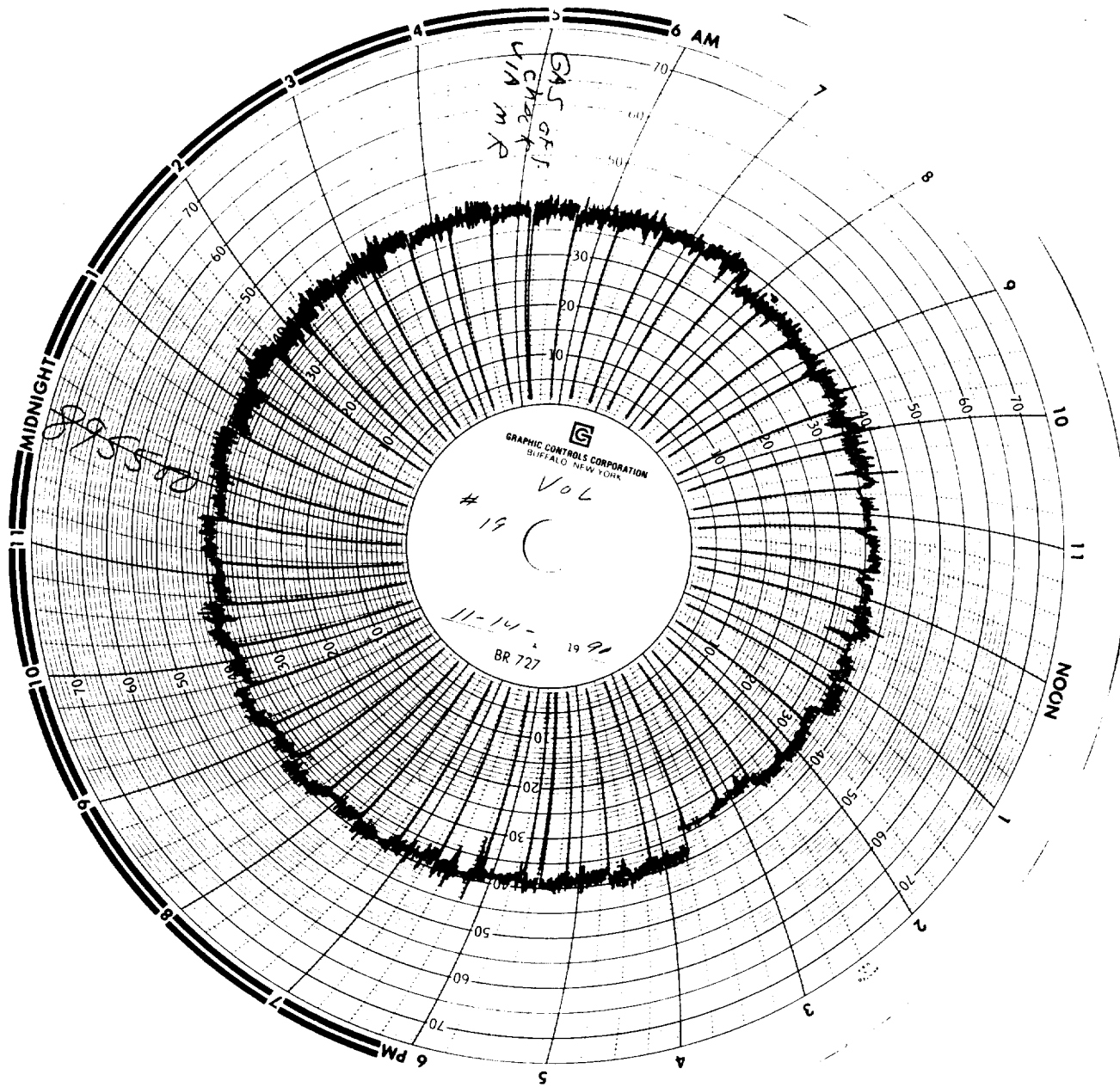
**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY COMBUSTION STACK**

**APPENDIX A
OPERATIONAL DATA**









PUSHING SCHEDULE FOR BATTERIES 19720

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	C15/19	C13/19		10:45	11:00	11:20
2	C15/20	C13/20		10:51	11:06	11:26
3	A1/19	A15/19		10:58	11:13	11:33
4	A17/19	A15/20		11:04	11:19	11:39
5	A17/20	B15/19		11:11	11:26	11:46
6	E17/19	E15/20		11:17	11:32	11:52
7	B17/20	C15/19		11:24	11:39	11:59
8	C17/19	C15/20		11:31	11:46	12:06
9	C17/20	A1/19		11:37	11:52	12:12
10	A19/19	A17/19		11:44	11:59	12:19
11	A19/20	A17/20		11:50	12:05	12:25
12	A29/20	B17/19		11:57	12:12	12:32
13	B19/19	B17/20		12:03	12:18	12:38
14	B19/20	C17/19		12:10	12:25	12:45
15	C19/19	C17/20		12:17	12:32	12:52
16	C19/20	A19/19		12:23	12:38	12:58
17	A21/19	A19/20		12:30	12:45	1:05
18	A21/20	A29/20		12:36	12:51	1:11
19	B21/19	B19/19		12:43	12:58	1:18
20	B21/20	E19/20		12:49	1:04	1:24
21	C21/19	C19/19		12:56	1:11	1:31
22	C21/20	C19/20		1:03	1:18	1:38
23	A23/19	A21/19		1:09	1:24	1:44
24	A23/20	A21/20		1:16	1:31	1:51
25	B23/19	B21/19		1:22	1:37	1:57
26	B23/20	B21/20		1:29	1:44	2:04
27	C23/19	C21/19		1:35	1:50	2:10
28	C23/20	C21/20		1:42	1:57	2:17
29	A25/19	A23/19		1:49	2:04	2:24
30	A25/20	A23/20		1:55	2:10	2:30
31	B25/19	B23/19		2:02	2:17	2:37
32	B25/20	B23/20		2:08	2:23	2:43
33	C25/19	C23/19		2:15	2:30	2:50
34	C25/20	C23/20		2:21	2:36	2:56
35	A2/19	A25/19		2:28	2:43	3:03
36	A27/19	A25/20		2:35	2:50	3:10
37	B27/19	B25/19		2:41	2:56	3:16
38	B27/20	B25/20		2:48	3:03	3:23
39	C27/19	C25/19		2:54	3:09	3:29
40	C27/20	C25/20		3:01	3:16	3:36
41	A29/19	A2/19		3:08	3:23	3:43
42	B29/19	A27/19		3:14	3:29	3:49
43	B29/20	B27/19		3:21	3:36	3:56
44	C10/19	E27/20		3:27	3:42	4:02
45	C29/19	C27/19		3:34	3:49	4:09
46	C29/20	C27/20		3:40	3:55	4:15
47	A2/20	A29/19		3:47	4:02	4:22
48	B2/19	B29/19		3:54	4:09	4:29
49	B2/20	B29/20		4:00	4:15	4:35
50	C2/19	C10/19		4:07	4:22	4:42
51	C2/20	C29/19		4:13	4:28	4:48
52	A4/20	C29/20		4:20	4:35	4:55
53	B4/19	A2/20		4:26	4:41	5:01
54	B4/20	B2/19		4:33	4:48	5:08
55	C4/19	B2/20		4:40	4:55	5:15
56	C4/20	C2/19		4:46	5:01	5:21
57	A6/19	C2/20		4:53	5:08	5:28
58	A6/20	A4/20		4:59	5:14	5:34
59	B6/19	B4/19		5:06	5:21	5:41
60	B6/20	B4/20		5:12	5:27	5:47
61	C6/19	C4/19		5:19	5:34	5:54
62	C6/20	C4/20		5:26	5:41	6:01
63	A8/19	A6/19		5:32	5:47	6:07
64	A8/20	A6/20		5:39	5:54	6:14
65	B8/19	B6/19		5:45	6:00	6:20
66	B8/20	B6/20		5:52	6:07	6:27
67	C8/19	C6/19		5:58	6:13	6:33
68	C8/20	C6/20		6:05	6:20	6:40
69	A10/19	A8/19		6:12	6:27	6:47
70	A10/20	A8/20		6:18	6:33	6:53
71	B10/19	B8/19		6:25	6:40	7:00
72	B10/20	B8/20		6:31	6:46	7:06
73	C10/20	C8/19		6:38	6:53	7:10

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11X 7 TURN

A-5

-A27/20 + A1/19W19
 -A29/20 + A2/19W27
 -A2/19 + A29/20W19
 -A4/19 + C10/19W29
 -C10/19

PUSHING SCHEDULE FOR GATHERERS 1/27/20

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	A12/19	A10/19		6:45	7:0	7:20
2	A12/20	A10/20		6:51	7:6	7:26
3	B12/19	B10/19		6:58	7:13	7:33
4	B12/20	B10/20		7:5	7:20	7:40
5	C12/19	C10/19		7:12	7:27	7:47
6	C12/20	C10/20		7:19	7:34	7:54
7	A14/19	A12/19		7:26	7:41	8:1
8	A14/20	A12/20		7:33	7:48	8:8
9	B14/19	B12/19		7:40	7:55	8:15
10	B14/20	B12/20		7:47	8:2	8:22
11	C14/19	C12/19		7:54	8:9	8:29
12	C14/20	C12/20		8:1	8:16	8:36
13	A16/19	A14/19		8:8	8:23	8:43
14	A16/20	A14/20		8:15	8:30	8:50
15	B16/19	B14/19		8:22	8:37	8:57
16	B16/20	B14/20		8:29	8:44	9:4
17	C16/19	C14/19		8:36	8:51	9:11
18	C16/20	C14/20		8:43	8:58	9:18
19	A18/19	A16/19		8:50	9:5	9:25
20	A18/20	A16/20		8:57	9:12	9:32
21	B18/19	B16/19		9:4	9:19	9:39
22	B18/20	B16/20		9:11	9:26	9:46
23	C18/19	C16/19		9:18	9:33	9:53
24	C18/20	C16/20		9:25	9:40	10:0
25	A20/19	A18/19		9:31	9:46	10:6
26	A20/20	A18/20		9:38	9:53	10:13
27	B20/19	B18/19		9:45	10:0	10:20
28	B20/20	B18/20		9:52	10:7	10:27
29	C20/19	C18/19		9:59	10:14	10:34
30	C20/20	C18/20		10:6	10:21	10:41
31	A22/19	A20/19		10:13	10:28	10:48
32	A22/20	A20/20		10:20	10:35	10:55
33	B22/19	B20/19		10:27	10:42	11:2
34	B22/20	B20/20		10:34	10:49	11:9
35	C22/19	C20/19		10:41	10:56	11:16
36	C22/20	C20/20		10:48	11:3	11:23
37	A24/19	A22/19		10:55	11:10	11:30
38	A24/20	A22/20		11:2	11:17	11:37
39	B24/19	B22/19		11:9	11:24	11:44
40	B24/20	B22/20		11:16	11:31	11:51
41	C24/19	C22/19		11:23	11:38	11:58
42	C24/20	C22/20		11:30	11:45	12:5
43	A26/19	A24/19		11:37	11:52	12:12
44	B26/19	A24/20		11:44	11:59	12:19
45	B26/20	B24/19		11:51	12:6	12:26
46	C26/19	B24/20		11:58	12:13	12:33
47	C26/20	C24/19		12:5	12:20	12:40
48	A28/19	C24/20		12:11	12:26	12:46
49	B28/19	A26/19		12:18	12:33	12:53
50	B28/20	B26/19		12:25	12:40	1:0
51	C28/20	B26/20		12:32	12:47	1:7
52	A 1/20	C26/19		12:39	12:54	1:14
53	B 1/19	C26/20		12:46	1:1	1:21
54	B 1/20	A28/19		12:53	1:8	1:28
55	C 1/19	B28/19		1:0	1:15	1:35
56	C 1/20	B28/20		1:7	1:22	1:42
57	A 3/20	C28/20		1:14	1:29	1:49
58	B 3/19	A 1/20		1:21	1:36	1:56
59	B 3/20	B 1/19		1:28	1:43	2:3
60	C 3/19	B 1/20		1:35	1:50	2:10
61	C 3/20	C 1/19		1:42	1:57	2:17
62	A 5/20	C 1/20		1:49	2:4	2:24
63	B 5/19	A 3/20		1:56	2:11	2:31
64	B 5/20	B 3/19		2:3	2:18	2:38
65	C 5/19	B 3/20		2:10	2:25	2:45
66	C 5/20	C 3/19		2:17	2:32	2:52
67	A 7/19	C 3/20		2:24	2:39	2:59
68	A 7/20	A 5/20		2:31	2:46	3:6
69	B 7/19	B 5/19		2:38	2:53	3:10

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7X 3 TURN

Pass UP C10/19 - A26/20 - A28/20
 C28/19 - A1/19 - A3/19
 A5/19

PUSHING SCHEDULE FOR BATTERIES 19/20

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	B 7/20	B 5/20		2:45	3:0	3:20
2	C 7/19	C 5/19		2:51	3:6	3:26
3	C 7/20	C 5/20		2:58	3:13	3:33
4	A 9/19	A 7/19		3:4	3:19	3:39
5	A 9/20	A 7/20		3:11	3:26	3:46
6	E 9/19	E 7/19		3:17	3:32	3:52
7	E 9/20	E 7/20		3:24	3:39	3:59
8	C 9/19	C 7/19		3:31	3:46	4:6
9	C 9/20	C 7/20		3:37	3:52	4:12
10	A11/19	A 9/19		3:44	3:59	4:19
11	A11/20	A 9/20		3:50	4:5	4:25
12	E11/19	E 9/19		3:57	4:12	4:32
13	E11/20	E 9/20		4:3	4:18	4:38
14	C11/19	C 9/19		4:10	4:25	4:45
15	C11/20	C 9/20		4:17	4:32	4:52
16	A13/19	A11/19		4:23	4:38	4:58
17	A13/20	A11/20		4:30	4:45	5:5
18	A26/20	B11/19		4:36	4:51	5:11
19	E13/19	E11/20		4:43	4:58	5:18
20	E13/20	C11/19		4:49	5:4	5:24
21	C13/19	C11/20		4:56	5:11	5:31
22	C13/20	A13/19		5:3	5:18	5:38
23	A15/19	A13/20		5:9	5:24	5:44
24	A15/20	A26/20		5:16	5:31	5:51
25	E15/19	E13/19		5:22	5:37	5:57
26	E15/20	E13/20		5:29	5:44	6:4
27	C15/19	C13/19		5:35	5:50	6:10
28	C15/20	C13/20		5:42	5:57	6:17
29	A17/19	A15/19		5:49	6:4	6:24
30	A17/20	A15/20		5:55	6:10	6:30
31	E17/19	E15/19		6:2	6:17	6:37
32	E17/20	E15/20		6:8	6:23	6:43
33	C17/19	C15/19		6:15	6:30	6:50
34	C17/20	C15/20		6:21	6:36	6:56
35	A 5/19	A17/19		6:28	6:43	7:3
36	A19/19	A17/20		6:35	6:50	7:10
37	A19/20	E17/19		6:41	6:56	7:16
38	E19/19	E17/20		6:48	7:3	7:23
39	E19/20	C17/19		6:54	7:9	7:29
40	C19/19	C17/20		7:1	7:16	7:36
41	C19/20	A 5/19 LC		7:8	7:23	7:43
42	A21/19	A19/19		7:14	7:29	7:49
43	A21/20	A19/20		7:21	7:36	7:56
44	E21/19	E19/19		7:27	7:42	8:2
45	E21/20	E19/20		7:34	7:49	8:9
46	C21/19	C19/19		7:40	7:55	8:15
47	C23/19	C19/20		7:47	8:2	8:22
48	C21/20	A21/19		7:54	8:9	8:29
49	A23/19	A21/20		8:0	8:15	8:35
50	A23/20	E21/19		8:7	8:22	8:42
51	B23/19	B21/20		8:13	8:28	8:48
52	B23/20	C21/19		8:20	8:35	8:55
53	C23/19	C28/19		8:26	8:41	9:1
54	C23/20	C21/20		8:33	8:48	9:8
55	A25/19	A23/19		8:40	8:55	9:15
56	A25/20	A23/20		8:46	9:1	9:21
57	B25/19	B23/19		8:53	9:8	9:28
58	E25/20	E23/20		8:59	9:14	9:34
59	C25/19	C23/19		9:6	9:21	9:41
60	C25/20	C23/20		9:12	9:27	9:47
61	A27/19	A25/19		9:19	9:34	9:54
62	E27/19	A25/20		9:26	9:41	10:1
63	B27/20	B25/19		9:32	9:47	10:7
64	C27/19	E25/20		9:39	9:54	10:14
65	C27/20	C25/19		9:45	10:0	10:20
66	A29/19	C25/20		9:52	10:7	10:27
67	B29/19	A27/19		9:58	10:13	10:33
68	E29/20	E27/19		10:5	10:20	10:40
69	C29/19	B27/20		10:12	10:27	10:47
70	C29/20	C27/19		10:18	10:33	10:53
71	A 2/20	C27/20		10:25	10:40	11:0
72	E 2/19	A29/19		10:31	10:46	11:6
73	B 2/20	B29/19		10:38	10:53	11:10

WED NOV 14 1990

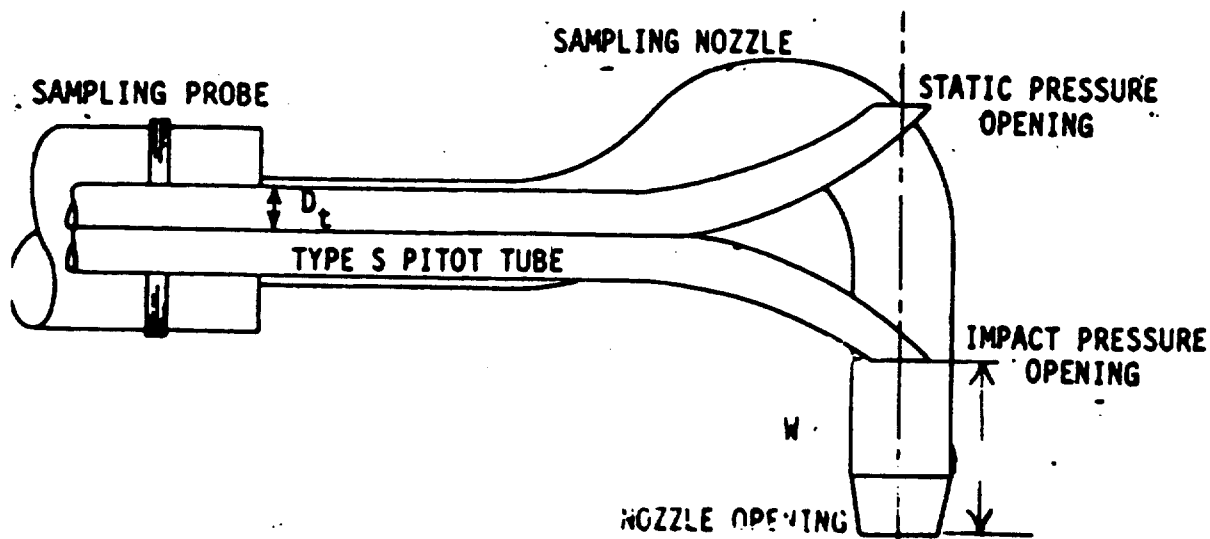
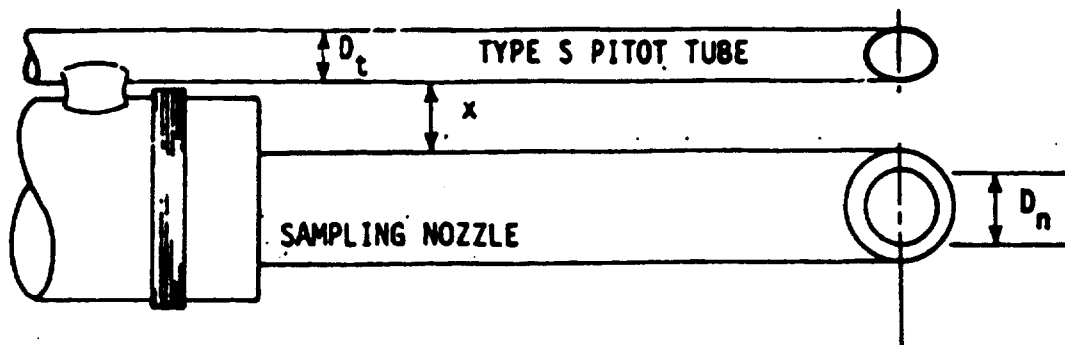
3X11 TURN

$-A \frac{27}{20} - A \frac{19}{20} - A \frac{2}{19}$
 $+ A \frac{26}{58} w 13 + A \frac{5}{19} w 19 + C \frac{28}{19} w 21$

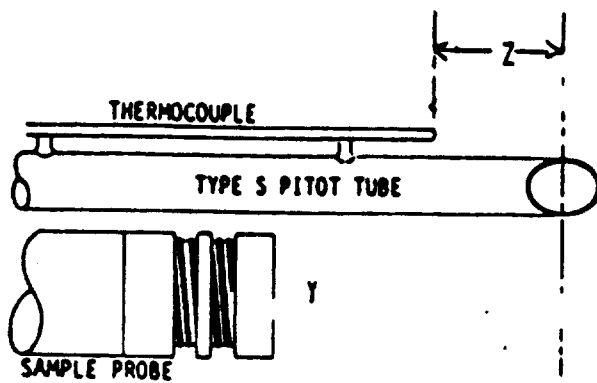
**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY COMBUSTION STACK**

APPENDIX B

PRE-TEST AND POST-TEST CALIBRATION AND AUDIT RESULTS



D_n = Nozzle diameter
 D_t = 3/16 to 3/8"



$W \geq 0$
 $X \geq 3/4"$ for 1/2" Nozzle
 $Y \geq 3"$
 $Z \geq 2"$

GEOMETRIC PITOT CALIBRATION

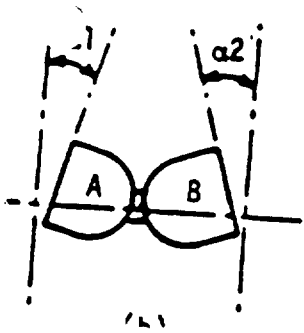
Form No. 10-1

Date 11-12-90

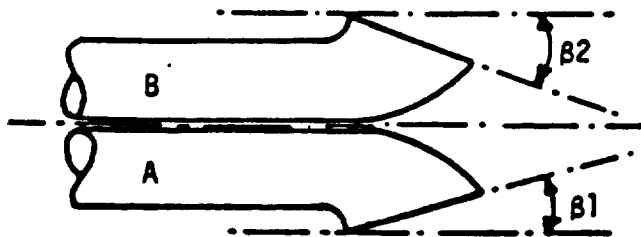
Initials JH

pre-test

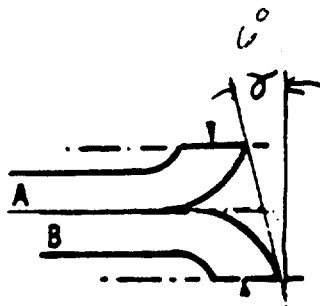
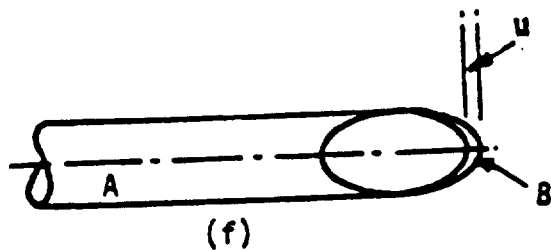
$\alpha 1 = 2^\circ$
 $\alpha 2 = 4^\circ$
 $\beta 1 = 4^\circ$
 $\beta 2 = 2^\circ$
 $A = .91$
 $\mu = .95$
 $V = .111$
 $W = \geq 0$
 $X = .945$
 $Y = \geq 3"$
 $Z = > 2"$
 $D_t = .375$



$\alpha 1, \alpha 2 < 10^\circ$

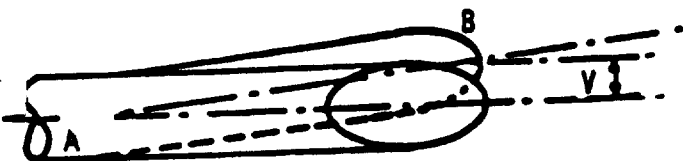


$\beta 1, \beta 2 < 5$

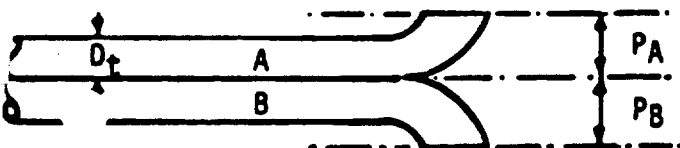


$$\mu = A \sin \theta \quad 6^\circ$$

$$V = A \sin \theta \quad 7^\circ$$



A-SIDE PLANE



B-SIDE PLANE

0.394 0.563
 $1.05 D_t < P < 1.50 D_t$
 $P_A = P_B$
 $2.10 D_t < A < 3.00 D_t$
 0.788 1.125

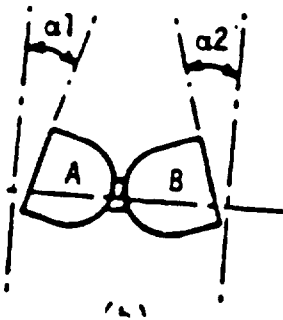
GEOMETRIC PITOT CALIBRATION

Date 12-14-90

Initials TGM

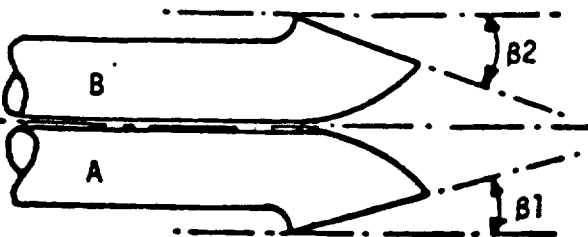
post-test

$\alpha 1 = 3^\circ$
 $\alpha 2 = 4^\circ$
 $\beta 1 = 7^\circ$
 $\beta 2 = 1^\circ$
 $A = .733$
 $\mu = .081$
 $V = .016$
 $W = .20$
 $X = .792$
 $Y = .73''$
 $Z = .72''$
 $D_t = .325$

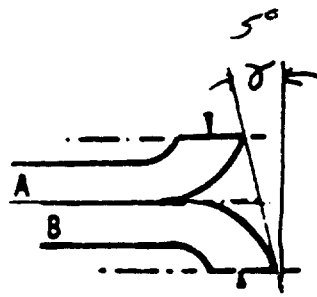
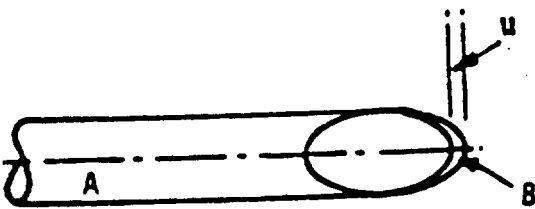


$\alpha 1, \alpha 2 < 10^\circ$

$\beta 1, \beta 2 < 5$

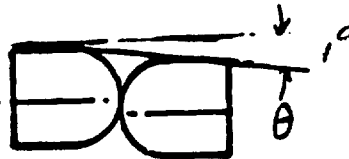


(f)

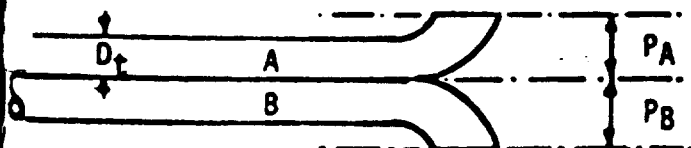


$$\mu = A \sin \theta$$

$$V = A \sin \theta$$



A-SIDE PLANE



B-SIDE PLANE

0.394

0.563

$$1.05 D_t < P < 1.50 D_t$$

$$P_A = P_B$$

$$2.10 D_t < A < 3.00 D_t$$

0.788

1.125

GEOMETRIC PITOT CALIBRATION

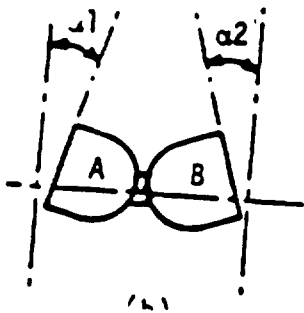
Probe No. 10-01

Date 11-12-90

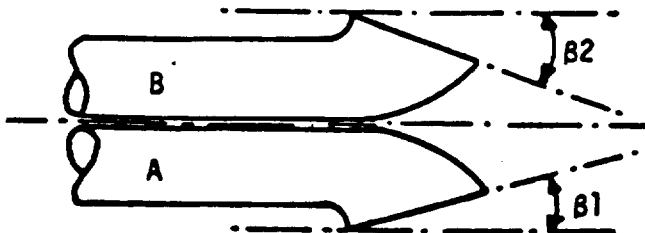
Initials Yof

pre-test

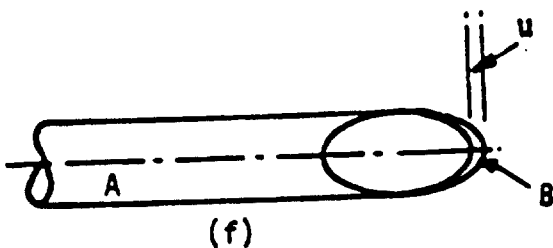
$\alpha 1 = 6^\circ$
 $\alpha 2 = 3^\circ$
 $\beta 1 = 3^\circ$
 $\beta 2 = 0^\circ$
 $A = 90^\circ$
 $\mu = .032$
 $V = .016$
 $W = .0$
 $X = .981$
 $Y = .3$
 $Z = .2$
 $D_t = .370$



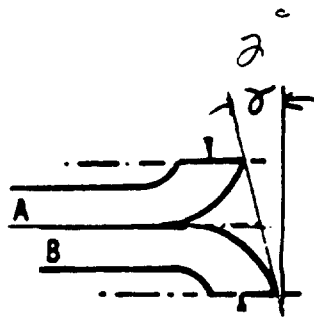
$\alpha 1, \alpha 2 < 10^\circ$



$\beta 1, \beta 2 < 5^\circ$

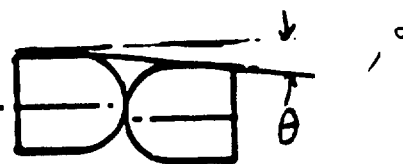


(f)

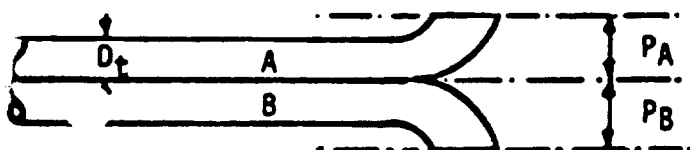


$$\mu = A \sin \gamma \cdot 2^\circ$$

$$V = A \sin \theta / ^\circ$$



A-SIDE PLANE



B-SIDE PLANE

0.389

0.555

$1.05 D_t < P < 1.50 D_t$

$P_A = P_B$

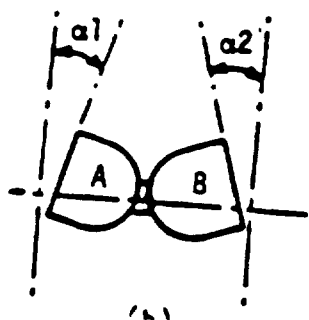
$2.10 D_t < A < 3.00 D_t$

0.777

1.110

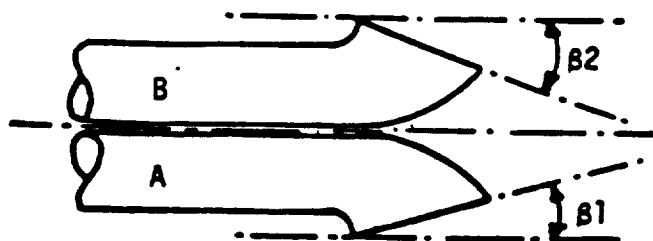
GEOMETRIC PITOT CALIBRATION

Probe No. 10.2
 Date 12-14-90
 Initials TJM
 post-test

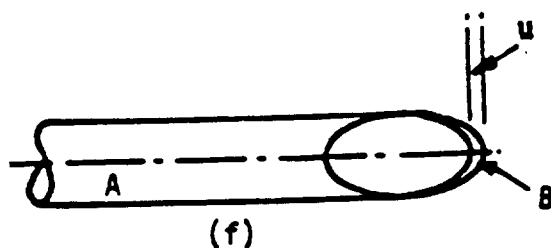


$\alpha_1, \alpha_2 < 10^\circ$

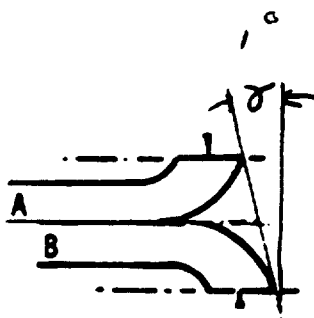
$\alpha_1 = 6^\circ$
 $\alpha_2 = 4^\circ$
 $B_1 = 8$
 $B_2 = 1$
 $A = .999$
 $u = .017$
 $V = .017$
 $W = 30$
 $X = 1.125$
 $Y = 3$
 $Z = 2$
 $D_t = .370$



$\beta_1, \beta_2 < 5$



(f)

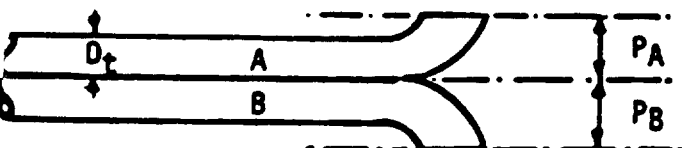


$$u = A \sin \theta / ^\circ$$

$$V = A \sin \theta / ^\circ$$



A-SIDE PLANE



B-SIDE PLANE

0.389 0.955
 $1.05 D_t < P < 1.50 D_t$
 $P_A = P_B$
 $2.10 D_t < A < 3.00 D_t$
 0.777 1.110

CONTROL BOX CALIBRATION

THREE POINT CALIBRATION

BOX # 1 BP 28.96
DATE 10-05-90 OPERATOR KS

WET TEST METER				DRY TEST METER						METER CORRECT Y	ORIFICE COEFFICIENT H@
TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD			
START		0.000	28.96				0.50	887.993			
HALF	77.0			99.0	94.0	96.5					
STOP	13.10	5.000						893.236			
CALCULATION	13.10	537.0	5.057	28.96		556.5	29.00	5.243		0.9982	1.904
START		0.000	28.96				1.00	893.698			
HALF	77.0			99.0	94.0	96.5					
STOP	9.80	5.000						898.940			
CALCULATION	9.80	537.0	5.057	28.96		556.5	29.03	5.242		0.9971	2.131
START		0.000	28.96				2.00	900.102			
HALF	77.0			102.0	94.0	98.0					
STOP	6.90	5.000						905.323			
CALCULATION	6.90	537.0	5.057	28.96		558.0	29.11	5.221		1.0013	2.107
AVERAGE										0.9989	2.047

POST TEST

BOX # 1 BP 28.87
 DATE 11-27-90 OPERATOR RPC

<u>WET TEST METER</u>				<u>DRY TEST METER</u>						<u>METER CORRECT</u>		<u>ORIFICE COEFFICIENT</u>
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	Y		H@
START			0.000	28.87				0.75	308.800			
HALF		80.0			92.0	84.0	88.0					
STOP	9.97		5.000						313.945			
CALCULATION	9.97	540.0	5.057	28.87			548.0	28.93	5.145	0.9955		1.704
START			0.000	28.87				0.75	314.700			
HALF		80.0			92.0	84.0	88.0					
STOP	9.97		5.000						319.873			
CALCULATION	9.97	540.0	5.057	28.87			548.0	28.93	5.173	0.9901		1.704
START			0.000	28.87				0.75	321.100			
HALF		80.0			94.0	85.0	89.5					
STOP	9.95		5.000						326.261			
CALCULATION	9.95	540.0	5.057	28.87			549.5	28.93	5.161	0.9951		1.692
AVERAGE										0.9935		1.700
DIFFERENCE										0.54%		20.42%

MAGNEHELIC CALIBRATION

DATE 10-05-90
OPERATOR KS

0 to 10" H2O RANGE

MAGNEHELIC DELTA P	MANOMETER
0.50	0.49
1.00	0.99
2.00	2.00
4.00	4.00
6.00	6.00
8.00	8.00

0 to 0.50" H2O RANGE

MAGNEHELIC DELTA P	MANOMETER
0.50	0.49
0.40	0.39
0.30	0.29
0.20	0.19
0.10	0.10

0 to 5" H2O RANGE

MAGNEHELIC DELTA H	MANOMETER
4.00	4.00
3.00	3.00
2.00	2.00
1.00	1.00
0.50	0.48

LEAK CHECK

DATE 11-27-90
OPERATOR RPC

START CF	STOP CF	VOLUME CF	TIME (min)	LEAK RATE
300.380	300.520	0.140	10.000	0.000
0.000	0.140	0.140		
DRY				
WET				

PYROMETER CALIBRATION

DATE 04-28-88
OPERATOR AGL

mV input	F	TEMP
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
	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 11-27-90
OPERATOR RPC

mV input	F	TEMP	READING	F
0.18	40	40	40.0	
0.40	50	50	50.0	
0.84	70	70	70.0	
1.29	90	90	89.0	
1.74	110	110	109.0	
2.66	150	150	150.0	
3.82	200	200	200.0	
6.09	300	300	301.0	
8.31	400	400	400.0	
10.57	500	500	500.0	

Name: RICHARD P. CASSELEGARY, SR.

Phone: _____

Date 12-06-90 Train ID Box # 1 DGM Cal. Factor, Y .9989 Orifice No. BAPC-3Type of Meter Box NAPP Type of Pump DIAPHRAM

		Run Number			
		Example	<u>1</u>	<u>2</u>	<u>3</u>
DGM					
Final reading	ft ³	966.461	<u>344.579</u>	<u>351.701</u>	<u>358.845</u>
Initial reading	ft ³	946.602	<u>337.500</u>	<u>344.579</u>	<u>351.701</u>
Difference, V _m	ft ³	9.859	<u>7.079</u>	<u>7.122</u>	<u>7.144</u>
Percent Accuracy, %A					
Inlet/Outlet temperatures					
Initial	°F.	103.88	<u>73.172</u>	<u>75.175</u>	<u>77.176</u>
After 5 minutes		110.88	<u>76.173</u>	<u>78.176</u>	<u>79.177</u>
After 10 minutes		111.88	<u>76.174</u>	<u>78.176</u>	<u>79.178</u>
Final		112.89	<u>76.174</u>	<u>78.177</u>	<u>79.178</u>
Avg. temperature, t _d	°F/°R	99.3/559.3	<u>74.29/534.25</u>	<u>76.6/536.6</u>	<u>77.9/537</u>
Time, θ	min	15.0	<u>15.0</u>	<u>15.0</u>	<u>15.0</u>
Orifice man. rdg., delta H		1.35	<u>.65</u>	<u>.65</u>	<u>.65</u>
Bar. pressure, P _{bar}		29.75	<u>28.75</u>	<u>28.75</u>	<u>28.75</u>
Ambient temperature, t _a	°F/°C	74/23.3	<u>76.124.4</u>	<u>76.124.4</u>	<u>76.124</u>
Pump vacuum	in. Hg	18.8	<u>21.0</u>	<u>21.0</u>	<u>21.0</u>
V _m (std)'	ft ³	9.2815	<u>6.721</u>	<u>6.734</u>	<u>6.741</u>
DGM cal. factor, Y _c		1.0593	<u>.9989</u>	<u>.9989</u>	<u>.9989</u>
*V _m (std) (M)	m ³	0.2629			

*If you calculate dry gas volume in English Units, use the conversion factor of 0.02832 m³/ft³ to obtain the volume in metric units.

Data Sheet

VOLUMETRIC FLOW DEVICE CALCULATION SHEET

$$\text{Eq. 8-1} \quad Vm(\text{std}) = VmY \left(\frac{T_{\text{std}}}{T_m} \right) \left(\frac{P_{\text{bar}} + \frac{\Delta H}{13.6}}{P_{\text{std}}} \right)$$

$$\text{Run \#1} \quad Vm(\text{std})' = Vm \times Y \times \frac{528}{T_m} \times \left(\frac{P_{\text{bar}} + \frac{\Delta H}{13.6}}{29.92} \right)$$

$$Vm(\text{std})' = \frac{(7.079)(.9989)(.988)(.962)}{}$$

$$Vm(\text{std})' = \underline{6.721} \text{ ft}^3 \text{ (round to 3 decimals)}$$

$$\text{Run \#2} \quad Vm(\text{std})' = \frac{(7.122)(.9989)(.984)(.962)}{}$$

$$Vm(\text{std})' = \underline{6.734} \text{ ft}^3$$

$$\text{Run \#3} \quad Vm(\text{std})' = \frac{(7.144)(.9989)(.982)(.962)}{}$$

$$Vm(\text{std})' = \underline{6.741} \text{ ft}^3$$

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

$$V_{\text{std}}(\text{M}) = \underline{6.732} \text{ ft}^3$$

(To Be Completed By Auditor)

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

$$\% A = \underline{\hspace{2cm}} \times 100$$

$$\% A = \underline{\hspace{2cm}} \%$$

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY COMBUSTION STACK**

APPENDIX C

FIELD DATA SHEETS FOR PARTICULATE MATTER EMISSIONS

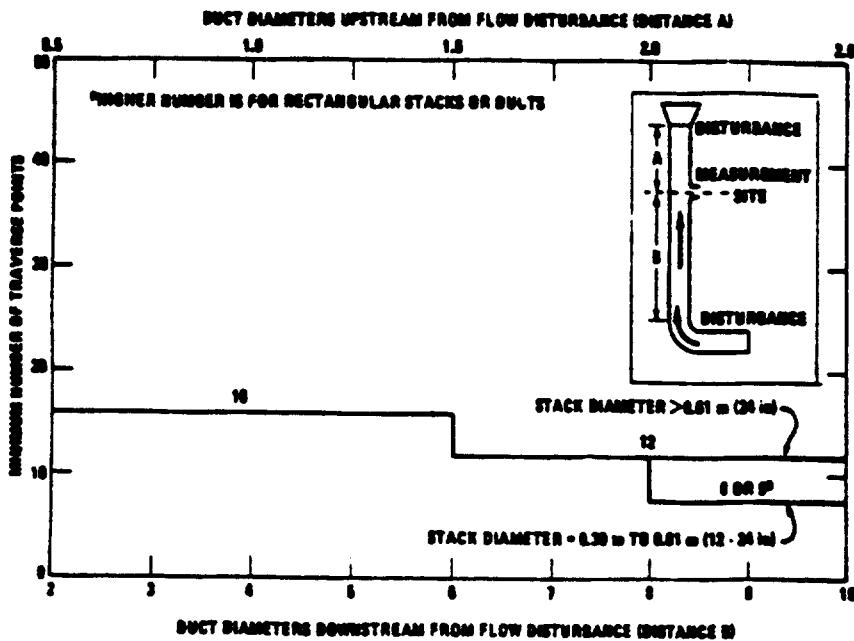
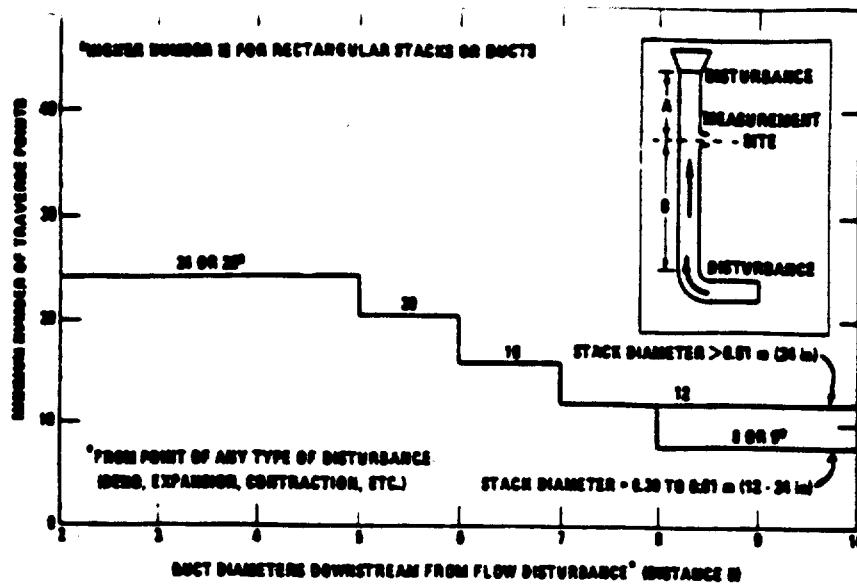


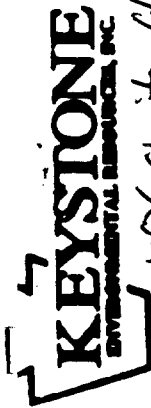
TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[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	9.8	8.5	7.5	6.7	6.0	5.5
4		83.3	70.4	32.3	22.8	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	18.6	16.5	14.6	13.2
7				88.5	77.4	64.4	38.6	26.3	23.6	20.4	18.0	16.1
8				98.8	85.4	75.0	63.4	37.5	29.6	25.0	21.6	19.4
9					91.6	82.3	73.1	62.5	36.2	30.6	26.2	23.0
10					97.4	86.2	79.9	71.7	61.6	38.6	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	66.4	40.7	36.6
13							94.3	87.5	81.2	75.0	66.5	40.2
14							98.2	91.5	85.4	79.6	73.6	47.7
15								96.1	89.1	83.6	78.2	72.6
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	86.6
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	Measure layout
9	30
12	40
16	50
20	60
24	70
28	80
32	90
36	100
40	110
44	120
48	130



STACK SAMPLING DATA SHEET

PLANT: USX Clouston Lake Works DATE: 11-14-90 AM: 2:047 (10-5-90) HOT BOX NO.: 1
LOCATION: #19 Battery Combustion TEST NO.: CLR-19CS-1 METER CORRECTION: 0.9989 COLD BOX NO.: 1
ACTIVITY NO.: Stack NOZZLE: #56 0.429 PITOT CORRECTION: 0.84 PROBE NO.: 10-2
CONTROL BOX OPERATOR: Stack CONTROL BOX NO.: 1 FILTER NO.: 503
PROBE HANDLER: Stack STATIC PRESSURE PS: -1.4 MONOGRAPH SET POINT: 186 STACK DIA.: 186
CLEAN UP: Stack PORT DIRECTION: A, B LENGTHS OF UMBILICAL: 25' x 50'

Point	Time	Meter Reading (dry) CF	Velocity in. H ₂ O	Orifice in. H ₂ O		Meter Temp. °F		Vacuum in. Hg	Stack Temp. °F	Probe Temp. °F	Imp. Temp. °C/°F	Hot Box Temp. °F	Comments
				Req.	Act.	In	Out						
46.2	0833	036.301	0.045	0.76	0.76	50	47	4.0	522	260	56.8 °F / 132 °F	250	Smile/pt
46.5			0.045	0.76	0.76	56	49	4.0	537				
33.0			0.020	0.33	0.33	56	49	3.0	487				
22.0			0.025	0.41	0.41	56	49	3.0	492				
12.5			0.020	0.33	0.33	56	50	3.0	491				
4.0	0903	046.407	0.010	0.17	0.17	56	50	2.5	480				
66.2	0907	046.407	0.025	0.41	0.41	56	52	3.0	497				
46.5			0.030	0.50	0.50	60	53	3.5	502				
33.0			0.030	0.50	0.50	60	53	3.5	508				
22.0			0.025	0.41	0.41	60	53	3.0	509				
12.5			0.020	0.33	0.33	60	53	3.0	490				
4.0	0937	056.898	0.015	0.25	0.25	59	51	2.5	483				

Impinger No.	Final	Twilink	Difference
1	635.6	517.6	118.0
2	567.6	550.0	17.6
3	475.9	474.1	1.8
4	636.2	628.1	8.1
5			

100ml H₂O
100ml H₂O
empty
Silica Gel

ORSAT		1		2		3	
CO ₂	4.5						
O ₂	11.5						
CO	0						
N	84.0						

LEAK CHECK		Rate	
Before	5.5	10.02	CFM
After	5.0	0.018	CFM

11-14-90



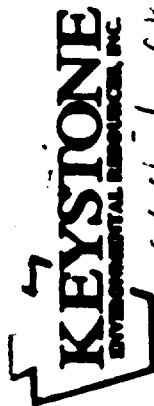
STACK SAMPLING DATA SHEET

PLANT: USX Clouston Coke Works DATE: 11-14-90 AM#: 2.047 (10-5-90) HOT BOX NO.: 1
LOCATION: #19 Bethel Combustion TEST NO.: CLR-19CS-1 METER CORRECTION: 0.9989 COLD BOX NO.: 1
ACTIVITY NO.: Stack NOZZLE: #56 0.429 PITOT CORRECTION: 0.84 PROBE NO.: 10-2
CONTROL BOX OPERATOR: Static Pressure Ps: -1.4 CONTROL BOX NO.: 1 FILTER NO.: 503
PROBE HANDLER: Port Direction: C, D MONOGRAPH SET POINT: Stack Dia.: 186"
CLEAN UP: Barometric Pressure 29.80 LENGTHS OF UMBILICAL: x 25' x 50'

Point	Time	Meter Reading (dry) CF	Velocity in. H ₂ O	Orifice in. H ₂ O		Meter Temp. °F		Vacuum in. Hg	Stack Temp. °F	Probe Temp. T _p °F	Imp. Temp. T _i °C/°F	Hot Box Temp. T _H °F	Comments
				Reg.	Act.	In	Out						
66.2	0941	0.56.898	0.030	0.50	0.50	61	57	3.5	477	260	168°F Lead Down	250	Smippt
46.5			0.035	0.60	0.60	64	57	3.5	485				
33.0			0.035	0.60	0.60	65	57	3.5	457				
22.0			0.035	0.60	0.60	66	58	3.5	457				
12.5			0.040	0.69	0.69	66	59	4.0	471				
4.0	1011	0.68.840	0.015	0.26	0.26	66	59	2.5	470				
66.2	1020	0.68.840	0.035	0.60	0.60	65	62	3.5	572				
46.5			0.053	0.95	0.95	70	62	5.0	575				
33.0			0.053	0.95	0.95	71	62	5.0	516				
22.0			0.053	0.95	0.95	72	62	5.0	534				
12.5			0.035	0.61	0.61	71	62	4.0	474				
4.0	1050	0.83.386	0.035	0.61	0.61	70	63	4.0	469				

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

LEAK CHECK				ORSAT			
Before	in Hg	Rate		1	2	3	



STACK SAMPLING DATA SHEET

PLANT: USX Charleston Coke Works DATE: 11-14-90 AM#: 2.047 (10-5-90) HOT BOX NO.: 7
LOCATION: H9 Battery Combustion TEST NO.: QR-19CS-2 METER CORRECTION: 0.9989 COLD BOX NO.: 7
ACTIVITY NO.: Stack NOZZLE: #50 0.431 PITOT CORRECTION: 0.84 PROBE NO.: 10-1
CONTROL BOX OPERATOR: Static Pressure Ps: -1.4 CONTROL BOX NO.: 1 FILTER NO.: 502
PROBE HANDLER: PORT DIRECTION: D, C MONOGRAPH SET POINT: STACK DIA.: 186"
CLEAN UP: BAROMETRIC PRESSURE 29.20 LENGTHS OF UMBILICAL x 25' x 50'

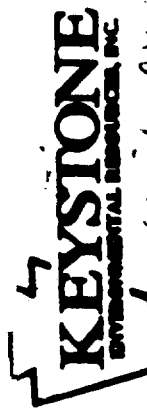
Point	Time	Meter Reading (dry) CF	Velocity in. H ₂ O	Orifice in. H ₂ O		Meter Temp. °F		Vacuum in. Hg	Stack Temp. °F	Probe Temp. T _p °F	Imp. Temp. T _i °C/°F	Hot Box Temp. T _h °F	Comments
				Req.	Act.	In	Out						
66.2	1101	0.933630	0.055	0.98	0.98	69	65	3.0	450	260	46.54F Teal Dwn	250	5 min up
46.5			0.055	0.98	0.98	74	66	3.0	506				
33.0			0.040	0.71	0.71	74	67	2.5	486				
22.0			0.050	0.89	0.89	75	67	3.0	497				
12.5			0.045	0.80	0.80	76	67	3.0	503				
4.0	1131	0.98335	0.020	0.36	0.36	71	67	1.5	487				
66.2	1134	0.98335	0.030	0.53	0.53	73	68	2.0	470				
46.5			0.030	0.53	0.53	76	69	2.0	478				
33.0			0.035	0.62	0.62	77	70	2.0	446				
22.0			0.035	0.62	0.62	77	71	2.0	449				
12.5			0.046	0.83	0.83	78	71	3.0	452				
4.0	1204	110.882	0.015	0.28	0.28	78	71	1.5	451				

Impinger No.	Final	Twilink	Difference
1	647.5	531.2	110.3
2	601.8	582.1	119.7
3	468.3	466.2	2.1
4	664.6	656.1	8.5
5			

100ml H₂O
100ml H₂O
empty
Silica Gel

ORSAI		
1	2	3
CO ₂	4.0	
O ₂	10.5	
CO	0	
N	85.5	

LEAK CHECK		Rate
in Hg		CFM
Before	5.0	0.02
After	3.0	0.005



STACK SAMPLING DATA SHEET

PLANT: USX Claitor Coke Works DATE: 11-14-90 AWP: 2047 (10-5-90) HOT BOX NO.: 7
LOCATION: #19 Bedley Combustion TEST NO.: CLE-19CS-2 METER CORRECTION: 0.9989 COLD BOX NO.: 7
ACTIVITY NO.: Stack Nozzle: #50 0.431 PITOT CORRECTION: 0.81 PROBE NO.: 10-1
CONTROL BOX OPERATOR: Stack Nozzle CONTROL BOX NO.: 1 FILTER NO.: 502
PROBE HANDLER: B, A STATIC PRESSURE PS: -1.4 MONOGRAPH SET POINT: 186"
CLEAN UP: BAROMETRIC PRESSURE 29.80 LENGTHS OF UMBILICAL x 25' x 50'

Point	Time	Meter Reading (dry) CF	Velocity HD in. H ₂ O	Orifice in. H ₂ O Reg.	Orifice Act.	Meter Temp. °F		Vacuum Vm in. Hg	Stack Temp. T _s °F	Probe Temp. T _p °F	Imp. Temp. T _i °C/°F	Hot Box Temp. T _H °F	Comments
						In	Out						
66.2	1257	110.882	0.045	0.83	0.83	77	72	3.0	477	260	485	250	5 min/pst
46.5			0.035	0.64	0.64	81	74	2.5	483				
33.0			0.035	0.64	0.64	81	74	2.5	489				
22.0			0.025	0.46	0.46	80	74	2.0	495				
12.5			0.025	0.46	0.46	79	73	2.0	488				
4.0	1237	123.600	0.025	0.46	0.46	78	72	2.0	486				
66.2	1243	123.600	0.025	0.46	0.46	75	72	2.0	485				
46.5			0.025	0.46	0.46	77	72	2.0	490				
33.0			0.020	0.37	0.37	77	71	2.0	492				
22.0			0.020	0.37	0.37	77	71	2.0	498				
12.5			0.020	0.37	0.37	77	70	2.0	489				
4.0	1313	133.753	0.015	0.28	0.28	76	70	1.5	482				

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

LEAK CHECK			
Before	After	in Hg	Rate

ORSAT			
1	2	3	
CO ₂			
O ₂			
CO			
N			

KEYSTONE

ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clanton Coke Works DATE: 11-14-90 AM#: 2.047 (10-5-90) HOT BOX NO.: 5
 LOCATION: #19 Battery Combustion TEST NO.: CUR-19CS-3 METER CORRECTION: 0.9989 COLD BOX NO.: 5
 ACTIVITY NO.: Stack NOZZLE: #56 0.429 PITOT CORRECTION: 0.834 PROBE NO.: 10-2
 CONTROL BOX OPERATOR: Stack STATIC PRESSURE PS: -14 CONTROL BOX NO.: 1 FILTER NO.: 495
 PROBE HANDLER: AB PORT DIRECTION: AB MONOGRAPH SET POINT: 186" STACK DIA.: 186"
 BAROMETRIC PRESSURE 29.30 LENGTHS OF UMBILICAL x 25' x 50'

Point	Time	Meter Reading (dry) CF	Velocity in. H ₂ O	Orifice in. H ₂ O		Meter Temp. °F		Vacuum in. Hg	Stack Temp. °F	Probe Temp. T ₀ °F	Imp. Temp. T ₁ °C/°F	Hot Box Temp. T _H °F	Comments
				Reg.	Act.	In	Out						
66.2	1318	133.900	0.030	0.54	0.54	75	72	3.5	494	260	48°F	250	Sample
46.5			0.020	0.36	0.36	78	73	2.5	512				
33.0			0.020	0.36	0.36	79	73	2.5	513				
22.0			0.025	0.45	0.45	80	74	3.0	506				
12.5			0.020	0.36	0.36	80	74	2.5	492				
4.0	1348	143.852	0.010	0.18	0.18	80	74	1.5	483				
66.2	1350	143.852	0.035	0.62	0.62	80	76	3.5	493				
46.5			0.030	0.54	0.54	82	76	3.0	502				
33.0			0.035	0.63	0.63	83	76	3.5	514				
22.0			0.035	0.63	0.63	83	76	3.5	521				
12.5			0.035	0.63	0.63	83	76	3.5	483				
4.0	1420	156.494	0.020	0.36	0.36	81	76	2.5	472				

Impinger No.

Final

Twink

Difference

100ml 460

100ml 460

empty

Silled 60d

662.1

494.2

417.3

670.8

655.9

551.8

480.2

416.1

15.1

ORSAT

3

2

1

CO₂O₂

CO

N

4.0

12.0

0

184.0

Rate

<0.02

cfm

Before

After

4.0

5.0

10.0

12



STACK SAMPLING DATA SHEET

PLANT: USX Claiton Coke Works DATE: 11-14-90 AHP: 2.047 40-5-90 HOT BOX NO.: 5
LOCATION: #19 Bethany Combustion TEST NO.: CR-19CS-3 METER CORRECTION: 0.9989 COLD BOX NO.: 5
ACTIVITY NO.: Stack NOZZLE: #56 0.429 PITOT CORRECTION: 0.84 PROBE NO.: 10-2
CONTROL BOX OPERATOR: Stack STATIC PRESSURE PS: -1.4 CONTROL BOX NO.: 1 FILTER NO.: 495
PROBE HANDLER: C.D. PORT DIRECTION: C.D. MONOGRAPH SET POINT: 25 STACK DIA.: 186"
CLEAN UP: BAROMETRIC PRESSURE 29.80 LENGTHS OF UMBILICAL 25 x 50

Point	Time	Meter Reading (dry) CF	Velocity HD in. H ₂ O	Orifice ΔH in. H ₂ O		Meter Temp. °F		Vacuum Vm in. Hg	Stack Temp. °F	Probe Temp. °F	Imp. Temp. °C/°F	Hot Box Temp. °F	Comments
				Req.	Act.	In	Out						
66.2	1423	156.494	0.030	0.54	0.54	81	77	3.0	487	260	268°F Feed Run	250	5mcs/pt
46.5			0.030	0.54	0.54	82	77	3.0	491				
37.0			0.040	0.72	0.72	82	76	4.0	481				
22.0			0.040	0.72	0.72	82	75	4.0	481				
12.5			0.035	0.63	0.63	81	75	4.0	480				
4.0	1453	169.240	0.020	0.30	0.30	79	73	2.0	473				
66.2	1455	169.240	0.035	0.63	0.63	78	73	3.5	501				
46.5			0.045	0.81	0.81	80	73	4.5	516				
33.0			0.045	0.81	0.81	80	74	4.5	516				
22.0			0.045	0.81	0.81	82	74	4.5	495				
12.5			0.045	0.81	0.81	82	75	4.5	500				
4.0	1525	184.065	0.045	0.81	0.81	83	75	4.5	489				

Impinger No. 1 2 3 4 5
Initial Final Difference

LEAK CHECK		ORSAT			
	in Hg	Rate	1	2	3
Before			CO ₂		
After			O ₂		
			CO		
			N		

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY COMBUSTION STACK**

**APPENDIX D
PARTICULATE MATTER EMISSIONS CALCULATIONS**

Plant: Clinton Steel **Date:** 11/19/90

Activity No. 601050-11

PARTICULATE REPORTING FORM

[illegible]

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY
COMBUSTION STACK

DATE:11-14-90
CHARGE #: ...150-601050
TEST #:CLR-19CS-1

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00830	5.25161

2. STACK CONDITIONS

FLOW (ACFM)	153100.
(SCFM)	84173.
MOISTURE CONTENT (%)	12.33
STACK TEMPERATURE (F)	493.2

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	48.783
PERCENT ISOKINETIC	103.55

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-1 11-14-90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER READING (DRY) CF	DELTA P IN. H2O	ORIFICE DELTA H		METER TEMP DEG F		VACUUM IN. HG.	STACK TEMP DEG	CORRECTED VELOCITY FFT/SEC
				REQ	ACT	IN	OUT			
66.2A	833.0	35.301	.045	.76	.76	50.	47.	4.0	522.	16.6
46.5A			.045	.76	.76	56.	49.	4.0	537.	16.7
33.0A			.020	.33	.33	56.	49.	3.0	487.	10.8
22.0A			.025	.41	.41	56.	49.	3.0	492.	12.2
12.5A			.020	.33	.33	56.	50.	3.0	491.	10.9
4.0A	903.0	46.407	.010	.17	.17	56.	50.	2.5	480.	7.6
66.2B	907.0	46.407	.025	.41	.41	56.	52.	3.0	497.	12.2
46.5B			.030	.50	.50	60.	53.	3.5	502.	13.4
33.0B			.030	.50	.50	60.	53.	3.5	508.	13.4
22.0B			.025	.41	.41	60.	53.	3.0	509.	12.3
12.5B			.020	.33	.33	60.	53.	3.0	490.	10.9
4.0B	937.0	56.898	.015	.25	.25	59.	54.	2.5	483.	9.4
66.2C	941.0	56.898	.030	.50	.50	61.	57.	3.5	479.	13.2
46.5C			.035	.60	.60	64.	57.	3.5	485.	14.3
33.0C			.035	.60	.60	65.	57.	3.5	457.	14.1
22.0C			.035	.60	.60	66.	58.	3.5	457.	14.1
12.5C			.040	.69	.69	66.	59.	4.0	471.	15.2
4.0C	1011.0	68.840	.015	.26	.26	66.	59.	2.5	470.	9.3
66.2D	1020.0	68.840	.035	.60	.60	65.	62.	3.5	512.	14.5
46.5D			.055	.95	.95	70.	62.	5.0	515.	18.3
33.0D			.055	.95	.95	71.	62.	5.0	516.	18.3
22.0D			.055	.95	.95	72.	62.	5.0	534.	18.4
12.5D			.035	.61	.61	71.	62.	4.0	474.	14.2
4.0D	1050.0	83.386	.035	.61	.61	70.	63.	4.0	469.	14.2

O R S A T

CO2 4.5
O2 11.5
CO .0
N 84.0

IMPINGER NO. 1 118.0

2 17.6

3 1.8

4 .0

ABSORBED H2O 8.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	2.047	10-05-90
METER	0.9989	10-05-90
PITOT	0.84	11-12-90

LEAK CHECK

	RATE	IN. HG
INITIAL LT	0.02CFM	5.5
FINAL LT	0.02CFM	5.0

CONTROL BOX NO. 1

PROBE NO. 10-2

NOZZLE NO. 56

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-1 11-14-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.80
B.	AVG. DELTA H (IN H2O).....	.54
C.	METER PRESSURE (IN. HG.).....	29.84
D.	STATIC PRESSURE (IN. H2O).....	-1.40
E.	STATIC PRESSURE (IN. HG.).....	-.103
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.70
G.	STACK DIAMETER (IN.).....	186.00
H.	STACK AREA (SQ. FT.).....	188.69
	NOZZLE DIAMETER.....	.4290
I.	NOZZLE AREA (SQ. FT.).....	.001004
J.	AVG. STACK TEMP (DEG. R.).....	953.2
K.	AVG. METER TEMP (DEG. R.).....	518.8
L.	CONDENSATE VOL. (ML).....	137.4
M.	ABSORBED H2O (ML).....	8.1
N.	TOTAL H2O (ML).....	145.5
O.	METERED GAS (CF).....	48.085
P.	GAS METER CORRECTION.....	.9989
Q.	CORRECTED METERED GAS (CF).....	48.032
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	6.755
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	54.787
T.	PERCENT H2O (100R/S).....	12.33
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	12.33
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	48.783

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	.8767	X	44.0	=	1.74
CO	.000	X	.8767	X	28.0	=	.00
O2	.115	X	.8767	X	32.0	=	3.23
N2	.840	X	.8767	X	28.2	=	20.77
H2O		X	T/100= .1233	X	18.0	=	2.22
MOLECULAR WEIGHT OF STACK GAS							= 27.95

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	13.52
	[85.49*W*SQRT{(J*DELTA P)/(V*F)}]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	153100.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	84173.
	STACK FLOW RATE (DRY).....	73795.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	103.55
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-1 11-14-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.01890	.00000	.00740

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

PARTICULATE	.02630
-------------	--------

ALL MATLS.	.02630
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PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00830	5.25161

Emission rates are based on EPA Method 5.

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY
COMBUSTION STACK

DATE:11-14-90
CHARGE #: ...150-601050
TEST #:CLR-19CS-2

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00756	4.85624

2. STACK CONDITIONS

FLOW (ACFM)	152449.
(SCFM)	84936.
MOISTURE CONTENT (%)	11.82
STACK TEMPERATURE (F)	480.6

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	49.472
PERCENT ISOKINETIC	102.51

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-2 11-14-90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER	DELTA P	ORIFICE		METER		VACUUM	STACK	CORRECTED
		READING (DRY) CF		DELTA H	REQ ACT	DEG F	IN OUT			
			IN.H2O					IN.HG.	TEMP	VELOCITY
									DEG	FFT/SEC
66.2D	1101.0	83.630	.055	.98	.98	69.	65.	3.0	456.	17.7
46.5D			.055	.98	.98	74.	66.	3.0	506.	18.2
33.0D			.040	.71	.71	74.	67.	2.5	486.	15.3
22.0D			.050	.89	.89	75.	67.	3.0	497.	17.3
12.5D			.045	.80	.80	76.	67.	3.0	503.	16.4
4.0D	1131.0	98.355	.020	.36	.36	74.	67.	1.5	487.	10.9
66.2C	1134.0	98.355	.030	.53	.53	73.	68.	2.0	470.	13.2
46.5C			.030	.53	.53	76.	69.	2.0	478.	13.2
33.0C			.035	.62	.62	77.	70.	2.0	446.	14.0
22.0C			.035	.62	.62	77.	71.	2.0	449.	14.1
12.5C			.045	.83	.83	78.	71.	3.0	452.	16.0
4.0C	1204.0	110.882	.015	.28	.28	78.	71.	1.5	451.	9.2
66.2B	1207.0	110.882	.045	.83	.83	77.	72.	3.0	477.	16.2
46.5B			.035	.64	.64	81.	74.	2.5	483.	14.3
33.0B			.035	.64	.64	81.	74.	2.5	489.	14.4
22.0B			.025	.46	.46	80.	74.	2.0	495.	12.2
12.5B			.025	.46	.46	79.	73.	2.0	488.	12.1
4.0B	1237.0	123.600	.025	.46	.46	78.	72.	2.0	486.	12.1
66.2A	1243.0	123.600	.025	.46	.46	75.	72.	2.0	485.	12.1
46.5A			.025	.46	.46	77.	72.	2.0	490.	12.2
33.0A			.020	.37	.37	77.	71.	2.0	492.	10.9
22.0A			.020	.37	.37	77.	71.	2.0	498.	10.9
12.5A			.020	.37	.37	77.	70.	2.0	489.	10.9
4.0A	1313.0	133.753	.015	.28	.28	76.	70.	1.5	482.	9.4

O R S A T

CO2	4.0	IMPINGER NO. 1	110.3
O2	10.5	2	19.7
CO	.0	3	2.1
N	85.5	4	.0
		ABSORBED H2O	8.5

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	2.047	10-05-90
METER	0.9989	10-05-90
PITOT	0.84	11-12-90

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	5.0
FINAL LT	0.02CFM	3.0

CONTROL BOX NO. 1

PROBE NO. 10-1

NOZZLE NO. 50

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-2 11-14-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.80
B.	AVG. DELTA H (IN H2O).....	.58
C.	METER PRESSURE (IN. HG.).....	29.84
D.	STATIC PRESSURE (IN. H2O).....	-1.40
E.	STATIC PRESSURE (IN. HG.).....	-.103
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.70
G.	STACK DIAMETER (IN.).....	186.00
H.	STACK AREA (SQ. FT.).....	188.69
	NOZZLE DIAMETER.....	.4310
I.	NOZZLE AREA (SQ. FT.).....	.001013
J.	AVG. STACK TEMP (DEG. R.).....	940.6
K.	AVG. METER TEMP (DEG. R.).....	533.3
L.	CONDENSATE VOL. (ML).....	132.1
M.	ABSORBED H2O (ML).....	8.5
N.	TOTAL H2O (ML).....	140.6
O.	METERED GAS (CF).....	50.123
P.	GAS METER CORRECTION.....	.9989
Q.	CORRECTED METERED GAS (CF).....	50.068
R.	H2O GAS VOLUME (CF) (0.00267N(K/C)).....	6.709
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	56.777
T.	PERCENT H2O (100R/S).....	11.82
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	11.82
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	49.472

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	.8818	X	44.0	=	1.55
CO	.000	X	.8818	X	28.0	=	.00
O2	.105	X	.8818	X	32.0	=	2.96
N2	.855	X	.8818	X	28.2	=	21.26
H2O		X	T/100= .1182	X	18.0	=	2.13
MOLECULAR WEIGHT OF STACK GAS							= 27.90

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	13.47
	[85.49*W*SQRT{(J*DELTA P)/(V*F)}]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	152449.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	84936.
	STACK FLOW RATE (DRY).....	74900.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	102.51
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLAIRTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-2 11-14-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.01610	.00000	.00820

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

PARTICULATE	.02430
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ALL MATLS.	.02430
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PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.00756	4.85624

Emission rates are based on EPA Method 5.

KEYSTONE ENVIRONMENTAL RESOURCES
AIR QUALITY ENGINEERING

USX CLARTON COKE WORKS
#19 BATTERY
COMBUSTION STACK

DATE:11-14-90
CHARGE #: ...150-601050
TEST #:CLR-19CS-3

1. EMISSION RESULTS

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.02167	13.84555

2. STACK CONDITIONS

FLOW (ACFM)	154290.
(SCFM)	84613.
MOISTURE CONTENT (%)	11.89
STACK TEMPERATURE (F)	495.6

3. SAMPLING CONDITIONS

SAMPLE TIME (MIN.)	120.0
SCFD GAS SAMPLED	49.112
PERCENT ISOKINETIC	103.20

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLARTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-3 11-14-90

FIELD DATA AND VELOCITY CALCULATIONS

POINT	TIME	METER	DELTA P	ORIFICE		METER		VACUUM	STACK	CORRECTED
		READING (DRY)CF		DELTA H	REQ ACT	DEG F	IN OUT		TEMP	VELOCITY
			IN.H2O					IN.HG.	DEG	FFT/SEC
66.2A	1318.0	133.900	.030	.54	.54	75.	72.	3.5	494.	13.3
46.5A			.020	.36	.36	78.	73.	2.5	512.	11.0
33.0A			.020	.36	.36	79.	73.	2.5	513.	11.0
22.0A			.025	.45	.45	80.	74.	3.0	506.	12.2
12.5A			.020	.36	.36	80.	74.	2.5	492.	10.9
4.0A	1348.0	143.852	.010	.18	.18	80.	74.	1.5	483.	7.7
66.2B	1350.0	143.852	.035	.62	.62	80.	76.	3.5	493.	14.4
46.5B			.030	.54	.54	82.	76.	3.0	502.	13.4
33.0B			.036	.63	.63	83.	76.	3.5	514.	14.8
22.0B			.035	.63	.63	83.	76.	3.5	521.	14.6
12.5B			.035	.63	.63	83.	76.	3.5	483.	14.3
4.0B	1420.0	156.494	.020	.36	.36	81.	76.	2.5	472.	10.8
66.2C	1423.0	156.494	.030	.54	.54	81.	77.	3.0	487.	13.3
46.5C			.030	.54	.54	82.	77.	3.0	491.	13.3
33.0C			.040	.72	.72	82.	76.	4.0	481.	15.3
22.0C			.040	.72	.72	82.	75.	4.0	481.	15.3
12.5C			.035	.63	.63	81.	75.	4.0	480.	14.3
4.0C	1453.0	169.240	.020	.36	.36	79.	73.	2.0	473.	10.8
66.2D	1455.0	169.240	.035	.63	.63	78.	73.	3.5	501.	14.5
46.5D			.045	.81	.81	80.	73.	4.5	516.	16.5
33.0D			.045	.81	.81	80.	74.	4.5	516.	16.5
22.0D			.045	.81	.81	82.	74.	4.5	495.	16.3
12.5D			.045	.81	.81	82.	75.	4.5	500.	16.4
4.0D	1525.0	184.065	.045	.81	.81	83.	75.	4.5	489.	16.3

O R S A T

CO2 4.0 IMPINGER NO. 1 110.3
O2 12.0 2 14.0
CO .0 3 1.2
N 84.0 4 .0

ABSORBED H2O 15.1

CONTROL BOX CALIBRATIONS

	FACTOR	DATE
ORIFICE	2.047	10-05-90
METER	0.9989	10-05-90
PITOT	0.84	11-12-90

LEAK CHECK

	RATE	IN.HG
INITIAL LT	0.02CFM	4.0
FINAL LT	0.02CFM	5.0

CONTROL BOX NO. 1

PROBE NO. 10-2

NOZZLE NO. 56

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLARTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-3 11-14-90

STACK SAMPLING CALCULATIONS

A.	BAROMETRIC PRESSURE IN. HG.....	29.80
B.	AVG. DELTA H (IN H2O).....	.58
C.	METER PRESSURE (IN. HG.).....	29.84
D.	STATIC PRESSURE (IN. H2O).....	-1.40
E.	STATIC PRESSURE (IN. HG.).....	-.103
F.	STACK PRESSURE (IN. HG.) (A+E).....	29.70
G.	STACK DIAMETER (IN.).....	186.00
H.	STACK AREA (SQ. FT.).....	188.69
	NOZZLE DIAMETER.....	.4290
I.	NOZZLE AREA (SQ. FT.).....	.001004
J.	AVG. STACK TEMP (DEG. R.).....	955.6
K.	AVG. METER TEMP (DEG. R.).....	537.7
L.	CONDENSATE VOL. (ML).....	125.5
M.	ABSORBED H2O (ML).....	15.1
N.	TOTAL H2O (ML).....	140.6
O.	METERED GAS (CF).....	50.165
P.	GAS METER CORRECTION.....	.9989
Q.	CORRECTED METERED GAS (CF).....	50.110
R.	H2O GAS VOLUME (CF) (0.00267N(K/C).....	6.764
S.	TOTAL SAMPLED VOLUME (CF) (Q+R).....	56.874
T.	PERCENT H2O (100R/S).....	11.89
	THEORETICAL MAXIMUM.....	100.00
	PERCENT WATER USED.....	11.89
U.	SCFD GAS SAMPLED (528*Q*C/(29.9*K)).....	49.112

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	.8811	X	44.0	=	1.55
CO	.000	X	.8811	X	28.0	=	.00
O2	.120	X	.8811	X	32.0	=	3.38
N2	.840	X	.8811	X	28.2	=	20.87
H2O		X	T/100= .1189	X	18.0	=	2.14
MOLECULAR WEIGHT OF STACK GAS							= 27.95

W.	PITOT CORRECTION.....	.840
X.	AVERAGE CORRECTED VELOCITY (FPS).....	13.63
	[85.49*W*SQRT{(J*DELTA P)/(V*F)}]	
Y.	AVG. FLOW RATE (CFM) (X*H*60).....	154290.
Z.	STACK FLOW RATE (SCFM) (528*Y/J*F/29.92).....	84613.
	STACK FLOW RATE (DRY).....	74550.
AA.	SAMPLE TIME (SEC).....	7200.
BB.	PERCENT ISOKINETIC.....	103.20
	(J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	

KEYSTONE ENVIRONMENTAL RESOURCES, INC.
AIR QUALITY ENGINEERING

USX CLARTON COKE WORKS
#19 BATTERY COMBUSTION STACK
CLR-19CS-3 11-14-90

PARAMETER	CYCLONE WT. (G)	MATL.ON FILTER(G)	INSOL.MATL. IN PROBE(G)	SOL.MATL. IN PROBE(G)
PARTICULATE	.00000	.04330	.00000	.02580

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

PARTICULATE .06910

ALL MATLS. .06910

PARAMETER	GR/SCFD	LB/HR
PARTICULATE	.02167	13.84555

Emission rates are based on EPA Method 5.

**USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY COMBUSTION STACK**

**APPENDIX E
FIELD DATA SHEETS FOR VISIBLE EMISSIONS**

VISIBLE EMISSIONS OBSERVATIONS FORM

19 Stack Test

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clanton

OBSERVATION: START TIME: 8:33

END TIME: 9:33

OBSERVATION POINT:

Walbash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-4

HEIGHT: 200'

WIND:

SPEED: 6 mph

DIRECTION: South

TEMPERATURE: 26°

SKY CONDITION: P. Cloudy

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN:

COMMENTS:

0	—	—	—	—
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	—	—	—	—
5	—	—	—	—
6	—	—	—	—
7	—	—	—	—
8	—	—	—	—
9	—	—	—	—
10	—	—	—	—
11	—	—	—	—
12	—	—	—	—
13	—	—	—	—
14	—	—	—	—
15	—	—	—	—
16	—	—	—	—
17	—	—	—	—
18	—	—	—	—
19	—	—	—	—
20	—	—	—	—
21	—	—	—	—
22	—	—	—	—
23	—	—	—	—
24	—	—	—	—
25	—	—	—	—
26	—	—	—	—
27	—	—	—	—
28	—	—	—	—
29	—	—	—	—

30	—	—	—	—
31	—	—	—	—
32	—	—	—	—
33	—	—	—	—
34	—	—	—	—
35	—	—	—	—
36	—	—	—	—
37	—	—	—	—
38	—	—	—	—
39	—	—	—	—
40	—	—	—	—
41	—	—	—	—
42	—	—	—	—
43	—	—	—	—
44	—	—	—	—
45	—	—	—	—
46	—	—	—	—
47	—	—	—	—
48	—	—	—	—
49	—	—	—	—
50	—	—	—	—
51	—	—	—	—
52	—	—	—	—
53	—	—	—	—
54	—	—	—	—
55	—	—	—	—
56	—	—	—	—
57	—	—	—	—
58	—	—	—	—
59	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

19 Stack Test

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clinton

OBSERVATION: START TIME: 9:33

END TIME: 10:33

OBSERVATION POINT:

Walbass Employee Lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

HEIGHT: 200'

WIND:

SPEED: 6 mph

DIRECTION: South

TEMPERATURE: 32°

SKY CONDITION: Clear-Sunny

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN: Reoli

COMMENTS: _____

0	—	—	—	—
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	—	—	—	—
5	—	—	—	—
6	—	—	—	—
7	—	—	—	—
8	—	—	—	—
9	—	—	—	—
10	—	—	—	—
11	—	—	—	—
12	—	—	—	—
13	—	—	—	—
14	—	—	—	—
15	—	—	—	—
16	—	—	—	—
17	—	—	—	—
18	—	—	—	—
19	—	—	—	—
20	—	—	—	—
21	—	—	—	—
22	—	—	—	—
23	—	—	—	—
24	—	—	—	—
25	—	—	—	—
26	—	—	—	—
27	—	—	—	—
28	—	—	—	—
29	—	—	—	—

30	—	—	—	—
31	—	—	—	—
32	—	—	—	—
33	—	—	—	—
34	—	—	—	—
35	—	—	—	—
36	—	—	—	—
37	—	—	—	—
38	—	—	—	—
39	—	—	—	—
40	—	—	—	—
41	—	—	—	—
42	—	—	—	—
43	—	—	—	—
44	—	—	—	—
45	—	—	—	—
46	—	—	—	—
47	—	—	—	—
48	—	—	—	—
49	—	—	—	—
50	—	—	—	—
51	—	—	—	—
52	—	—	—	—
53	—	—	—	—
54	—	—	—	—
55	—	—	—	—
56	—	—	—	—
57	—	—	—	—
58	—	—	—	—
59	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

19 Stack test

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: CLARTON

OBSERVATION: START TIME: 10:33

END TIME: 11:33

OBSERVATION POINT:

Abash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

HEIGHT: 200'

WIND:

SPEED: 6 mph

DIRECTION: South

TEMPERATURE: 36°

SKY CONDITION: Sunny, Clear

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN: Reali

COMMENTS:

0	—	—	—	—
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	—	—	—	—
5	—	—	—	—
6	—	—	—	—
7	—	—	—	—
8	—	—	—	—
9	—	—	—	—
10	—	—	—	—
11	—	—	—	—
12	—	—	—	—
13	—	—	—	—
14	—	—	—	—
15	—	—	—	—
16	—	—	—	—
17	—	—	—	—
18	—	—	—	—
19	—	—	—	—
20	—	—	—	—
21	—	—	—	—
22	—	—	—	—
23	—	—	—	—
24	—	—	—	—
25	—	—	—	—
26	—	—	—	—
27	—	—	—	—
28	—	—	—	—
29	—	—	—	—

30	—	—	—	—
31	—	—	—	—
32	—	—	—	—
33	—	—	—	—
34	—	—	—	—
35	—	—	—	—
36	—	—	—	—
37	—	—	—	—
38	—	—	—	—
39	—	—	—	—
40	—	—	—	—
41	—	—	—	—
42	—	—	—	—
43	—	—	—	—
44	—	—	—	—
45	—	—	—	—
46	—	—	—	—
47	—	—	—	—
48	—	—	—	—
49	—	—	—	—
50	—	—	—	—
51	—	—	—	—
52	—	—	—	—
53	—	—	—	—
54	—	—	—	—
55	—	—	—	—
56	—	—	—	—
57	—	—	—	—
58	—	—	—	—
59	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: CIAirton

OBSERVATION: START TIME: 11:33

END TIME: 12:33

OBSERVATION POINT:

Walbash employee lot

SOURCE:

DISTANCE: 300

DIRECTION FROM: S-W

HEIGHT: 200

WIND:

SPEED: 6 mph

DIRECTION: South

TEMPERATURE: 44°

SKY CONDITION: Sunny - Clear

BACKGROUND: SKY

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN: Reoli

COMMENTS: _____

0	—	—	—	—
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	—	—	—	—
5	—	—	—	—
6	—	—	—	—
7	—	—	—	—
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13	—	—	—	—
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17	—	—	—	—
18	—	—	—	—
19	—	—	—	—
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36	—	—	—	—
37	—	—	—	—
38	—	—	—	—
39	—	—	—	—
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41	—	—	—	—
42	—	—	—	—
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52	—	—	—	—
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54	—	—	—	—
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56	—	—	—	—
57	—	—	—	—
58	—	—	—	—
59	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clarton

OBSERVATION: START TIME: 12:33

END TIME: 1:33

OBSERVATION POINT:

Walbush employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-14

HEIGHT: 200'

WIND:

SPEED: 8 mph

DIRECTION: South

TEMPERATURE: 47°

SKY CONDITION: Clear, Sunny

BACKGROUND: SKY

READING CONDITIONS: Good

COLOR OF EMISSION: ---

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN: Reoli

COMMENTS: ---

0	—	—	—	—
1	—	—	—	—
2	—	—	—	—
3	—	—	—	—
4	—	—	—	—
5	—	—	—	—
6	—	—	—	—
7	—	—	—	—
8	—	—	—	—
9	—	—	—	—
10	—	—	—	—
11	—	—	—	—
12	—	—	—	—
13	—	—	—	—
14	—	—	—	—
15	—	—	—	—
16	—	—	—	—
17	—	—	—	—
18	—	—	—	—
19	—	—	—	—
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34	—	—	—	—
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36	—	—	—	—
37	—	—	—	—
38	—	—	—	—
39	—	—	—	—
40	—	—	—	—
41	—	—	—	—
42	—	—	—	—
43	—	—	—	—
44	—	—	—	—
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56	—	—	—	—
57	—	—	—	—
58	—	—	—	—
59	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clinton

OBSERVATION: START TIME: 1:33

END TIME: 2:33

OBSERVATION POINT:

Walbash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-4

HEIGHT: 200'

WIND:

SPEED: 8mph

DIRECTION: South

TEMPERATURE: 50°

SKY CONDITION: Sunny, clear

BACKGROUND: sky

READING CONDITIONS: Good

COLOR OF EMISSION: Black

TOTAL No. OF READINGS: 240

No. READINGS $\geq$ 20% 34

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 40%

CREW: FOREMAN: Redli

COMMENTS:

19 Stack Test

0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	10	15	15
6	20	25	25	30
7	30	35	35	40
8	30	30	30	35
9	25	35	35	40
10	40	40	35	35
11	35	35	30	30
12	30	30	25	25
13	25	25	30	30
14	30	20	10	10
15	10	15	15	15
16	15	15	10	5
17	5	5	5	5
18	5	5	5	5
19	5	5	5	5
20	5	5	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0

30	0	0	0	0
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	5
35	5	10	5	5
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clanton

OBSERVATION: START TIME: 2:33

END TIME: 3:25

OBSERVATION POINT:

Walbash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-14

HEIGHT: 200'

WIND:

SPEED: 8 mph

DIRECTION: South

TEMPERATURE: 51°

SKY CONDITION: Sunny - Clear

BACKGROUND: sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 228

No. READINGS $\geq$ 20% 0

No. READINGS $\geq$ 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN: Redli

COMMENTS:

19 Stack test

0	—	—	—	—
1	—	—	—	—
2	—	—	—	—
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