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.

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 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 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.

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3000 TECH CENTER DRIVE
MONROEVILLE, PA 15146

	NAME	DATE
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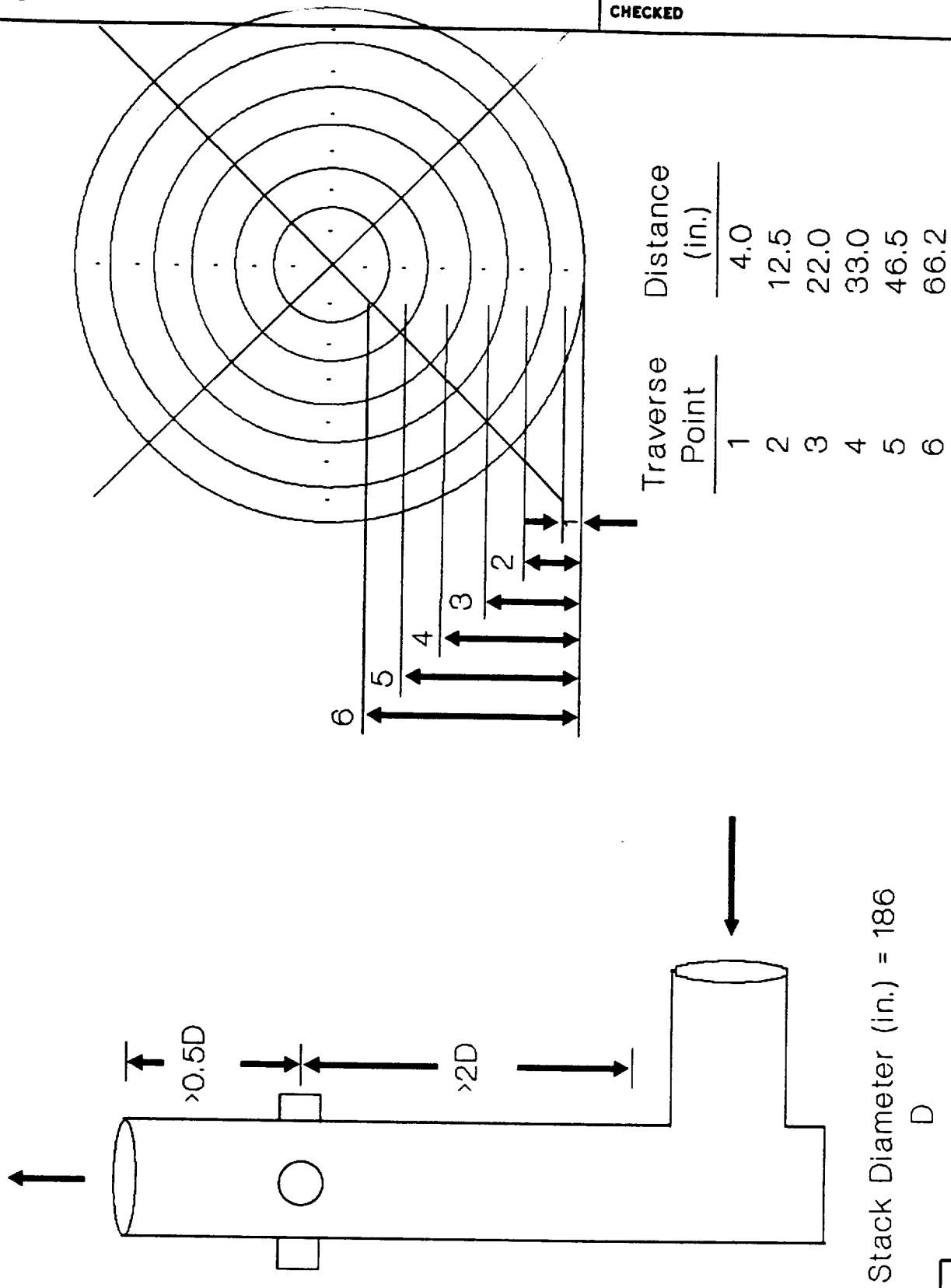

Traverse Point	Distance (in.)
1	4.0
2	12.5
3	22.0
4	33.0
5	46.5
6	66.2

ACTIVITY No.

REVISION

TITLE Schematic Diagram of the Stack and Traverse Points

Figure 2-1
2-1a

RD-197 REV. 2 #17-0483 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 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.

Should be #19

As promulgated by the Amended Mon Valley Consent Decree, Paragraph V.A.(6), the particulate matter standard for #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

EMISSIONS	TEST #1	TEST #2	TEST #3	AVERAGE
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. (^{o}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

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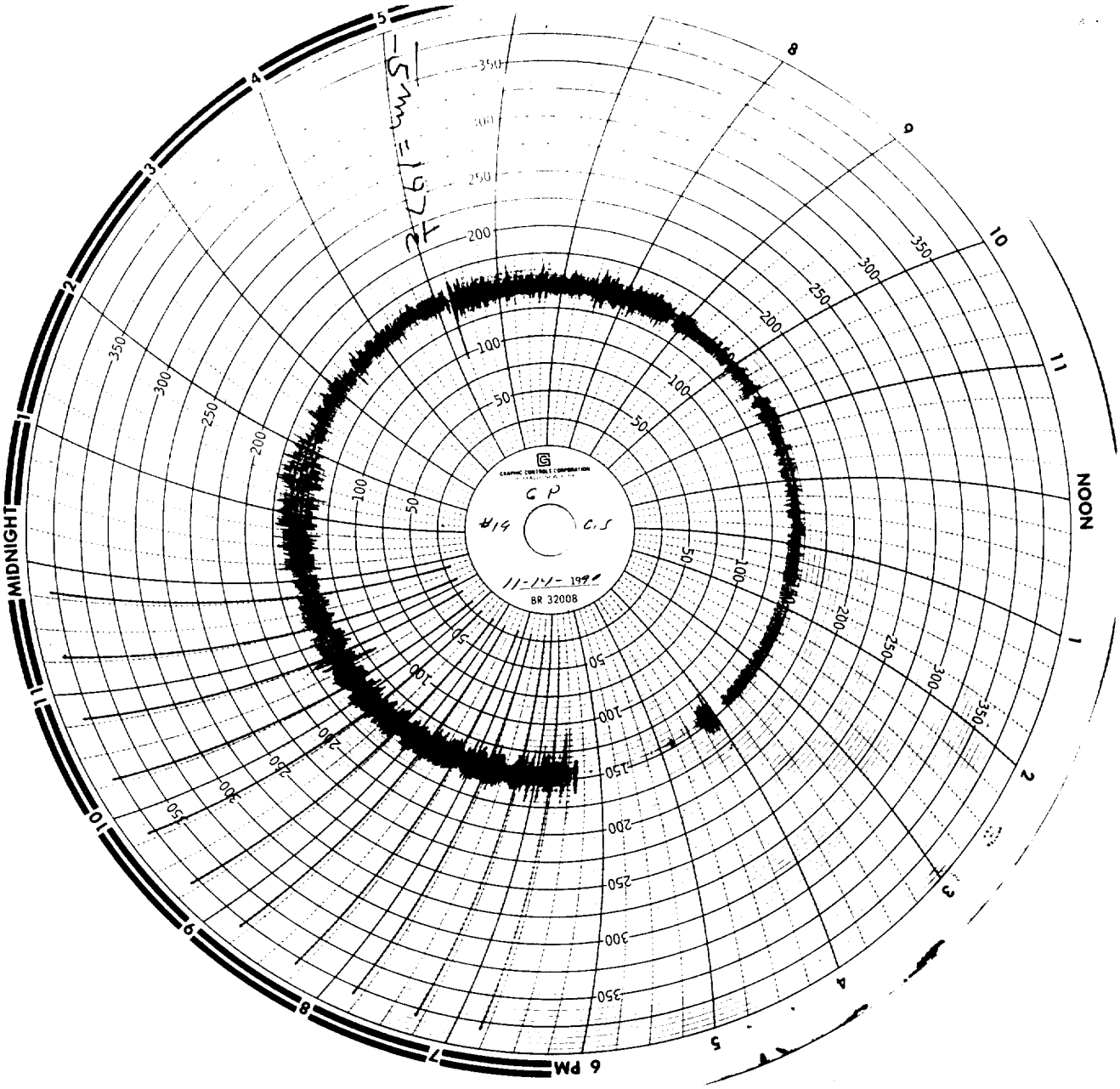
ENVIRONMENTAL RESOURCES INC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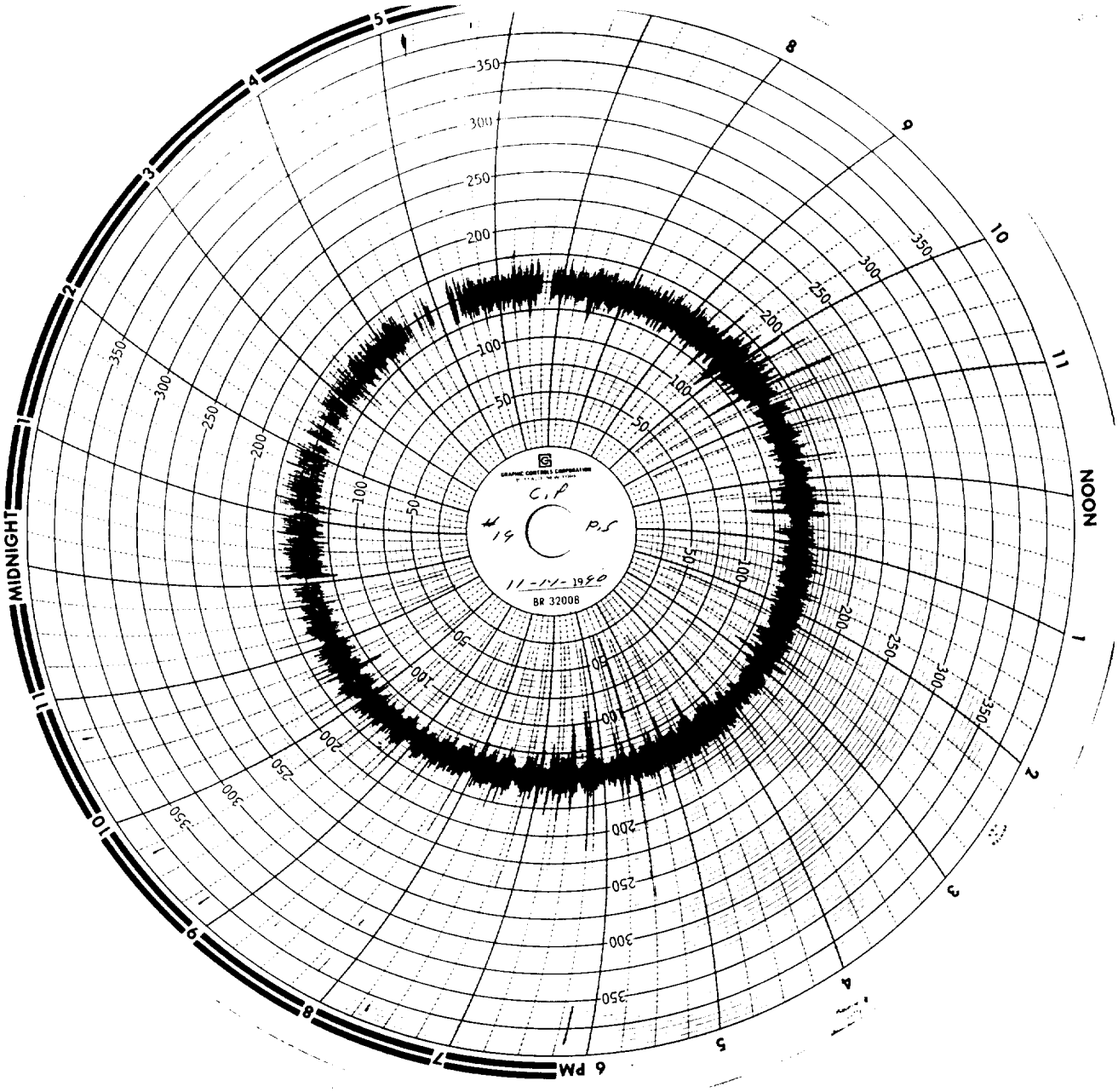
GRAPHIC CONTROLS CORPORATION
BR 32008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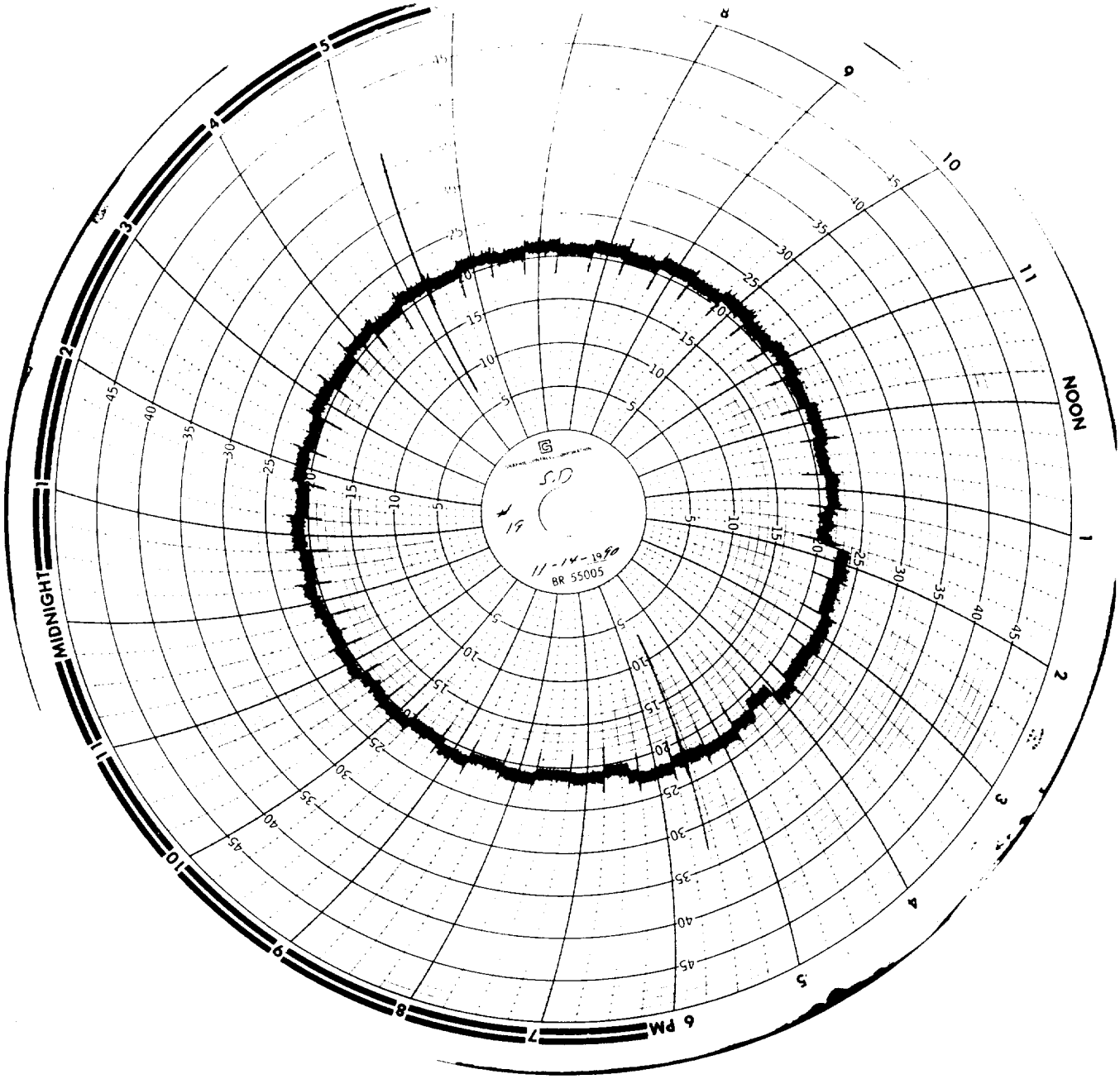
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S.D
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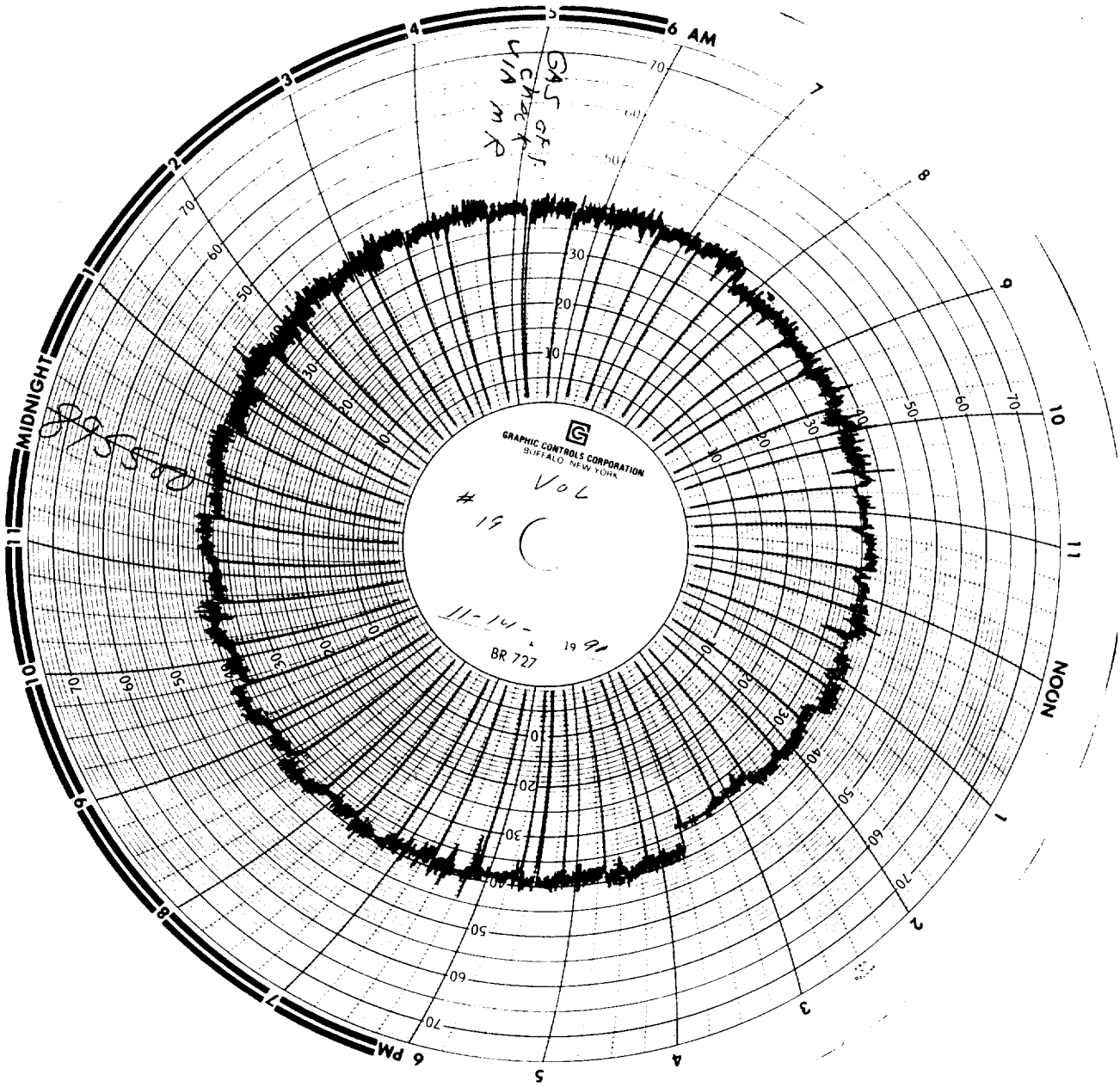
BR 55005


MIDNIGHT
AM
NOON
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GRAPHIC CONTROLS CORPORATION
BUFFALO NEW YORK
BR 727

PUSHING SCHEDULE FOR BATTERIES 19/20

SEQ #	PUSH	CHARGE	STATION	EARLIEST	DESIRED	LATEST
1	C15/17	C13/19		10:45	11: 0	11:20
2	C15/20	C13/20		10:51	11: 6	11:26
3	A 1/19	A15/19		10:58	11:13	11:33
4	A17/19	A15/20		11: 4	11:19	11:39
5	A17/20	B15/19		11:11	11:26	11:46
6	B17/19	B15/20		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: 6
9	C17/20	A 1/19		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: 5	12:25
12	A29/20	B17/19		11:57	12:12	12:32
13	B19/19	B17/20		12: 3	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: 5
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	B19/20		12:49	1: 4	1:24
21	C21/19	C19/19		12:56	1:11	1:31
22	C21/20	C19/20		1: 3	1:18	1:38
23	A23/19	A21/19		1: 9	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: 4
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: 4	2:24
30	A25/20	A23/20		1:55	2:10	2:30
31	B25/19	B23/19		2: 2	2:17	2:37
32	B25/20	B23/20		2: 8	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	A 2/19	A25/19		2:28	2:43	3: 3
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: 3	3:23
39	C27/19	C25/19		2:54	3: 9	3:29
40	C27/20	C25/20		3: 1	3:16	3:36
41	A29/19	A 2/19		3: 8	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	B27/20		3:27	3:42	4: 2
45	C29/19	C27/19		3:34	3:49	4: 9
46	C29/20	C27/20		3:40	3:55	4:15
47	A 2/20	A29/19		3:47	4: 2	4:22
48	B 2/19	B29/19		3:54	4: 9	4:29
49	B 2/20	B29/20		4: 0	4:15	4:35
50	C 2/19	C10/19		4: 7	4:22	4:42
51	C 2/20	C29/19		4:13	4:28	4:48
52	A 4/20	C29/20		4:20	4:35	4:55
53	B 4/19	A 2/20		4:26	4:41	5: 1
54	B 4/20	B 2/19		4:33	4:48	5: 8
55	C 4/19	B 2/20		4:40	4:55	5:15
56	C 4/20	C 2/19		4:46	5: 1	5:21
57	A 6/19	C 2/20		4:53	5: 8	5:28
58	A 6/20	A 4/20		4:59	5:14	5:34
59	B 6/19	B 4/19		5: 6	5:21	5:41
60	B 6/20	B 4/20		5:12	5:27	5:47
61	C 6/19	C 4/19		5:19	5:34	5:54
62	C 6/20	C 4/20		5:26	5:41	6: 1
63	A 8/19	A 6/19		5:32	5:47	6: 7
64	A 8/20	A 6/20		5:39	5:54	6:14
65	B 8/19	B 6/19		5:45	6: 0	6:20
66	B 8/20	B 6/20		5:52	6: 7	6:27
67	C 8/17	C 6/19		5:58	6:13	6:33
68	C 8/20	C 6/20		6: 5	6:20	6:40
69	A10/19	A 8/19		6:12	6:27	6:47
70	A10/20	A 8/20		6:18	6:33	6:53
71	B10/19	B 8/19		6:25	6:40	7: 0
72	B10/20	B 8/20		6:31	6:46	7: 6
73	C10/20	C 8/19		6:38	6:53	7:10

WED NOV 14 1990 11X 7 TURN

-A27/20 + A1/19W17
-A29/20 + A2/19W27
-A2/19 + A29/20W19
-A4/19 + C10/19W29
-C10/19

PUSHING SCHEDULE FOR [illegible]

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

WED NOV 14 1990 7X 3 TURN

Pass up C10/19 - A20/20 - 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	B 9/19	B 7/19		3:17	3:32	3:52
7	B 7/20	B 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	B11/19	B 9/19		3:57	4:12	4:32
13	B11/20	B 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	B13/19	B11/20		4:43	4:58	5:18
20	B13/20	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	B15/19	B13/19		5:22	5:37	5:57
26	B15/20	B13/20		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
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31	B17/19	B15/19		6: 2	6:17	6:37
32	B17/20	B15/20		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	B17/19		6:41	6:56	7:16
38	B19/19	B17/20		6:48	7: 3	7:23
39	B17/20	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	B21/19	B19/19		7:27	7:42	8: 2
45	B21/20	B19/20		7:34	7:47	8: 9
46	C21/19	C19/19		7:40	7:55	8:15
47	C28/17	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	B21/19		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	B25/20	B23/20		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	B27/19	A25/20		9:26	9:41	10: 1
63	B27/20	B25/19		9:32	9:47	10: 7
64	C27/19	B25/20		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	B29/20	B27/19		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	B 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

$-A\frac{27}{20} - A\frac{29}{20} - A\frac{2}{19}$

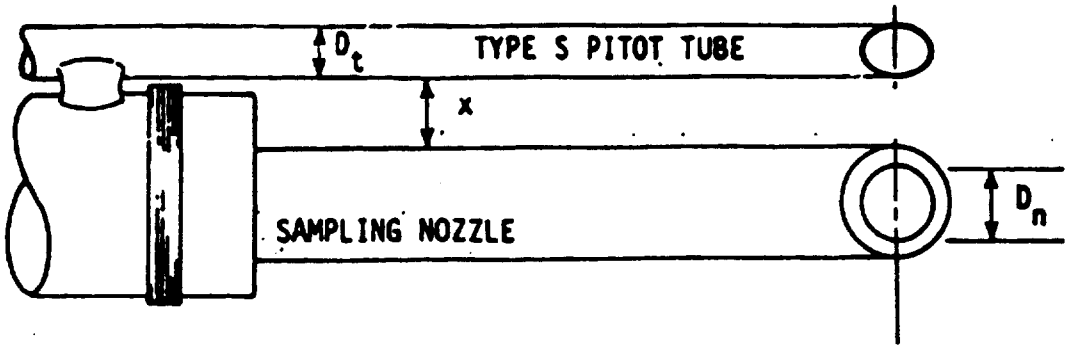
$+A\frac{26}{5A}$ w 13 $+A\frac{5}{19}$ w 19 $+C\frac{28}{19}$ w 21

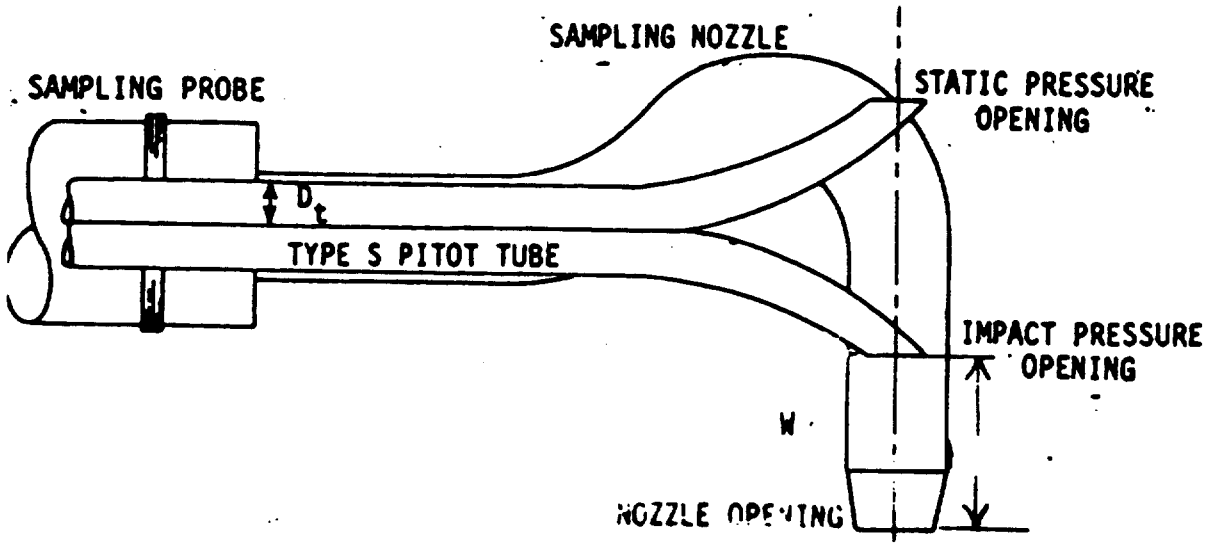
USS CLAIRTON WORKS
RESULTS OF THE
COMPLIANCE DEMONSTRATION
OF THE #19 BATTERY COMBUSTION STACK

APPENDIX B

PRE-TEST AND POST-TEST CALIBRATION AND AUDIT RESULTS

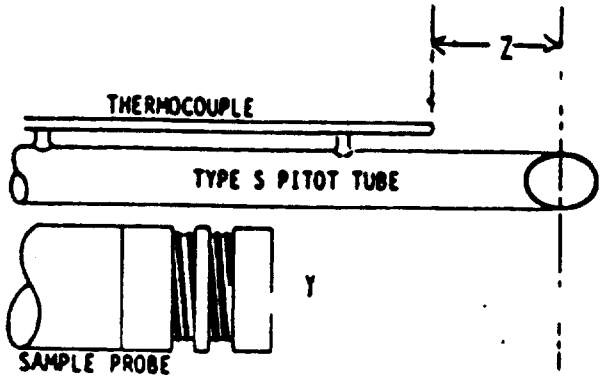
KEYSTONE
ENVIRONMENTAL RESOURCES, INC





D_n = Nozzle diameter

D_t = 3/16 to 3/8"



$W \geq 0$

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

$Y \geq 3"$

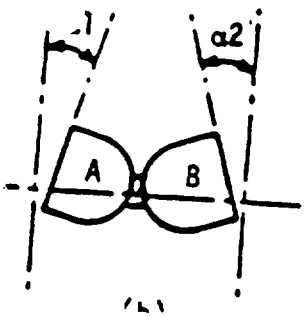
$Z \geq 2"$

GEOMETRIC PITOT CALIBRATION

Date 11-12-90

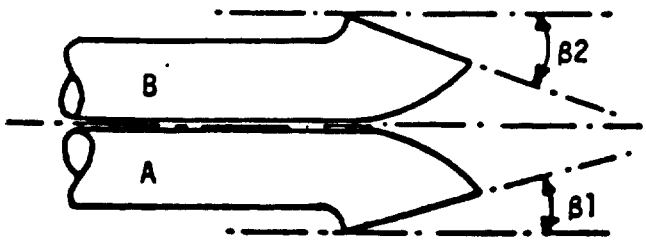
Initials [illegible]

pre-test

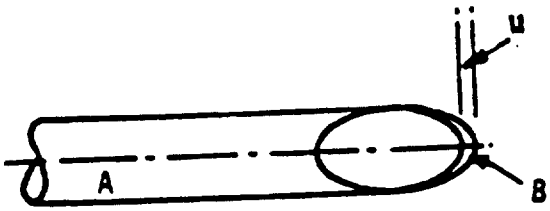


α1, α2 <10°

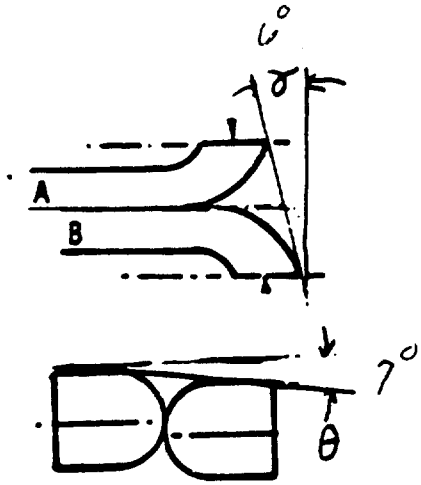
α1 = 2°
α2 = 4°
β1 = 4°
β2 = 2°
A = .91
μ = .95
V = .111
W = ≥0
X = .945
Y = ≥3"
Z = >2"
D_t = .375



β1, β2 <5



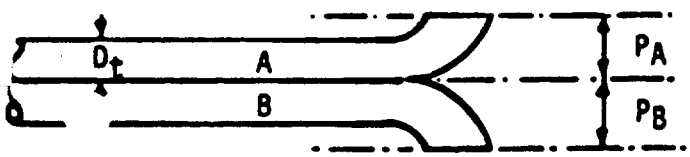
(f)



μ = A SIN γ 6°

V = A SIN θ 7°

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 TJM

post-test

α1 = 3°

α2 = 4°

β1 = 7°

β2 = 1°

A = .733

μ = .081

V = .016

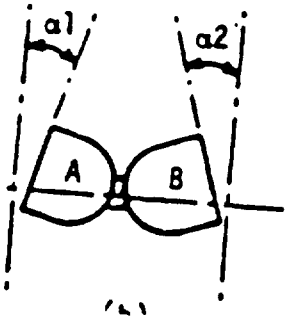
W = ≥0

X = .792

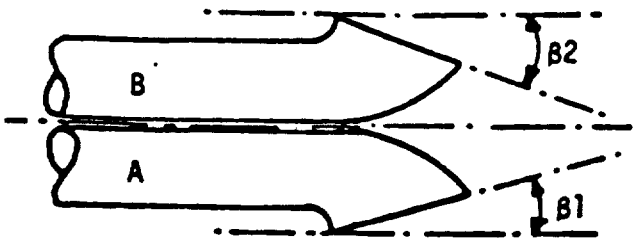
Y = ≥3"

Z = ≥2"

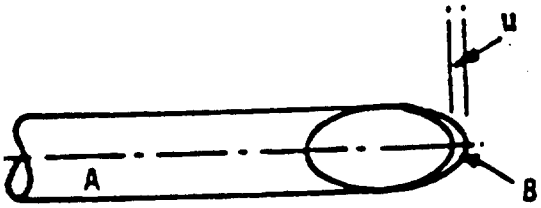
D_t = .375



α1, α2 <10°



β1, β2 <5



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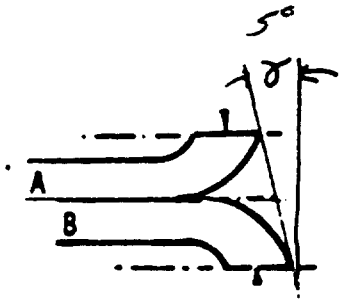
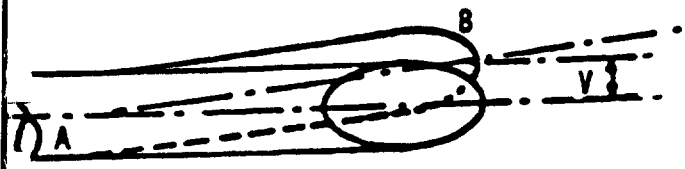
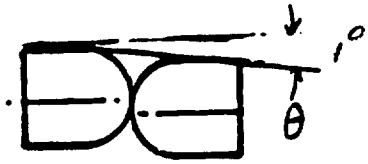


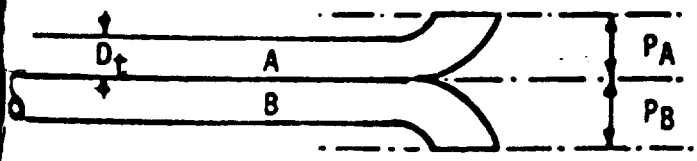
μ = A SIN γ 5°

V = A SIN θ 1°





A-SIDE PLANE



B-SIDE PLANE

0.394 0.583

$1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

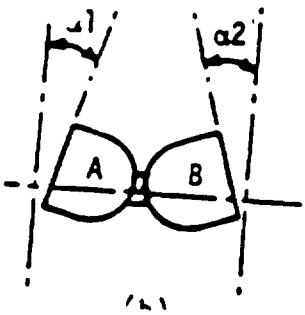
$2.10\ D_t < A < 3.00\ D_t$

0.788 1.125

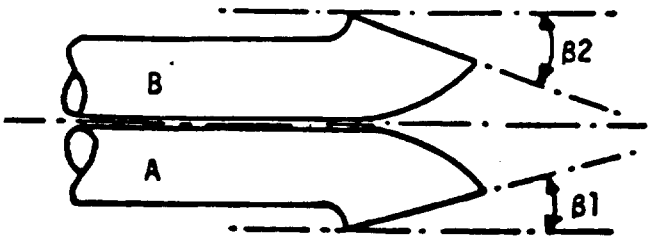
GEOMETRIC PITOT CALIBRATION

Probe No. 10-0
Date 11-12-90
Initials [illegible]
pre-test

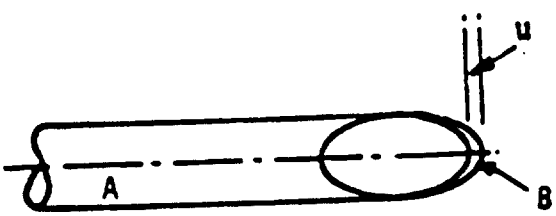
$\alpha 1$ = 6°
$\alpha 2$ = 3°
$\beta 1$ = 3°
$\beta 2$ = 0°
A = .904
μ = .032
V = .016
W = ≥0
X = .981
Y = ≥3
Z = ≥2
D_t = .370



$\alpha 1, \alpha 2 < 10°$



$\beta 1, \beta 2 < 5$



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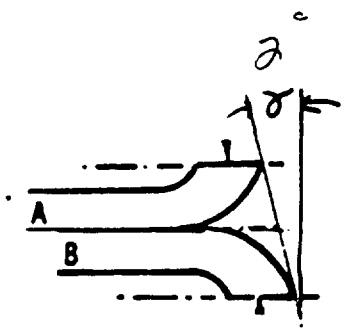
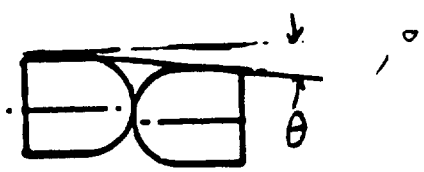
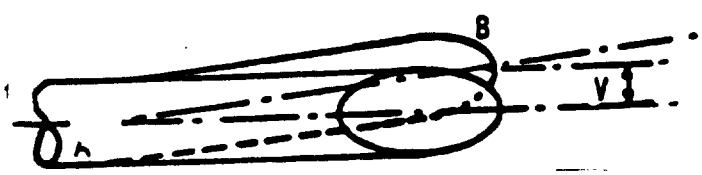


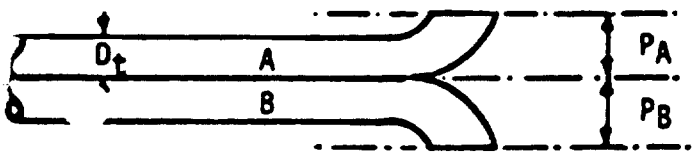
$\mu = A \sin \gamma \cdot 2°$

$V = A \sin \theta 1°$





A-SIDE PLANE



B-SIDE PLANE

0.389 0.555

$1.05\ D_t < P < 1.50\ D_t$

$P_A = P_B$

$2.10\ D_t < A < 3.00\ D_t$

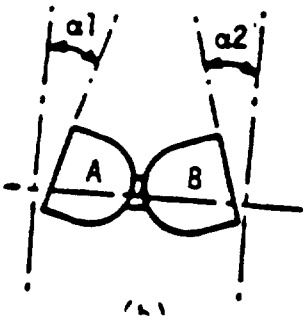
0.777 1.110

GEOMETRIC PITOT CALIBRATION

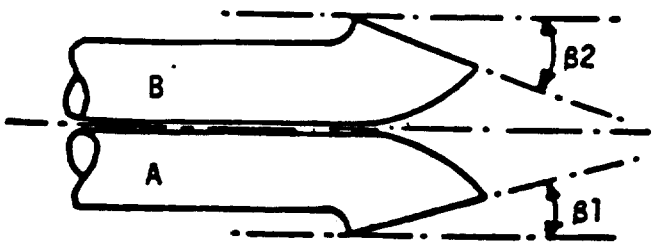
Probe No. 1C-2
Date 12-14-90
Initials TJM

post-test

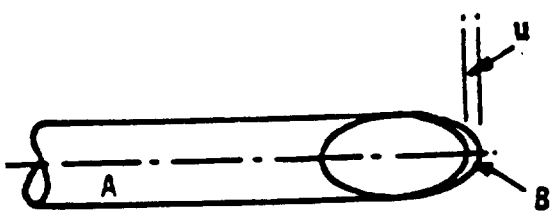
$\alpha 1$ = 6°
$\alpha 2$ = 4°
$\beta 1$ = 2°
$\beta 2$ = 1°
A = .999
μ = .017
V = .017
W = ≥0
X = 1.125
Y = ≥3
Z = ≥2
D_t = .370



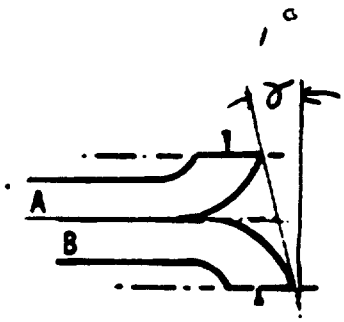
$\alpha 1, \alpha 2 < 10°$



$\beta 1, \beta 2 < 5$

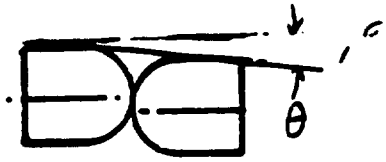


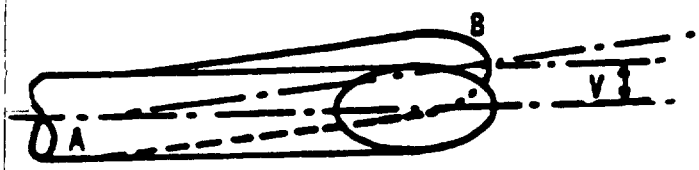
(f)



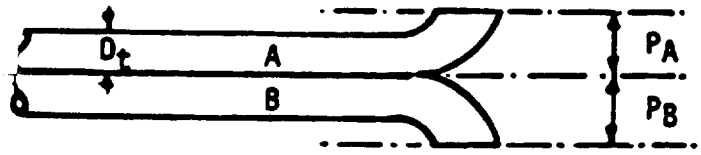
$\mu = A \sin \gamma$ 1°

$V = A \sin \Theta$ 1°





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

CONTROL BOX CALIBRATION

THREE POINT CALIBRATION

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

	WET TEST METER				DRY TEST METER						
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	METER CORRECT Y	ORIFICE COEFFICIENT H@
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

	WET TEST METER				DRY TEST METER						
	TIME (min)	TEMP TW	VOLUME VM	PRESSURE PW	TEMP IN TI	TEMP OUT TO	TEMP AVG TA	ORIFICE PD	VOLUME VD	METER CORRECT Y	ORIFICE COEFFICIENT 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
DRY	300.380	300.520	0.140	10.000	0.000
WET	0.000	0.140	0.140		

PYROMETER CALIBRATION

DATE 04-28-88
OPERATOR AGL

mV input	TEMP F	TEMP READING 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
	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	TEMP F	TEMP READING F
0.18	40	40.0
0.40	50	50.0
0.84	70	70.0
1.29	90	89.0
1.74	110	109.0
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

Name: RICHARD P. CASSELBERRY, SR. Phone: _____

Date 8-06-90 Train ID Box #1 DGM Cal. Factor, Y .9989 Orifice No. BAPC-3

Type of Meter Box NAPP Type of Pump DIAPHRAM

		Example	Run Number 1	2	3
DGM					
Final reading	ft^3	966.461	344.579	351.701	358.845
Initial reading	ft^3	946.602	337.500	344.579	351.701
Difference, V_m	ft^3	9.859	7.079	7.122	7.144
Percent Accuracy, %A					
Inlet/Outlet temperatures					
Initial	°F.	108/88	73/72	75/75	77/76
After 5 minutes		110/88	76/73	78/76	79/77
After 10 minutes		111/88	76/74	78/76	79/78
Final		112/89	76/74	78/77	79/78
Avg. temperature, t_d	°F/°R	99.3/559.3	74.25/534.25	76.6/536.6	77.9/537
Time, θ	min	15.0	15.0	15.0	15.0
Orifice man. rdg., delta H		1.35	.65	.65	.65
Bar. pressure, P_{bar}		29.75	28.75	28.75	28.75
Ambient temperature, t_i	°F/°C	74/23.3	76/24.4	76/24.4	76/24
Pump vacuum	in. Hg	18.8	21.0	21.0	21.0
$V_{m(std)}$'	ft^3	9.2815	6.721	6.734	6.741
DGM cal. factor, Y_c		1.0593	.9989	.9989	.9989
*V_m(std)(M)	m^3	0.2629			

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

Data Sheet

VOLUMETRIC FLOW DEVICE CALCULATION SHEET

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

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

Vm(std)' = (7.079)(.9989)(.988)(.962)

Vm(std)' = 6.721 ft^3 (round to 3 decimals)

Run #2 Vm(std)' = (7.122)(.9989)(.984)(.962)

Vm(std)' = 6.734 ft^3

Run #3 Vm(std)' = (7.144)(.9989)(.982)(.962)

Vm(std)' = 6.741 ft^3

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

Vstd(M) = 6.732 ft^3

(To Be Completed By Auditor)

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

% A = _____ x 100

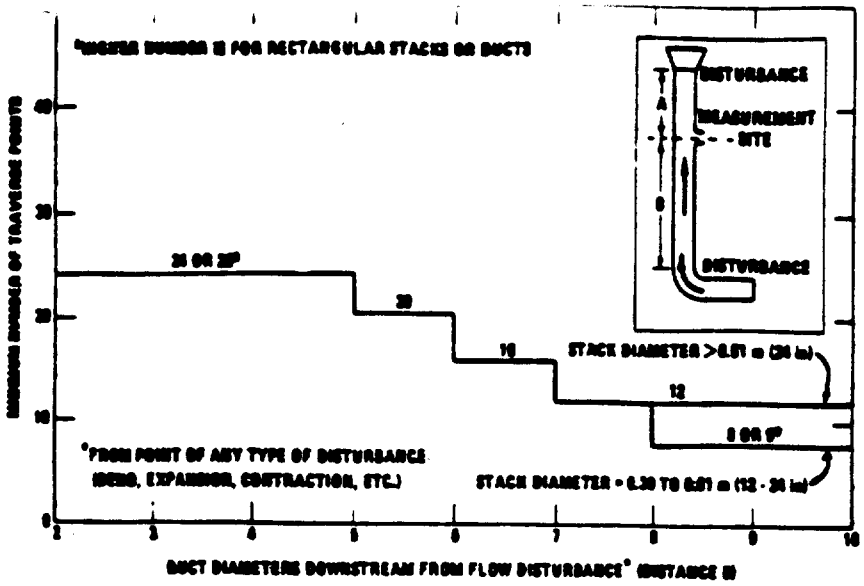
% A = _____ %

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

APPENDIX C

FIELD DATA SHEETS FOR PARTICULATE MATTER EMISSIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC



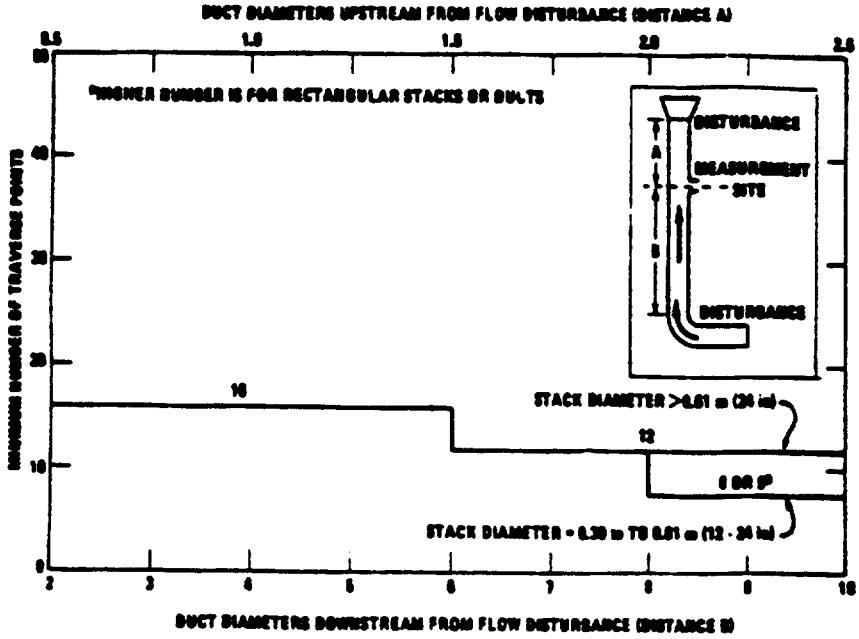


TABLE 1-2. LOCATION OF TRAVERSE POINTS IN CIRCULAR STACKS

[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		83.3	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	26.3	23.6	20.4	18.0	16.1
8				96.8	85.4	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	38.3	32.3
12						97.9	90.1	83.1	76.4	69.4	60.7	38.6
13							94.3	87.5	81.2	75.0	68.5	60.2
14							98.2	91.5	85.4	79.6	73.8	67.7
15								95.1	88.1	83.5	78.2	72.8
16								98.4	92.5	87.1	82.0	77.0
17									95.6	90.3	85.4	80.6
18									98.6	93.3	88.4	83.9
19										96.1	91.3	86.8
20										98.7	94.0	89.5
21											96.5	92.1
22											98.9	94.5
23												96.8
24												98.9

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

Number of traverse points	Matrix layout
9	3x3
12	4x3
16	4x4
20	5x4
25	5x5
30	6x5
36	6x6
42	7x6
49	7x7

37

1-1

B C D
A
plant road

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton Coke Works
LOCATION: #19 Battery Combustion
ACTIVITY NO: Stack
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 11-14-90
TEST NO.: CLR-19CS-1
NOZZLE: # 56 0.429
STATIC PRESSURE Ps: -1.4
PORT DIRECTION: A,B
BAROMETRIC PRESSURE 29.80

ΔH@: 2.047 (10-5-90)
METER CORRECTION: 0.9989
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.: 10-2
FILTER NO.: 503
STACK DIA.: 186"

	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. T_m °F In	Meter Temp. T_m °F Out	Vacuum V_m 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
A	66.2	0833	036.301	0.045	0.76	0.76	50	47	4.0	522	260	<68°F Iced Down	250	5min/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				
B	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	54	2.5	483				

C-2

LEAK CHECK

	in Hg	Rate
Before	5.5	<0.02 cfm
After	5.0	0.018 cfm

ORSAT

	1	2	3
CO_2	4.5		
O_2	11.5		
CO	0		
N	84.0		

100ml H_2O
100ml H_2O
empty
Silica Gel

Impinger No.	Final	Initial	Difference
1	635.6	517.6	18.0
2	567.6	550.0	17.6
3	475.9	474.1	1.8
4	636.2	628.1	8.1
5			

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

RI 837

STACK SAMPLING DATA SHEET

PLANT: USX Clairton Coke Works
LOCATION: #19 Battery Combustion
ACTIVITY NO: Stack
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 11-14-90
TEST NO.: CLR-19CS-1
NOZZLE: #56 0.429
STATIC PRESSURE Ps: -1.4
PORT DIRECTION: C, D
BAROMETRIC PRESSURE 29.80

ΔH@: 2.047 (10-5-90)
METER CORRECTION: 0.9989
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.: 10-2
FILTER NO.: 503
STACK DIA.: 186"

	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., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m 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
C	66.2	0941	056.898	0.030	0.50	0.50	61	57	3.5	479	260	<68°F Iced Down	250	5 min/pt
	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	068.840	0.015	0.26	0.26	66	59	2.5	470				
D	66.2	1020	068.840	0.035	0.60	0.60	65	62	3.5	512				
	46.5			0.055	0.95	0.95	70	62	5.0	515				
	33.0			0.055	0.95	0.95	71	62	5.0	516				
	22.0			0.055	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	083.386	0.035	0.61	0.61	70	63	4.0	469				

LEAK CHECK

	in Hg	Rate
Before		
After		

ORSAT

	1	2	3
CO_2			
O_2			
CO			
N			

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton Coke Works
LOCATION: #19 Battery Combustion
ACTIVITY NO: Stack
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 11-14-90
TEST NO.: CLR-19CS-2
NOZZLE: # 50 0.431
STATIC PRESSURE Ps: -1.4
PORT DIRECTION: D, C
BAROMETRIC PRESSURE 29.80

ΔH@: 2.047 (10-5-90)
METER CORRECTION: 0.9989
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

HOT BOX NO.: 7
COLD BOX NO.: 7
PROBE NO.: 10-1
FILTER NO.: 502
STACK DIA.: 186"

	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. T_m °F In	Meter Temp. T_m °F Out	Vacuum V_m 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
↑	66.2	1101	083.630	0.055	0.98	0.98	69	65	3.0	456	260	<68°F Ice Down	250	5 min/pt
	46.5			0.055	0.98	0.98	74	66	3.0	506				
D	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	098.355	0.020	0.36	0.36	74	67	1.5	487				
↑	66.2	1134	098.355	0.030	0.53	0.53	73	68	2.0	470				
	46.5			0.030	0.53	0.53	76	69	2.0	478				
C	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				

LEAK CHECK

	in Hg	Rate
Before	5.0	<0.02 cfm
After	3.0	0.005 cfm

ORSAT

	1	2	3
CO_2	4.0		
O_2	10.5		
CO	0		
N	85.5		

	Impinger No.	Final	Initial	Difference
100ml H_2O	1	641.5	531.2	110.3
100ml H_2O	2	601.8	582.1	19.7
empty	3	468.3 ~~48.3~~	466.2	2.1
Silica Gel	4	664.6	656.1	8.5
	5			

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton Coke Works
LOCATION: #19 Battery Combustion Stack
ACTIVITY NO:
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 11-14-90
TEST NO.: CLR-19CS-2
NOZZLE: #50 0.431
STATIC PRESSURE Ps: -1.4
PORT DIRECTION: B, A
BAROMETRIC PRESSURE 29.80

ΔH@: 2.047 (10-5-90)
METER CORRECTION: 0.9989
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50' ____

HOT BOX NO.: 7
COLD BOX NO.: 7
PROBE NO.: 10-1
FILTER NO.: 502
STACK DIA.: 186"

	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., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m 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
												<68°F Iced down		5 min/pt
↑	66.2	1207	110.882	0.045	0.83	0.83	77	72	3.0	477	260		250	
	46.5			0.035	0.64	0.64	81	74	2.5	483				
B	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				
A	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				

LEAK CHECK

	in Hg	Rate
Before		
After		

ORSAT

	1	2	3
CO_2			
O_2			
CO			
N			

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton Coke Works
LOCATION: #19 Battery Combustion
ACTIVITY NO: Stack
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 11-14-90
TEST NO.: CLR-19CS-3
NOZZLE: #56 0.429
STATIC PRESSURE Ps: -1.4
PORT DIRECTION: A, B
BAROMETRIC PRESSURE 29.30

ΔH@: 2.047 (10-5-90)
METER CORRECTION: 0.9989
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

HOT BOX NO.: 5
COLD BOX NO.: 5
PROBE NO.: 10-2
FILTER NO.: 495
STACK DIA.: 186"

	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., T_m °F In	Meter Temp., T_m °F Out	Vacuum V_m 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
A	66.2	1318	138.900	0.030	0.54	0.54	75	72	3.5	494	260	<68°F Iced Down	250	5 min/pt
	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				
B	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				

LEAK CHECK

	in Hg	Rate
Before	4.0	<0.02 cfm
After	5.0	0.012

ORSAT

	1	2	3
CO_2	4.0		
O_2	12.0		
CO	0		
N	84.0		

	Impinger No.	Final	Initial	Difference
100ml H_2O	1	662.1	551.8	110.3
100ml H_2O	2	494.2	480.2	14.0
empty	3	417.3	416.1	1.2
Silica Gel	4	670.8	655.9	15.1
	5			

KEYSTONE ENVIRONMENTAL RESOURCES, INC.

STACK SAMPLING DATA SHEET

PLANT: USX Clairton Coke Works
LOCATION: #19 Battery Combustion
ACTIVITY NO: Stack
CONTROL BOX OPERATOR
PROBE HANDLER
CLEAN UP

DATE: 11-14-90
TEST NO.: CLR-19CS-3
NOZZLE: #56 0.429
STATIC PRESSURE Ps: -1.4
PORT DIRECTION: C, D
BAROMETRIC PRESSURE 29.80

ΔH@: 2.047 (10-5-90)
METER CORRECTION: 0.9989
PITOT CORRECTION: 0.84
CONTROL BOX NO.: 1
NOMOGRAPH SET POINT:
LENGTHS OF UMBILICAL ____ x 25' ____ x 50'

HOT BOX NO.: 5
COLD BOX NO.: 5
PROBE NO.: 10-2
FILTER NO.: 495
STACK DIA.: 186"

	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. T_m °F In	Meter Temp. T_m °F Out	Vacuum V_m 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
C	66.2	1423	156.494	0.030	0.54	0.54	81	77	3.0	487	260	268°F Iced Dum	250	5min/pt
	46.5			0.030	0.54	0.54	82	77	3.0	491				
	33.0			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	0.36	0.36	79	73	2.0	473				
D	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				

LEAK CHECK

	in Hg	Rate
Before		
After		

ORSAT

	1	2	3
CO_2			
O_2			
CO			
N			

Impinger No.	Final	Initial	Difference
1			
2			
3			
4			
5			

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

APPENDIX D

PARTICULATE MATTER EMISSIONS CALCULATIONS

KEYSTONE
ENVIRONMENTAL RESOURCES, INC.

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

Activity No. 601050-11

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-19CS-1	Particulate			0.0189				0.0074
CLR-19CS-2	Particulate			0.0161				0.0082
CLR-19CS-3	Particulate			0.0433				0.0258

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

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2. STACK CONDITIONS

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

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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 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
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	

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

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2. STACK CONDITIONS

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

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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 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
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
O2	10.5
CO	.0
N	85.5

IMPINGER NO.	1	110.3
	2	19.7
	3	2.1
	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	
ALL MATLS.	.02430	

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

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2. STACK CONDITIONS

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

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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 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
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
O2	12.0
CO	.0
N	84.0

IMPINGER NO.	1	110.3
	2	14.0
	3	1.2
	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) [85.49*W*SQRT{(J*DELTA P)/(V*F)}]	13.63
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 (J*100*U*29.92)/(528*X*AA*I*F*(1-T/100))	103.20

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

KEYSTONE
ENVIRONMENTAL RESOURCES, INC

VISIBLE EMISSIONS OBSERVATIONS FORM

19 Stack Test

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clinton

OBSERVATION: START TIME: 8:33

END TIME: 9:33

OBSERVATION POINT:

Wabash employee Lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

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 >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 090

CREW: FOREMAN:

COMMENTS:

0	—	—	—	—	30	—	—	—	—
1	—	—	—	—	31	—	—	—	—
2	—	—	—	—	32	—	—	—	—
3	—	—	—	—	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	—	—	—	—

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:

Wabash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

HEIGHT: 200'

WIND:

SPEED: 6mph

DIRECTION: South

TEMPERATURE: 32°

SKY CONDITION: Clear-Sunny

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 090

CREW: ____ FOREMAN: Reoll

COMMENTS:

0	—	—	—	—	30	—	—	—	—
1	—	—	—	—	31	—	—	—	—
2	—	—	—	—	32	—	—	—	—
3	—	—	—	—	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	—	—	—	—

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:

14 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 >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 090.

CREW: ____ FOREMAN: Reoll

COMMENTS:

0	—	—	—	—	30	—	—	—	—
1	—	—	—	—	31	—	—	—	—
2	—	—	—	—	32	—	—	—	—
3	—	—	—	—	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	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clairton

OBSERVATION: START TIME: 11:33

END TIME: 12:33

OBSERVATION POINT:

Wabash employee lot

SOURCE:

DISTANCE: 300

DIRECTION FROM: S-W

HEIGHT: 200

WIND:

SPEED: 6mph

DIRECTION: South

TEMPERATURE: 44°

SKY CONDITION: Sunny - Clear

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 240

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0%

CREW: ____ FOREMAN: Reoli

COMMENTS:

0	—	—	—	—	30	—	—	—	—
1	—	—	—	—	31	—	—	—	—
2	—	—	—	—	32	—	—	—	—
3	—	—	—	—	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	—	—	—	—

VISIBLE EMISSIONS OBSERVATIONS FORM

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clinton

OBSERVATION: START TIME: 12:33

END TIME: 1:33

OBSERVATION POINT:

Wabash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

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 >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 0%

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: Clairton

OBSERVATION: START TIME: 1:33

END TIME: 2:33

OBSERVATION POINT:

Wabash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

HEIGHT: 200'

B-3

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 >= 20% 34

No. READINGS >= 60% 0

GREATEST OPACITY: 40%

CREW: ____ FOREMAN: Redl

COMMENTS:

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	35	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

19 stack test

OBSERVER: Spiker

DATE: 11-14-90

FACILITY: Clairton

OBSERVATION: START TIME: 2:33

END TIME: 3:25

OBSERVATION POINT:

Wabash employee lot

SOURCE:

DISTANCE: 300'

DIRECTION FROM: S-W

HEIGHT: 200'

WIND:

SPEED: 8mph

DIRECTION: South

TEMPERATURE: 51°

SKY CONDITION: Sunny - Clear

BACKGROUND: Sky

READING CONDITIONS: Good

COLOR OF EMISSION: —

TOTAL No. OF READINGS: 228

No. READINGS >= 20% 0

No. READINGS >= 60% 0

GREATEST OPACITY: 090

CREW: ____ FOREMAN: Redli

COMMENTS:

0	—	—	—	—	30	—	—	—	—
1	—	—	—	—	31	—	—	—	—
2	—	—	—	—	32	—	—	—	—
3	—	—	—	—	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				